SESSIONAL PAPERS

VOLUME 11

SECOND SESSION OF THE TENTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1906

VOLUME XL

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4a. Further Supplementary Estimates for the year ending 30th June, 1906. Presented 20th April, 1906, by Hon. W. S. Fielding ....*Printed for both distribution and sessional papers.*

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5a. Supplementary Estimates for the nine months ending 31st March, 1907. Presented 20th June, 1906, by Hon. W. S. Fielding..........*Printed for both distribution and sessional papers.*

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19d. Second Interim Report of the Canadian Section of the International Waterways Commission. Presented 4th May, 1906, by Hon. C. S. Hyman. . ....*Printed for both distribution and sessional papers.*

20. Annual Report of the Department of Railways and Canals, for the fiscal year ended 30th June, 1905. Presented 12th March, 1906, by Hon. H. R. Emmerson.
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20b. Railway Statistics of Canada for the year ended 30th June, 1905. Presented 26th April, 1906, by Hon. H. R. Emmerson.... ....*Printed for both distribution and sessional papers.*

21. Report of the Department of Marine and Fisheries (Marine), for the fiscal year ended 30th June, 1905. Presented 9th April, 1906, by Hon. L. P. Brodeur
Printed for both distribution and sessional papers.

21a. Sixth Annual Report of the Geographic Board of Canada, containing all decisions to.
Printed for both distribution and sessional papers.

21b. List of Shipping issued by the Department of Marine and Fisheries, being a list of vessels on the registry books of Canada, on the 31st December, 1905. Presented 29th May, 1906, by Hon. R. Lemieux.... ....*Printed for both distribution and sessional papers.*

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22. Report of the Department of Marine and Fisheries (Fisheries), for the fiscal year ended 30th June, 1905. Presented 23rd March, 1906, by Hon. S. A. Fisher.
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23. Report of the Harbour Commissioners, etc., 1905....*Printed for both distribution and sessional papers.*

24. Report of the Postmaster General, for the year ended 30th June, 1905. Presented 14th March, 1906, by Hon. A. B. Aylesworth..... ....*Printed for both distribution and sessional papers*

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25. Annual Report of the Department of the Interior, for the fiscal year ended 30th June, 1905. Presented 28th March, 1906, by Hon. W. Paterson......*Printed for both distribution and sessional papers.*

25a. Report of the Surveyor General of Dominion Lands for the year ending 30th June, 1905.
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25b. Report of the Chief Astronomer, for the year ending 30th June, 1905.
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26. Summary Report of the Geological Survey Department for the calendar year 1905.
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26a. Report on the Inspection of Mines. ....*Printed for both distribution and sessional papers*

27. Annual Report of the Department of Indian Affairs, for the fiscal year ended 30th June, 1905. Presented 26th March, 1906, by Hon. F. Oliver.......*Printed for both distribution and sessional papers.*

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77d. Return to an order of the House of Commons, dated 28th May, 1906, for a copy of all correspondence, telegrams and petitions, in possession of the government, or any member or official thereof, in reference to the dismissal of David D. Coffin as postmaster at Head of Hillsboro' in Prince Edward Island, and the appointment of his successor. Presented 4th June, 1906.—*Mr. Martin (Queen's)* *Not printed.*

78. Return to an order of the House of Commons dated 28th March, 1906, for a copy of the report of the deputy postmaster general, that an additional first-class clerkship is necessary for the proper performance of the public business in the department, for which clerkship parliament is asked to vote money; also for a copy of the report of the deputy postmaster general, that an additional second-class clerkship is necessary for the proper performance of the public business in the department, for which clerkship parliament is asked to vote money. Presented 5th April, 1906.—*Mr. Barker.* *Not printed.*

79. Return to an order of the House of Commons, dated 19th March, 1906, for copies of all petitions, letters and correspondence relating to the change of the location of the post office at French Village, Prince Edward Island. Presented 5th April, 1906.—*Mr. McLean (Queen's)*........... *Not printed.*

80. Return to an address of the House of Commons, dated 2nd April, 1906, for copies of all correspondence with the government by any parties in Lethbridge, concerning any matters in connection with the Lethbridge coal miners' strike, and the calling out of the mounted police in connection with the same. Presented 6th April, 1906.—*Mr. Smith (Nanaimo)*.......... *Not printed.*

81. Return to an order of the House of Commons, dated 14th March, 1906, showing the names of all the homestead inspectors at present attached to the thirteen agencies throughout Manitoba and the Northwest, and a record showing the number of days that each inspector was absent from his regular duties, between the 1st of July and the 31st December, 1905, the cause of said absence, and a statement of expenses for each month during that period. Presented 5th April, 1906.—*Mr. McCarthy (Calgary)*.......... *Not printed.*

82. Return to an address of the House of Commons, dated 2nd April, 1906, for a copy of the order in council appointing Mr. W. A. Weeks to investigate certain matters in dispute respecting lands taken by the Prince Edward Island Railway, and certain other matters in dispute connected with that railway; also a copy of the evidence and report of the said W. A. Weeks in the matter. Presented 6th April, 1906.—*Mr. Martin (Queen's)*.......... *Not printed.*

83. Return to an order of the House of Commons, dated 14th March, 1906, for copies of all correspondence had between the government or any department or member thereof, and the Transcontinental Construction Commission, in reference to the surveys of location of the route of the Transcontinental Railway, in the province of New Brunswick. Presented 6th April, 1906.—*Mr. Crocket*.. *Not printed.*

83a. Return to an order of the House of Commons, dated 18th April, 1906, for copies of all correspondence had between the Grand Trunk Pacific Railway Company and the government or any department thereof, and between the Grand Trunk Pacific Railway Company and the Transcontinental Railway Commission, in reference to the survey and location of the proposed Transcontinental Railway between Quebec and Moncton. Presented 1st June, 1906.—*Mr Crocket*.......... *Not printed.*

84. Return to an order of the House of Commons, dated 14th March, 1906, for copies of all forms of application for homestead entries used since the year 1890. Presented 6th April, 1906.—*Mr. Ingram.* *Not printed.*

85. Statement showing the wharfs transferred to the department of marine and fisheries since 1896. Presented 6th April, 1906, by Hon. L. P. Brodeur.......... *Not printed.*

86. Return to an order of the House of Commons, dated 19th March, 1906, (*a*) setting forth the various laws in the United Kingdom, and in the various dependencies and colonies of the Empire, with respect to the naturalization of aliens; (*b*) defining the effect of naturalization consummated in Great Britain, or in the various colonies or dependencies, respectively, when a person so naturalized becomes domiciled thereafter, in any other portion of the Empire; (*c*) setting forth any efforts heretofore made by the government of the United Kingdom, or of any colony or dependency, or by any body or association, for the purpose of securing uniformity in the naturalization laws throughout the Empire. Presented 6th April, 1906.—*Mr. Borden (Carleton).*
"Report of Departmental Committee" printed for Sessional Papers

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87. Copy of a letter addressed to S. G. Curry, Esquire, architect, informing him that, under an order in council, a commission will be to-day issued to him jointly with Mr. A. C. Hutchison, architect, of Montreal, to hold an investigation and to report upon an accident which occurred on the morning of the 5th instant, by the collapse of part of the tower in the west block extension of the departmental buildings in this city. Plans and specifications of the said extension accompany the said letter. Presented 9th April, 1906, by Hon. C. S. Hyman .... *Not printed.*

88. Return to an order of the House of Commons, dated 6th March, 1905, for copies of all reports, returns, estimates, correspondence, writings, records, documents, memoranda, or written or printed information of any kind in the possession or control of the post office department, in reference to the question of establishing rural mail delivery in Canada, or the manner of establishing or conducting such service, and the probable cost; including any information in the possession of the department as to the working of the United States system, or such a service or system elsewhere and the annual expense and other particulars. Presented 9th April, 1906.—*Mr. Lennox.*
Printed for Sessional Papers.

89. Return to an order of the House of Commons, dated 2nd April, 1906, for a copy of all correspondence, letters, telegrams, memorials or other documents, between the post office department, or any official thereof, and any person or persons, respecting the removal of the post office in the town of Thorndale, Ontario, from the place of business of Mr. S. Duffins, to the place of business of Mr. J. Falconer. Presented 9th April, 1906.—*Mr. Elson* .... *Not printed.*

90. Return to an order of the House of Commons, dated 19th March, 1906, showing all timber lands sold or leased by the department of the interior subsequent to the date of those included in Sessional Paper No. 39, brought down to the house on the 12th March, 1906; the description and area of such lots, the applications made therefor, the notice of advertisement for sale or tender, the tenders received, the amount of each tender, the tenders accepted, the name and address of the person or company to whom each lot was sold or leased. Presented 9th April, 1906.—*Mr. Foster* .... *Not printed.*

91. Return to an order of the House of Commons, dated 14th March, 1906, showing: 1. The number of homesteaders to make entry in and for the territory now included in the provinces of Manitoba, Saskatchewan and Alberta, during each year between 1896 and 31st December, 1905. 2. The nationality of said homesteaders, dividing same into the following categories: (*a*) British North America; (*b*) Great Britain and Ireland: (*c*) the United States; (*d*) France, Belgium and Switzerland; (*e*) Germany, Holland, Norway, Sweden, Denmark and Iceland; (*f*) all other countries of continental Europe; (*g*) all other nationalities; (*h*) persons who previously made entry. Presented 9th April, 1906.—*Mr. Wilson (Lennox and Addington)* .... *Not printed.*

91*a*. Return to an order of the House of Commons, dated 14th March, 1906, showing: 1. The number of authorizations granted, under the authority of subsection 3 of article 34 of the Dominion Lands Act, for one person to make homestead entry on behalf of another person, during each of the years of 1901, 1902, 1903, 1904 and 1905. 2. Of the homestead entries made in consequence of said authorizations, during each of the years 1901 and 1902; how many have resulted in a demand for a patent; how many have been cancelled; how many stood upon the books of the department of the interior on 1st January, 1906, as neither patented nor cancelled. 3. How many of the homesteads entered for during 1901 and 1902 on behalf of absent parties by means of powers of attorney, have been patented in the name of the person for whom the original entry was made. Presented 11th April, 1906. *Mr. Lake* .... *Not printed.*

91*b*. Return to an order of the House of Commons, dated 14th March, 1906, showing, in respect of every case where, during the year ending 30th June, 1905, and during the six months ending 31st December, 1905, an extension of time within which to complete his entry, has been accorded any homesteader within the territory now included in the provinces of Manitoba, Saskatchewan and Alberta; giving: (*a*) the name of the applicant for said extension; (*b*) his post office address at the time of original entry; (*c*) the date and agency of original homestead entry; (*d*) the location of the land in question, indicating township, range and section; (*e*) the earliest date at which applicant might have become entitled to secure a patent, had all conditions been promptly fulfilled; (*f*) post office address of applicant at time of demand for extension; (*g*) the date of demand for extension; (*h*) the length of extension granted; (*i*) the cause of granting extension; (*j*) the name or names of any and all parties who may have communicated with the department for the purpose of recommending the granting of said extension; (*k*) the name of the homestead inspector who reported on

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the case, and whether he advised in favour of granting an extension or the contrary ; (*l*) the name and address of any and every person who shall have applied to record a cancellation against said section or part thereof. All the above information to be arranged according to agencies. Presented 11th April, 1906.—*Mr. Ames*............ ....*Not printed.*

91*c*. Return to an order of the House of Commons, dated 14th March, 1906, showing : (*a*) the number of land sales, withdrawing even sections from homestead entry, made by the department of the interior during the year 1904-5, and during the six months ending 31st December, 1905, together with the total acreage represented thereby ; (*b*) the same regarding land sales affecting only odd sections ; (*c*) the same regarding land sales affecting solid blocks of both even and odd sections. Presented 23rd April, 1906.—*Mr. McCarthy (Calgary)*..................................*Not printed.*

91*d*. Return to an order of the House of Commons, dated 14th March, 1906, showing : 1. The number of homestead entries recorded each fiscal year from 1870 to 1905, and also during the six months ending 31st December, 1905, for the territory comprised in the present provinces of Manitoba, Saskatchewan and Alberta. 2. The number and percentage of such entries for each year for which patents have prior to the 31st December, 1905, been granted, or recommendations made for the issue of patents. 3. The number and percentage of such entries for each year that have, prior to the 31st December, 1905, been cancelled. 4. The number and percentage of such entries for each year which, neither patented or cancelled, remained in an incompleted state on the first of January, 1906. Presented 8th June, 1906.—*Mr. Lake*............... ....*Not printed.*

92. Return to an order of the House of Commons, dated 14th March, 1906, showing the name and post office address of each person or company having a closed grazing lease, granted for a period of more than three years, by the department of the interior, of lands in Alberta or Saskatchewan, giving in each instance, (*a*) the location boundaries and area of each tract of land so leased ; (*b*) the date of issue and of expiry of said lease ; (*c*) the annual rental specified therein ; (*d*) and the amount of overdue rental wherever such be the case. Presented 9th April, 1906.—*Mr Ames*.......*Not printed.*

93. Return to an address of the House of Commons, dated 28th March, 1906, for copies of all correspondence, telegrams, memoranda, reports and orders in council, in possession of the government, or any member or official thereof, in connection with the grant of an additional subsidy to the province of Prince Edward Island in 1901, of $30,000 a year, and the basis on which the said subsidy was agreed to be paid to the province. Presented 10th April, 1906.—*Mr. Martin (Queen's)*........*Not printed.*

94. Return to an order of the House of Commons, dated 2nd April, 1906, for copies of all correspondence and contracts, if any, list of payments to men employed by the department of marine and fisheries in construction of Lake Ocebe lighthouse, on the Maganetawan River, district of Parry Sound. Presented 10th April, 1906.—*Mr. Bennett* .... *Not printed.*

95. Return to an address of the House of Commons, dated 17th April, 1906, for copies of orders in council and correspondence having reference to the assumption by the department of railways and canals of the several dams owned by the Ontario government on the head and subsidiary waters of the Trent canal. Presented 17th April, 1906.—*Hon. H. R. Emmerson*..................*Not printed.*

95*a*. Return to an order of the House of Commons, dated 9th April, 1906, showing the progress made and sums expended from time to time upon the construction of the Trent canal, giving the dates of the various contracts let, the completion of said contracts, the names of contractors on said contracts, the amount paid in extras, and the causes of these extras. Presented 26th April, 1906.—*Mr. Hughes (Victoria)*.............................. . ...*Not printed.*

96. Return to an address of the House of Commons, dated 14th March, 1906, for copies of all correspondence between the provincial governments on the subject of the readjustment of provincial subsidies. Presented 17th April, 1906.—*Mr. Parmelee*....... *Printed for both distribution and sessional papers.*

97. Return to an order of the House of Commons, dated 14th March, 1906, for copies of all petitions, reports, letters, notices, telegrams, correspondence, recommendations, bonds, leases, papers and documents in relation to a site and new post office building in the county of Elgin, at Aylmer. Presented 17th April, 1906.—*Mr. Ingram*..................... ....*Not printed.*

98. Return to an order of the House of Commons, dated 28th March, 1906, showing all amounts paid for dredging in the province of Ontario, from the 1st July, 1905, up to the present time ; the place where such work was performed ; the names of parties doing such work, and the amount paid therefor ; also of any unpaid amounts due or alleged to be due for dredging, showing the amount, the parties claiming, and where the work was done. Presented 17th April, 1906.—*Mr. Bennett.* *Not printed.*

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minister or official, and every person or corporation, including the contractor, Mr. Goodwin, and the owners or lessees of the Read, Battery, River Phillip, and other quarries. Presented 1st May, 1906. —*Mr. Perley*...*Not printed.*

129. Return to an order of the House of Commons, dated 9th April, 1906, for a copy of all correspondence and reports relative to the sale of the Giant's Tomb Island, or timber thereon, or to any negotiations with any person or persons for the purchase of said Island or timber thereon, or both. Presented 3rd May, 1906.—*Mr. Bennett*...*Not printed.*

130. Return to an order of the House of Commons, dated 11th April, 1906, for a copy of a certain report or communication to the department of the interior, from C. W. Speers, an officer of that department, dated in or about the month of February, 1901, recommending that 10,000 acres of land, included in or situate near the land afterwards sold by the government to Colonel A. D. Davidson and his associates should be broken at the expense of the government, to establish the fact that grain could be produced in that district; also for a copy of the map submitted therewith; also for a copy of all reports, letters and communications to the said department, up to the 24th day of May, 1902, respecting the quality or value of the said lands, mentioned in the order in council of that date. Presented 3rd May, 1906.—*Mr. Barker*...*Not printed.*

130*a*. Supplementary return to No. 130. Presented 11th May, 1906.......................*Not printed.*

131. Return to an order of the House of Commons, dated 14th March, 1906, showing the amount of money scrip redeemed in Dominion lands, and the number of acres thus purchased from the government, (*a*) in Manitoba; (*b*) in the Northwest, the figures for each year from 1875 to 31st December, 1905, being given separately. Presented 3rd May, 1906.—*Mr. Roche (Marquette)*......*Not printed.*

132. Return to an order of the House of Commons, dated 21st March 1906, of all the valuations made in or previously to the year 1902, of the lands sold or granted in that year to the Saskatchewan Valley Land Company. Presented 3rd May, 1906.—*Mr. Borden (Carleton)*.........*Not printed.*

133. Return to an order of the House of Commons, dated 14th March, 1906, showing: 1. The number of allotments of 240 acres of land, and acreage covered by the same, made between the 1st of July, 1896, and the 31st of December, 1905, to the half-breeds of Manitoba, giving separately the figures for each year, and for the final six months. 2. The land scrip, if any, issued during the aforesaid period to colonization companies, giving in the case of each such company the name and head office address, and also giving the face value of such scrip and the year of its issuance. 3. The number and acreage of land scrip issued during the same period, to the half-breeds of the Northwest (now Alberta and Saskatchewan), giving separately the figures for each year and for the final six months. 4. The number of acres of land scrip located within the limit of each of the thirteen Dominion land agencies of Manitoba and the Northwest, between the 1st of July, 1896, and the 31st of December, 1905, the figures of each agency each year to be given separately. 5. The number of acreage of land scrip granted prior to 1st July, 1896, to the half-breeds (*a*) in Manitoba and (*b*) of the Northwest. 6. The amount outstanding, granted but not located, on 1st July, 1896. Presented 3rd May, 1906.—*Mr. Roche (Marquette)*...*Not printed.*

134. Return to an order of the House of Commons, dated 14th March, 1906, showing: (1) The total number of acres of land within the present limits of Manitoba, Saskatchewan and Alberta, voted by parliament to railway companies. 2. The area of said lands in respect of which the time by law specified for earning the same has elapsed. 3. The area of said lands (*a*) which has been earned, selected and patented; (*b*) which has been earned and selected, but not patented; (*c*) which has been earned but neither selected nor patented. 4. The area of land which may yet be earned by any railway company, indicating the name of the company, and the amount of subsidy possible. 5. In the case of each of the following roads, the Canadian Northern Railway Company, the Manitoba and Southeastern Railway Company, and the Qu'Appelle, Long Lake and Saskatchewan Railway Company, (*a*) the quantity of land which may yet be earned; (*b*) the quantity earned but not patented; (*c*) the extent, location (giving township and range), and boundaries of the reserved territory wherein each of the remaining selections may be made. 6. The several orders in council by virtue of which the area of selection affecting the companies mentioned in paragraph 5 were indicated, and any amendments of the same. The whole of the above information to be brought up to 1st January, 1906. Presented 3rd May, 1906.—*Mr. Ames*...*Not printed.*

135. Return to an order of the House of Commons, dated 11th April, 1906, for a copy of any and all proposals or requests made by or on behalf of A. D. Davidson, his associates, or any of them, for

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purchase or acquisition of lands from the government or any department thereof, and particularly the proposal referred to in Sessional Paper 132*a*, 1893, page 159, being order in council. approved 24th May, 1902, and of all correspondence and other papers in any wise relating to said proposal or proposals. Also for a copy of any and all recommendations of any such proposals or dealing therewith, made by the commissioner of immigration, or general colonization agent, or either of them, referred to in said order in council. together with all correspondence and other papers in any wise relating to such recommendations. Also for a copy of any and all acceptance and acceptances, consent and consents in writing. by or on behalf of said A. D. Davidson, or associates, or any of them; of or to the terms of disposal of lands, set out in said order in council, and bearing numbers one to nine, both inclusive, or of or to any of such terms, together with all correspondence and other papers, in any wise relating to such acceptance or consent. Also for a copy of any and all agreement and agreements in writing, at any time made by the government, or any department thereof, with said A. D. Davidson, and associates, or any of them, for sale of lands, based on said order in council, approved 24th May, 1903, or on any modification thereof, together with all correspondence and other papers in any wise relating to such agreement or agreements. Presented 3rd May, 1906.—*Mr. Alcorn*.......................... ....*Not printed.*

136. Return to an address of the House of Commons, dated 2nd April, 1906, for copies of (*a*) all plans showing proposals of any railway or other corporation, or person, or association of persons, for and with regard to expropriation of Whitefish Island, in St. Mary's River, Ontario, or of portions thereof, and of water or land covered by water, surrounding the same; (*b*) of all correspondence between this government and the government of the province of Ontario, or any department thereof, and with any other person, firm or corporation, relating thereto, and of all reports, decisions, or findings upon such applications or proposals; (*c*) of all reports of and correspondence with the International Waterways Commission, with respect to erection, maintenance or alteration of dams, water-powers, and other works or erections in St. Mary's River. Presented 3rd May, 1906.—*Mr. Boyce.* *Not printed.*

137. Return to an order of the House of Commons, dated 25th April, 1906, showing imports and exports between United States and Canada for the last fiscal year, on the following agricultural products, showing Canadian duty and United States duty, also showing any of the following articles, and amount admitted free between United States and Canada: tobacco, corn, potatoes, barley, beans, oats, hay, eggs, fowls, butter, pork, beef, vegetables, apples, wood, cattle, hogs, sheep, horses, hay, canned vegetables, canned fruits, evaporated and dried apples, lard, hides and cheese. Presented 3rd May, 1906.—*Mr. Clements*... ....*Not printed.*

138. Return to an address of the House of Commons, dated 23rd April, 1906, for a copy of all orders in council, reports, correspondence, documents and papers, relating to the proposed sale, grant or disposal by the government of any lands in the province of Alberta, or in the province of Saskatchewan, to a syndicate or company in which Messieurs M. A. Walsh, E. C. Walsh, E. G. Walsh, of Clinton, Ohio; A. W. Carrol, Charles Maher, of Iowa, and J. Brown of Neepawa, Manitoba, or any or either of them are interested, or which they or any or either of them, or any person or persons on their behalf, are promoting. Presented 7th May, 1906.—*Mr. McCarthy, (Calgary).* *Not printed.*

139. Return to an order of the House of Commons, dated 18th April, 1906, for a copy of all letters, correspondence and communications between the minister of the interior or any department of the government and the superintendent under the Children's Protection Act of British Columbia, respecting the sale and slavery in British Columbia of young girls for immoral purposes; also a copy of all reports and communications from the agents of the Indian department in British Columbia, with respect to the matters aforesaid, and all replies or communications from the department to such agents. Presented 7th May, 1906,—*Mr. Borden (Carleton)*.....................*Not printed.*

140. Return to an order of the House of Commons, dated 14th March, 1906, showing: 1. The number of allotments of land scrip and the total acreage covered thereby, made to half-breeds *(a)* in Manitoba, and *(b)* in the Northwest, between 1st July, 1904, and 31st December, 1905. 2. The number of land warrants, if any, and the acreage covered thereby, issued for military services within the same period. 3. The number of scrip, if any, and the acreage covered thereby, issued to the Northwest Mounted Police within the same period. 4. The number and acreage of all the above outstanding on the 31st December, 1905. All the above information being required in order to bring the information contained in Sessional Paper No. 67*d*, brought down the 13th July, 1904, up to the end of the last calendar yea Presented 7th May, 1906.—*Mr. Roche (Marquette)*..........*Not printed.*

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156. Correspondence, &c., relative to the mining rights underlying the surface of the lands as may be required for the right of way, station grounds, &c., of the Western Division of the Grand Trunk Pacific Railway. Presented 22nd May, 1906, by Hon. F. Oliver.................. *Not printed.*

157. Return to an order of the House of Commons, dated 30th April, 1906, for a copy of all correspondence, letters, papers, lease or leases, relative to the leasing of the Blood Indian Reserve, in the province of Alberta, to the McEwan Cattle Company, of Brandon, or any other person or persons. Presented 23rd May, 1906.—*Mr. Sproule*.................. *Not printed.*

158. Return to an address of the House of Commons, dated 18th April, 1906, for a copy of an order in council passed on or about the 27th July, 1900, *re* certain lands in Alberta and Arthabasca, referred to in a question asked the government by Mr. Lefurgey on 9th April, instant, together with official plan or map showing lands referred to, and all other correspondence and papers in reference thereto, between the government or any person acting on its behalf, and others, up to the present time. Presented 23rd May, 1906.—*Mr. Lefurgey*.................. *Not printed.*

159. Record of accidents and casualties investigated by the Board of Railway Commissioners, for the year ending 30th June, 1905. Presented 28th May, 1906, by Hon. W. S. Fielding..... *Not printed.*

160. Return to an order of the House of Commons, dated 9th May, 1906, showing the freight rates in force last year on the Prince Edward Island Railway, and the tariff in force on 1st April, 1906, for local traffic; also a statement of the proportion of through freight rates on the Intercolonial Railway carloads of grain for export from Montreal to St. John, New Brunswick, Halifax, Nova Scotia, and Sydney, Cape Breton, giving the several distances and the through freight rates charged on grain in carloads from Tignish, Prince Edward Island, to St. John, New Brunswick, Halifax, Nova Scotia, and Sydney, Cape Breton, by Prince Edward Island Railway, government winter boats and Intercolonial Railway, showing the several distances. Presented 29th May, 1906.—*Mr. Lefurgey.* *Not printed.*

161. Report of the commissioners appointed to hold an investigation and report upon the accident which occurred on the 5th April, 1906, by the collapse of part of the tower on the west block extension of the departmental buildings. Presented 29th May, 1906, by Hon. C. S. Hyman. *Printed for both distribution and sessional papers.*

161*a*. The evidence taken before the commissioners appointed to hold an investigation and report upon the accident which occurred on the 5th April, 1906, by the collapse of part of the tower on the west block extension of the departmental buildings. Presented 19th June, 1906, by Hon. C. S. Hyman. *Not printed.*

161*b*. Correspondence in relation to the west block extension and the collapse of the tower. Presented 22nd June, 1906. by Hon. C. S. Hyman.................. *Not printed.*

162. Return to an order of the House of Commons, dated 9th May, 1906, showing the total number of land patents issued, together with the acreage covered thereby, in and for the territory included within the limits of the present provinces of Manitoba, Saskatchewan and Alberta, between the 1st of July, 1901, and the 31st of December, 1905, under each of the following forms of grant: (*a*) commutation grants, (*b*) homesteads, (*c*) Manitoba Act grants, (*d*) military bounty grants, (*e*) Northwest half-breed grants, (*f*) parish sales, (*g*) quit claim special grants, (*h*) railways, (*i*) sales of mining, farming, ranching, &c., (*j*) school land sales, (*k*) special grants, (*l*) and all others. Presented 29th May, 1906.—*Mr. Ames*.................. *Not printed.*

163. Return to an order of the House of Commons, dated 23rd April, 1906, showing what information is in possession of the department of the interior, or any department or member of the government, regarding alleged irregular or improper dealings, acts, charges, payments, or accounts of any officer, agent or other person in Great Britain or Ireland, or in Europe, in connection with immigration to Canada; what period is covered thereby; also what communications, if any, upon or in relation to such matters have been had from or with the High Commissioner for Canada, the commissioner of immigration or others, in writing or otherwise; also a copy of all correspondence, reports and papers, if any, relating to such matters. Presented 29th May, 1906.—*Mr. Barker*............ *Not printed.*

164. Return to an address of the Senate, dated 15th May, 1906, calling for a statement showing: 1st. The amount paid for the railway known as the Canada Eastern in New Brunswick, and the name of the person or persons to whom the purchase money was paid. 2nd. The amount of money expended on said railway since its purchase by the government to the 1st of April, 1906, on buildings, repairs,

CONTENTS OF VOLUME 14—*Continued.*

grading, culverts, bridges, ties, rails, and all other expenditures incurred in the improvement of said railway. 3rd. The total amount earned and received from the passengers, and for freights, separately, to the 1st of April, 1906. 4th. The total expenditure for operating said road, as a branch of the Intercolonial, from the date of purchase to the 1st of April, 1906. Presented 29th May, 1906.—*Hon. Sir Mackenzie Bowell*...*Not printed.*

165. Return to an address of the Senate, dated 8th May, 1906, for a statement showing: 1. What amount has been paid out annually during the last five years for salaries and expenses of the staff chargeable with the inspection duties of the life insurance branch of the finance department. 2. Did such staff perform any duties other than those pertaining to inspection. 3. Names of the officers of such staff. 4. Salaries paid each such officer. 5. Amounts collected annually from all life insurance companies doing business in Canada during the last five years for inspection charges or maintenance charges of such branch, or for such other charges incident thereto. 6. On what basis have such charges been made and collected. 7. The names of all companies and amounts paid each year by such companies. Presented 29th May, 1906.—*Hon. Mr. Lougheed*.......................................*Not printed.*

166. Return to an order of the House of Commons, dated 20th February, 1905, showing the number of miles of land in the Northwest Territories surveyed in block outlines, and the cost per mile; the number of miles of township outlines, and the cost per mile; the number of acres subdivided, and the cost per acre: the proportion of open prairie to the whole of the land surveyed; the contract survey rate per mile of section line in open prairie; the rate of pay of surveyors employed by the day, for the years 1880, 1881, 1882, 1883, 1900. 1901, 1902, 1903; the average for the first four years, and the average for the latter four years. Presented 13th June, 1906.—*Mr. Roche (Marquette).* *Not printed.*

167. Return to an address of the Senate, dated 16th May, 1906, for copies of the North Sydney Harbour Commissioners' Report for the calendar years 1897, 1899, 1901 and 1905, showing collections and disbursements of the said harbour commissioners during these years; also correspondence, if any, respecting purchase of land for harbour commissioners' purposes, with plans of the said land and harbour. Presented 29th May, 1906.—*Hon. Mr. McDonald*.......................*Not printed.*

168. Return to an address of the Senate, dated 8th May, 1906, for a statement relating to the Mutual Life Insurance Company of New York, showing: 1. The amount of life insurance in force in the Dominion on 31st December, 1905. 2. The amount of security deposited with the Dominion government. 3. The nature of the security. 4. If in gold, how much. 5. If in bonds, how much. 6. Who are the issuers of the bonds. 7. Are the bonds given in security taken at par or face value, or at the supposed market value. 8. How is the market value ascertained. 9. What means are taken to know if the makers or issuers of bonds taken as security are solvent from year to year. 10. In the event of the value of bonds falling below that at which they are taken as security, how would the deficiency in the security necessary to be held be made up. 11. Has the security deposited by the Mutual Life Insurance Company of New York fallen in value at any time below that necessary to be deposited according to law. Presented 29th May, 1906.—*Mr. Macdonald (Victoria)*...*Not printed.*

169. Papers relating to chapter 16, 4 Edward VII. intituled: 'An Act respecting an arbitration between His Majesty and the Grand Trunk Company of Canada.' Presented 29th May, 1906, by the Hon. R. W. Scott...*Not printed.*

170. A copy of a Report of the Committee of the Honourable the Privy Council, approved by His Excellency the Governor General on the 14th March, 1906, relating to the extension of the contract with the American Bank Note Company for a further period of five years; and correspondence relating thereto. Presented 30th May, 1906, by Hon. W. S. Fielding.........................*Not printed.*

171. Return to an order of the House of Commons, dated 14th March, 1906, showing the amounts voted, and the amounts expended, under their proper headings, each year since 30th June, 1896, on Port Stanley harbour; the date of such payments, to whom payments were made, and the amount paid to each person; the amount paid for actual labour performed; the amount paid for material not used; the quantity and kind of material purchased, with the price, and from whom purchased; the present actual condition of the harbour. A copy of the estimated cost of the harbour, the statement to include dredging and the breakwater; also copies of all advertisements calling for tenders, as well as all tenders and contracts and correspondence on the subject; the names of all dredges employed on the work since 30th June, 1896, and their owners; also copies of all telegrams, letters, reports, petitions, documents, correspondence, investigations and communications of every description in

CONTENTS OF VOLUME 14—*Continued.*

connection with said harbour works; also a copy of the pay-roll for each year since 30th June, 1896; the names of all foremen, superintendents and inspectors, their length of service as such, and by whom recommended, giving all correspondence in connection with their appointment; and if dismissed or resigned, state reason for said dismissal or resignation; the names of all civil engineers employed on the works, and by whom recommended, and all correspondence in connection therewith; also the name of the person or persons who paid the respective amounts at Port Stanley for material furnished and labour performed. Presented 31st May, 1906.—*Mr. Ingram*....*Not printed.*

172. Return to an order of the House of Commons, dated 9th May, 1906, for a copy of the instructions issued to each grade of civil engineers on the survey of the Montreal, Ottawa and Georgian Bay Ship Canal; also the names of each of the engineers engaged in the several grades, respectively, including transit men, levellers, rod men, and chain men, and the salaries of each. Presented 31st May, 1906.—*Mr. Taylor*.......*Not printed.*

173. Return to an order of the House of Commons, dated 30th April, 1906, for a copy of all papers, vouchers and statements in connection with the expenditure of $1,438.54 on Miminegash harbour, as per Auditor General's Report, 1905, giving names and amounts paid severally for labourers, names, prices and amounts for supplies of stone, brick, poles, plank, and small payments, &c. Presented 31st May, 1906.—*Mr. Lefurgey*.......*Not printed.*

174. Copy of an agreement of Charles M. Hatfield to increase the natural rainfall in any locality in the Yukon Territory. Presented 31st May, 1906, by Sir Wilfrid Laurier.
Printed for both distribution and sessional papers.

175. Return to an order of the House of Commons, dated 26th March, 1906, for copies of all correspondence pertaining to complaints received by the government protesting against quarantine from hog plague, in Kent County, Ontario. Presented 4th June, 1906.—*Mr. Clements*.........*Not printed.*

176. Return to an order of the House of Commons, dated 25th April, 1906, for a copy of all reports, evidence, correspondence, documents and papers relating to charges against any of the customs officials at Emerson, in the province of Manitoba, during the past two years. Presented 4th June, 1906.—*Mr. Roche (Marquette)*.......*Not printed.*

177. Return to an order of the House of Commons, dated 18th April, 1906, for a copy of all applications from C. F. Caldwell for himself, or by C. F. Caldwell on behalf of any clients, together with their names, or by any other person or persons, together with copies of all correspondence or other papers in connection with permission to purchase coal mining lands in the province of Alberta. Presented 4th June, 1906.—*Mr. Reid (Grenville)*.......*Not printed.*

178. Return to an order of the House of Commons, dated 23rd April, 1906, for a copy of all correspondence, memoranda, reports and telegrams in possession of the government or any member or official thereof, in reference to the construction of a new steamer for the winter navigation of the Straits of Northumberland, including Mr. Duguid's report or recommendations, and those of others co-operating with him, and the expenses connected therewith, and to whom paid. Presented 5th June, 1906. —*Mr Martin (Queen's)*.......*Not printed.*

179. Return to an order of the House of Commons, dated 23rd April, 1906, for a copy of the plans and specifications of the new steamer now being constructed in England. Presented 5th June, 1906. —*Mr. McLean (Queen's)*.......*Not printed.*

180. Return to an address of the Senate, dated 31st May, 1906, for a copy of the certificate obtained by Commander Spain in the month of February, 1903. Presented 1st June, 1906.—*Hon. Mr. Landry.*
Not printed.

181. Return to an order of the House of Commons, dated 9th May, 1906, for a statement showing the wages paid in different departments of the Prince Edward Island Railway, in the same manner as published in the Auditor's General's Report with reference to the Intercolonial Railway. Presented 13th June, 1906.—*Mr. Lefurgey*.......*Not printed.*

182. Return to an order of the House of Commons, dated 14th May, 1906, for a copy of the memorial received from the Dominion Marine Association, calling the attention of the Government to delays consequent upon the carrying out of the contract with M. P. Davis or the St. Lawrence Power Company for the hauling of vessels by electrical power in and out of the locks of the Cornwall Canal. Presented 13th June, 1906.—*Mr. Ames*.......*Not printed.*

CONTENTS OF VOLUME 14—*Continued.*

183. Return to an order of the House of Commons, dated 14th March, 1906, showing the amounts voted and the amounts expended, under their proper headings, each year since 30th June, 1896, on Port Burwell harbour; the date of such payments; to whom the payments were made, and the amount paid to each person; the amount paid for actual labour performed; the amount paid for material not used, and when; the amount paid for material used; the quantity and kind of material purchased, and the price, and from whom purchased; the present actual condition of the harbour. A copy of the estimated cost of the harbour, and a statement showing how much it will cost to finish said harbour; the above statement to include breakwater and dredging. Also copies of all advertisements calling for tenders, as well as all tenders and contracts, and correspondence on the subject: the names of all dredges employed on the works since 30th June, 1906, and their owners. And copies of all telegrams, letters, reports, petitions, documents, correspondence and communications of every description in connection with the said harbour works. Also a copy of the pay-roll for each year since 30th June, 1906; the names of all foremen, superintendents and inspectors; their length of service as such, and by whom recommended; with all correspondence in connection with their appointment; and if dismissed or resigned, the reason for said dismissal or resignation; the names of all civil engineers who are or have been employed on the works, and by whom recommended; the said return to include Mr. John H. Teall, resident engineer, the date of appointment, dismissal or resignation, as the case may be, and the reason for same; and all correspondence, petitions, telegrams, letters and communications connected therewith. Presented 15th June, 1906.—*Mr. Ingram.* *Not printed.*

184. The King's regulations and orders for the militia of Canada, 1904, 1905 and 1906. Presented 19th June, 1906, by Sir Frederick Borden........ *Not printed.*

184*a*. Regulations respecting pay, allowances, &c., to the Canadian militia. Presented 19th June, 1906, by Sir Frederick Borden .... *Not printed.*

185. Return to an order of the House of Commons, dated 9th May, 1906, showing: In respect of any or all ties purchased by the department of railways and canals during the years 1903-4 and 1904-5, from each of the fallowing: D. J. and J. D. Buckley, of Rogersville; John Mahony, of Rogersville; and Jude F. Gallant, of Rogersville; (*a*) the classes and quantities of ties; (*b*) prices paid; (*c*) the places of delivery; (*d*) the number rejected; (*e*) the name of the inspectors who represented the government; (*f*) the quantity and value of the ties in store at Rogersville at the time of stock taking for the fiscal year 1904-5; (*g*) a copy of all correspondence, orders or papers of any nature in the possession of the department of railways and canals, or any official thereof, relating to the ordering, purchasing, receiving, checking, inspecting, or refusing of any of said ties. Presented 19th June, 1906.—*Mr. Ames*........ *Not printed.*

186. Return to an order of the House of Commons, dated 28th May, 1906, showing the number of mail contracts in Elgin County, giving location, number of miles, names of couriers, and prices paid; also date of commencement, date of expiration, and names of bondsmen; also particulars of tenders, if any were called for; the name of each preceding contractor, with the name of courier, and the price paid. Presented 19th June, 1905.—*Mr. Ingram*........ *Not printed.*

187. Return to an order of the House of Commons, dated 14th May, 1906, showing: (1) What aid has been given by the Dominion government to the governments of the various provinces of the Dominion since confederation, for or towards the building of provincial railways, either by original aid or by ultimately bearing a share of the cost of such undertakings. (2) What railway subsidies or aids originally granted or agreed to be granted, by the provinces respectively, have been ultimately paid or borne by the Dominion in aid of such railways during such period. (3) What moneys have been paid by the Dominion to the several provinces, respectively, during each such period for or in respect of such railways or the stock or bonds thereof, respectively, purchased, acquired or taken over in whole or in part by the Dominion. Presented 21st June, 1906.—*Mr. Macdonell.* *Printed for sessional papers.*

188. Return to an order of the House of Commons, dated 14th May, 1906, showing what lands have been selected by the Canadian Northern Railway Company, in accordance with the order in council of 10th August, 1903, in townships 15 to 20, both included, in ranges 9, 10, 11 and 12, west of 1st meridian. Also any lands reserved for selection by the Canadian Northern Railway Company, in the territory mentioned above, that may have reverted to the government by reason of the said company not exercising its right of selection thereto before 31st December, 1905, in accordance with the provisions of order in council of the 10th August, 1903. Presented 22nd June, 1906.—*Mr. Roche (Marquette)*........ *Not printed.*

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188a. Return to an order of the House of Commons, dated 9th May, 1906, showing all lands selected by the Canadian Northern Railway Company from that portion of the lands reserved for selection by the said company, in townships 15 to 20, both included, in ranges 9, 10, 11 and 12, west of 1st meridian. Also a return of all lands patented to the nominees of the Canadian Northern Railway Company in the territory above-mentioned, and the names of the patentees, since 29th June, 1905. Presented 22nd June, 1906.—*Mr. Roche (Marquette)*.......... . . .. *Not printed.*

189. Return to an order of the House of Commons, dated 21st May, 1906, for a copy of all petitions and papers of every kind concerning the claims of certain retired servants of the Hudson's Bay Company, under a deed of sale by the said company to Lord Selkirk in 1811. Presented 22nd June, 1906.—*Mr. McCraney*.................... .... *Not printed.*

189a. Return to an order of the House of Commons, dated 17th July, 1905, for copies of all correspondence, documents, and memorials between the government or any member thereof, and the Rev. James Taylor, or any other person, on behalf of the retired servants of the Hudson's Bay Company, in reference to their claim to a portion of the estate of the late Lord Selkirk. Presented 27th June, 1906.—*Mr. Lamont*................ .... *Not printed.*

190. Return in part to an address of the Senate, dated 27th April, 1906, for a statement of all accidents that occurred on the Intercolonial Railway during the years 1897, 1898, 1899, 1900, 1901, 1902, 1903 1904 and 1905, specifying each accident, whether by collision, derailing, fire or otherwise, and the amount of damages of each such accident, mentioning the localities where such accidents occurred. Also the amount of losses each year, by theft or otherwise, of goods or freight, in transit, on the Intercolonial Railway, for each year as above. Presented 22nd June, 1906—*Hon. Mr. McDonald (Cape Breton)*.. .... *Not printed.*

191. Return showing: 1. What sums have been paid Messrs. Ahearn & Soper of Ottawa, in each year since 1896. 2. For what supplies or services were these payments made. Presented 25th June, 1906, by Hon. C. S. Hyman .... *Not printed.*

192. Return showing the total sums that have been paid by the government to the Manitoba *Free Press* and *Der Nordwester* Publishing Companies, for all services, for each of the financial years commencing 1st July, 1900, and ending 30th June, 1905. Presented 25th June, 1906, by Sir Wilfrid Laurier. *Not printed.*

193. Return to an order of the House of Commons, dated 9th May, 1906, for a copy of all correspondence, inquiries with officials, engineers, solicitors, contractors and others, bearing upon the accident to the wharf at Sorel, together with all documents in connection with the same. Presented 25th June, 1906. —*Mr. Blain*.............. .... *Not printed.*

194. Return to an address of the Senate, dated 19th June, 1906, calling for a statement since 1st March, 1904, showing: 1. Which are, more particularly at Quebec, Montreal and Ottawa, the newspapers, or the printing companies or firms, which publish advertisements or printed documents on account of the commissioners of the Transcontinental Railway. 2. How much has each of these newspapers or of these companies or firms received, and what is the date of each payment. 3. For what kind of services, advertisements, printing or puffs, and how much for each kind, have these newspapers or these companies or firms been paid. Presented 25th June, 1906.—*Hon. Mr. Landry. Not printed.*

195. Return to an order of the House of Commons, dated 23rd April, 1906, for a copy of all letters, correspondence, papers, reports and accounts relating to the construction of a fish ladder at Cowie's Dam, lower pulp mill, Milton, Queen's County, N.S, and of the accounts showing the cost of construction of the said ladder, the amount paid for labour and material, and to whom paid. Presented 30th June, 1906.—*Mr Crocket*........................ .... *Not printed.*

196. Return to an order of the House of Commons, dated 30th April, 1906, showing, by townships, all Indian lands sold or disposed of within the boundaries of the present electoral district of East and West Algoma, during the years 1896 to 1905, both inclusive, with the names and addresses of purchasers or lessees, and the prices paid or agreed to be paid, for such lands, by way of rental or purchase money; also showing, by townships, when the said purchases were completed, or when the final payments were made and the total amount paid for such lands; also showing, by townships, what agreements for sale are in default, and for what period the same have been in default; also showing what agreements for sale or lease, by townships, have been cancelled for non-payment of purchase money or non-performance of conditions. Presented 3rd July, 1906.—*Mr. Boyce.* *Not printed.*

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196a. Return to an order of the House of Commons, dated 30th April, 1906, for a copy of all the returns and reports made by Indian agents or other officials in the employment of the government, having charge of Indian lands in the territory now included within the boundaries of the present electoral districts of East and West Algoma, showing all sales, transactions and cancellations of lands in such territory, from the 1st July, 1896, to the 1st April, 1906. Presented 3rd July, 1906.—*Mr. Boyce,* *Not printed.*

197. Return to an order of the House of Commons, dated 28th May. 1906, for a copy all correspondence between Joseph Rirm and the government in reference to the surface right for coal on the northeast ¼ of section 26, township 1, range 6, west of the 2nd meridian. Also a copy of all letters, papers and telegrams, from any other party or parties in reference to the same. Presented 5th July, 1906.—*Mr. Roche (Marquette)*......*Not printed.*

198. Return to an order of the House of Commons, dated 14th March, 1906, for copies of all letters, telegrams, reports or other communications which, between the 1st of July, 1904, and the 31st December, 1905, passed between the Minister of the Interior, or any official of his department, on the one hand, and (*a*) the Canadian Northern Railway Company ; (*b*) the Manitoba and Southeastern Railway Company ; (*c*) the Qu'Appelle, Long Lake and Saskatchewan Railway Company, or any company to whom any of said companies shall have transferred its land rights, in regard to the area in which any of said companies were to be permitted to select land due by way of subsidy. Presented 5th July, 1906.—*Mr. Ames*......*Not printed.*

199. Return to an order of the House of Commons, dated 21st March, 1906, showing : 1. The description of all lands in Manitoba and the Northwest, formerly reserved for timber or hay purposes, to which homestead entries have been granted since 1st January, 1905. 2. The date of decisions to open such reservations for settlement. 3. The names of applicants, in order of application, on the books of the various agencies and sub-agencies, for each quarter section, at the date when the entry was granted. Presented 5th July, 1906.—*Mr. Lake*......*Not printed.*

200. Return to an order to the House of Commons, dated 21st March, 1906, showing the number of applications for inspection received at the several land agencies in Manitoba and the Northwest for each month of the years 1904 and 1905, from homesteaders desiring to secure their patents. 2. The number of inspections made monthly from each agency. 3. The number of applications for inspection on file 1st January, 1906, at each agency. Presented 5th July, 1906.—*Mr. Lake*...*Not printed.*

201. Return to an address of the House of Commons, dated 2nd April, 1906, for copies of all correspondence between the pilotage commissioners, the secretary of the Board of Pilot Commissioners, or any of the officials of that board, at Sidney, Cape Breton, and the department of marine and fisheries, or any of the officials of the said department, and all orders in council, regulations, memoranda, books, documents and papers, showing ; (1) the amount paid into the pilots' retiring fund in each year from the 31st December, 1896, to 31st December, 1905, respectively ; (2) the amount paid into the pilots' widows' and orphans' relief fund from 31st December, 1896, to 31st December, 1905, respectively ; (3) the disposition made of the said funds in each year during the above-mentioned period ; the amount on hand on the 31st December, 1905 ; the interest it bears ; where it is deposited ; the security for its safety for the benefit of the widows and orphans of the pilots ; (4) the amount on hand in these funds, respectively, on 31st December, 1896. Also all other correspondence, if any, bearing on this matter. Presented 5th July, 1906.—*Mr. Boyce*......*Not printed.*

202. Return to an order of the House of Commons, dated 14th March, 1906, showing (*a*) how many wrecks occurred in the river and gulf of St. Lawrence during the season of 1905 ; (*b*) the names, tonnage and character of the vessels so wrecked ; (*c*) whether such wreck resulted in a total loss of the ship and cargo, or either, in any and what cases ; (*d*) to what causes each of said wrecks were attributable ; (*e*) whether any inquiry was held in any and what cases. Also for a copy of all reports, evidence, correspondence, documents and papers, relating to or connected with the said wrecks, the inquiries concerning the same, and the loss thereby occasioned. Presented 5th July, 1906.—*Mr. Borden (Carleton)*......*Not printed.*

202a. Return to an address of the Senate, dated 15th March, 1906, for a copy of all the instructions given, of all the evidence heard, of the judgment rendered, and of all communications exchanged on the subject of the wreck of the steamer *Bavarian* last autumn upon the Wye rocks, and of the inquiry held thereinto, as well as of the correspondence exchanged between the department of marine and fisheries and any person whomsoever regarding the choice of the judge holding the inquiry and of his assessors. Presented 23rd April, 1906.—*Hon. Mr. Landry*......*Not printed.*

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ANNUAL REPORT

1906

OF THE

DEPARTMENT OF THE INTERIOR

FOR THE YEAR

1904-1905

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1906

[No. 25—1906.]

To His Excellency the Right Honourable Sir Albert Henry George, Earl Grey, G.C.M.G., &c., &c., Governor General of Canada.

May it Please Your Excellency:

The undersigned has the honour to lay before Your Excellency the Report of the transactions of the Department of the Interior for the fiscal year ending June 30, 1905.

Respectfully submitted,

FRANK OLIVER,

Minister of the Interior.

Ottawa, December 14, 1905.

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REPORT

OF THE

DEPUTY MINISTER OF THE INTERIOR.

1904-5.

DEPARTMENT OF THE INTERIOR,
OTTAWA, December 12, 1905.

The Honourable FRANK OLIVER,
Minister of the Interior.

SIR,—I have the honour to submit the annual report of the Department of the Interior for the fiscal year ending June 30, 1905.

The reports and statements of the officers in charge of the various branches have been classified in the same order as was followed in the report for 1903-1904, and will be found under the following sections:—

I. Dominion Lands.
II. Immigration.
III. Dominion Lands Surveys.
IV. Registrars.
V. Rocky Mountains Park.
VI. Keewatin.
VII. Yukon Territory.
VIII. Mines.
IX. Chief Astronomer's Office.
X. Forestry.

Owing to the large number of survey parties that were engaged in the field during the season of 1904, it was found necessary to publish the report of the Surveyor General in monograph form, so as not to delay the issue of the general report. For the same reason, it has again been considered advisable to issue it separately this year, and it will appear as an appendix to the report under Part III. It has also been found desirable to pursue the same course with regard to the report of the Chief Astronomer, Part IX.

NEW APPOINTMENTS.

The only important change that has taken place during the past year, in the permanent staff of the department at headquarters, has been the resignation of Mr. James

Allan Smart as Deputy Minister, and my appointment to that position, the change having taken effect on January 1, 1905.

It is a very pleasant duty for me to testify to the high esteem in which Mr. Smart was held by the members of the department. The marked ability and zeal which he displayed in the discharge of his important duties, during the nine years of his incumbency of the office of Deputy Minister, contributed in no small degree to the success which has attended the efforts put forth by the department to direct British and United States emigration to Canada.

The following new appointments were made in the outside service:—

Mr. R. E. A. Leech was, on January 1, 1905, appointed Inspector of Dominion Lands Agencies, in lieu of Mr. E. F. Stephenson, who up to that time held the combined offices of Inspector of Dominion and Crown Timber Lands. In view of the large increase in the work of the various agencies of the department in the west, it was found necessary to separate these two offices, as the importance of the duties attaching to the same are such as to warrant the employment of a responsible officer for each service, and thus insure the proper inspection of the work of the agencies.

Mr. R. F. Chisholm was relieved of his duties as Agent of Dominion Lands for the Battleford district on March 1, 1905, and Mr. L. P. O. Noël was appointed to succeed him on the same date.

DEATHS.

I regret to have to report two deaths in the department during the past year, namely, that of Mr. L. P. Kennedy, a third-class clerk in the Survey Branch, which occurred on May 25, 1905, and that of Mr. Theophile Lamontagne, a clerk in the Immigration Office at Quebec, who died on August 19, 1904.

STATEMENT showing Gross Revenue (Cash and Scrip) received from all sources during the Fiscal Year 1904-1905, compared with the receipts of the previous Fiscal Year.

Revenue.	Fiscal Year 1904–1905 Cash and Scrip	Fiscal Year 1903–1904 Cash and Scrip	Increase.	Decrease.	Net Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Lands	1,339,382 35	1,681,824 70		342,442 35	
School Lands	332,914 48	233,769 62	99,144 86		
Ordnance Lands	10,346 90	30,494 34		20,147 44	
Fines and Forfeitures, N.W.T.	10,018 49	5,911 92	4,106 57		
Fines under Immigration Act	60 00		60 00		
Registration Fees	123,082 86	109,233 73	13,849 13		
Casual Revenue	4,198 14	3,402 94	795 20		
Seed Grain	16,471 34	26,122 30		9,650 96	
	1,836,474 56	2,090,759 55	117,955 76	372,240 75	254,284 99

STATEMENT showing Receipts on Account of Dominion Lands from July 1, 1872, to June 30, 1905.

Fiscal Year.	Homestead Fees.	Preemption Fees.	Improvements.	Sales. Cash.	Sales. Scrip.	Map Sales, Office and Registration Fees, &c.	Surveyor's Examination Fees.	Miscellaneous, including Trust.	Inspection, Cancellation and Sundry Fees.	Timber Dues.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73	6,960 00			19,170 20						109 25
1873-74	7,310 00			19,834 75				125 50		2,710 55
1874-75	11,510 00			13,666 90		129 00				2,335 25
1875-76	4,680 00			3,478 94	320 00					387 00
1876-77	2,250 00			1,085 86	136,955 16	4 00		100 00	40 00	320 00
1877-78	14,540 00			2,794 86	120,159 54		180 00		290 00	1,620 00
1878-79	17,690 00			4,998 39	210,904 84	81 00	310 00	13 70	410 00	325 00
1879-80	41,255 00	10,241 43		45,708 97	81,685 86	245 40	580 00	183 25	1,780 00	25,121 46
1880-81	20,450 00	10,801 75	269 00	71,170 17	70,828 30	985 40	420 00	37 58		32,028 34
1881-82	54,155 00	39,843 90	1,758 00	1,240,328 27	50,590 81	3,036 45	890 00	58 10		58,753 14
1882-83	73,015 00	54,725 00	7,114 91	516,092 21	33,638 40	3,109 50	890 00	501 77		90,066 46
1883-84	41,580 00	28,810 00	2,596 11	124,863 36	40,919 67	1,289 55	530 00	45,766 53	1,713 45	147,983 10
1884-85	25,645 00	17,100 00	2,328 75	199,275 32	45,875 60	1,621 82	370 00	50,068 57	2,685 00	87,474 99
1885-86	26,110 00	14,371 00	1,101 50	76,140 41	214,657 97	1,339 34	360 00	20,070 00	5,025 00	64,820 31
1886-87	19,614 00	6,887 93	1,971 55	48,175 76	337,640 19	1,171 39	240 00	44,561 00	7,778 40	65,111 74
1887-88	23,691 00	4,830 00	1,918 35	52,238 36	313,522 67	1,660 75	240 00	20,591 41	12,078 53	94,964 55
1888-89	39,460 00	10,550 00	4,128 48	57,513 16	318,238 57	1,410 16	220 00	10,389 57	20,402 50	90,290 00
1889-90	35,920 00	8,580 00	3,250 54	54,896 85	228,744 47	2,099 07	190 00	3,316 23	20,232 50	84,642 95
1890-91	29,164 10		6,302 61	91,664 98	171,425 14	1,854 78	88 00	7,951 05	14,712 50	102,902 71
1891-92	46,994 00		6,472 31	108,901 01	97,822 41	2,147 31	135 00	29,898 49	23,104 50	106,461 35
1892-93	37,689 74		7,113 50	93,671 67	77,231 18	975 20	82 00	18,509 35	22,014 00	105,865 24
1893-94	36,462 26		3,497 76	53,254 71	27,840 96	973 11	40 00	13,457 09	11,097 00	81,290 51
1894-95	29,664 88		3,567 90	37,293 71	23,269 62	695 99		6,271 77	6,566 90	74,079 20
1895-96	18,278 00		3,163 15	46,373 98	46,929 65	610 78	50 00	21,679 31	6,810 50	61,923 47
1896-97	21,179 00		3,737 01	49,335 53	16,929 38	795 05	70 00	19,421 98	8,527 50	68,992 82
1897-98	34,780 00		5,649 63	80,178 64	28,918 14	1,987 40	10 00	21,242 66	10,042 00	119,313 78
1898-99	58,235 00		4,297 62	116,598 35	21,307 58	1,262 05	20 00	75,085 95	13,549 50	155,360 63
1899-1900	72,690 00		4,835 81	103,247 58	88,756 22	1,258 85	190 00	38,072 54	14,937 00	126,345 82
1900-1901	79,910 00		5,213 32	40,360 93	326,270 03	3,874 14	165 00	70,970 54	12,722 00	209,399 32
1901-1902	144,425 00		8,481 46	66,950 21	169,767 13	5,792 96	370 00	71,997 30	663 00	207,790 90
1902-1903	320,409 65		11,829 08	155,507 59	158,452 66	5,911 96	365 00	125,158 56	595 00	470,916 93
1903-1904	255,772 36		15,119 47	196,750 15	188,424 22	5,549 13	463 50	81,550 46	1,081 00	397,344 33
1904-1905	304,806 25		21,571 25	154,128 04	19,644 59	4,879 13	906 50	144,924 31	1,205 00	266,951 46
	1,956,295 24	206,741 01	137,288 97	4,245,649 82	3,667,670 99	56,750 67	8,375 00	941,974 57	220,062 78	3,404,002 56

* Including Scrip.

STATEMENT showing Receipts on Account of Dominion Lands from July 1, 1872, to June 30, 1905—*Concluded.*

Fiscal Year.	Grazing Lands. Cash.	Grazing Lands. Scrip, &c.	Hay Permits, Mining, Stone Quarries, &c. Cash.	Hay Permits, Mining, Stone Quarries, &c. Scrip.	Rocky Mountains Park of Canada.	Colonization Lands. Cash.	Colonization Lands. Scrip.	Gross Revenue.	Refunds.	Net Revenue.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1872-73								26,239 45		26,239 45
1873-74								29,980 80		29,980 80
1874-75								27,641 15		27,641 15
1875-76								8,865 94		8,865 94
1876-77								140,755 02		140,755 02
1877-78								139,584 40		139,584 40
1878-79								234,732 93		234,732 93
1879-80								206,801 37	4,636 08	202,165 29
1880-81								206,990 54	5,038 22	201,952 32
1881-82	2,245 00		40 00			351,036 17		1,805,734 87	10,687 55	1,795,047 32
1882-83	22,844 43		913 91			218,492 01		1,051,403 60	8,746 05	1,042,657 55
1883-84	11,370 60		640 90			253,713 10		1,001,776 67	9,220 50	992,556 17
1884-85	17,089 75		815 63			1,214 22		451,564 65	12,070 85	439,493 80
1885-86	29,562 51	3,131 08	1,281 83					457,973 95	63,389 12	394,584 83
1886-87	14,242 77	39,487 67	1,570 40	80 00				588,532 80	19,543 16	568,989 64
1887-88	5,922 47	23,023 28	2,273 73	80 00	2,951 58		10,000 00	569,986 68	6,277 66	563,709 02
1888-89	2,207 69	16,802 63	3,946 55		2,528 73		16,000 00	594,088 04	5,226 23	588,861 81
1889-90	1,305 57	9,021 63	9,242 08		1,091 37			462,536 26	8,209 71	454,326 52
1890-91	3,079 55	16,193 77	8,628 44	160 00	2,397 35	5 28	4,460 50	460,990 76	7,195 27	453,795 49
1891-92	3,726 80	17,222 60	5,616 85		3,648 45			452,151 08	15,291 39	436,859 69
1892-93	6,380 80	11,542 39	6,266 13		1,983 23			392,324 43	18,314 97	374,009 46
1893-94	5,740 79	7,687 86	6,243 15		2,523 92			250,069 12	4,544 01	245,525 11
1894-95	5,353 72	8,628 00	5,229 54		2,321 87			202,983 10	4,365 99	198,617 11
1895-96	7,071 86	6,255 90	5,813 51		2,734 82			227,694 93	8,368 79	219,326 14
1896-97	4,715 01	2,500 00	8,518 48		2,132 11			206,853 57	15,010 54	191,843 03
1897-98	4,728 58	510 39	699,334 76		3,015 65			1,009,741 63	4,678 55	1,005,063 08
1898-99	5,245 88		1,130,371 60		2,994 16			1,584,328 32	32,296 39	1,552,031 93
1899-1900	8,382 86	1,083 30	1,038,195 42	20 00	2,727 60			1,503,743 00	23,062 28	1,480,680 72
1900-1901	4,726 28	14,671 99	1,101,808 33	20 00	4,017 31			1,874,159 09	18,368 85	1,855,790 24
1901-1902	7,292 46	8,409 27	737,878 43		*2,861 13			1,432,679 25	27,165 55	1,405,513 70
1902-1903	13,913 33	15,041 33	607,722 05		*5,063 69			1,890,886 83	21,519 84	1,869,366 99
1903-1904	19,790 27	15,202 15	495,579 18		*9,198 48			1,681,824 70	36,721 75	1,645,102 95
1904-1905	36,145 32	5,237 36	364,923 59		*14,059 55			1,339,382 35	25,786 90	1,313,595 45
	243,084 30	224,652 60	6,242,857 19	360 00	*71,314 00	857,461 08	30,460 50	22,515,001 28	415,736 23	22,099,265 05

* Including Scrip.

DOMINION LANDS REVENUE.

STATEMENT of Dominion Lands Revenue for the fiscal year 1904-1905, compared with the Receipts for the previous fiscal year.

Agencies, &c.	Cash and Scrip 1904-1905.	Cash and Scrip 1903-1904.	Increase.	Decrease.
Yukon Territory.	$ cts.	$ cts.	$ cts.	$ cts.
Sales of land	7,637 04	12,678 17		5,041 13
Rentals of land	18,496 93	19,504 90		1,007 97
Survey fees	100 00	1,060 00		960 00
Map sales, office fees, &c.	161 00	538 00		377 00
Timber dues	25,503 97	38,807 90		13,303 93
Coal lands	69 93	5 50	64 43	
Hay lands	283 00	467 55		184 55
Grazing lands	9 92		9 92	
Mining fees	92,854 00	145,391 14		52,537 14
Export tax on gold	206,755 87	272,217 96		65,462 09
Hydraulic leases	6,957 05	10,383 11		3,426 06
Dredging leases	385 78	640 16		254 38
Free miners' certificates	46,022 53	62,190 10		16,167 57
Free certificates for export of gold	452 00	27 00	425 00	
Royalty on water sold	65 65	139 75		74 10
Miscellaneous	953 50	885 50	68 00	
	406,708 17	564,936 74	567 35	158,795 92
Dominion Lands Agencies.				
Alameda	30,225 25	27,504 08	2,721 17	
Battleford	38,397 56	17,411 74	20,985 82	
Brandon	11,946 33	16,822 35		4,876 02
Calgary	43,585 27	56,711 98		13,126 71
Dauphin	7,086 07	5,657 15	1,428 92	
Edmonton	36,133 56	38,435 78		2,302 22
Kamloops	13,095 36	16,485 53		3,390 17
Lethbridge	63,305 95	86,046 18		22,740 23
Minnedosa	5,586 59	6,100 77		514 18
New Westminster	4,431 85	8,394 35		3,962 50
Prince Albert	25,128 30	24,013 35	1,114 95	
Red Deer	24,953 77	16,392 29	8,561 48	
Regina	107,939 13	246,446 26		138,507 13
Wininipeg	26,925 00	22,590 92	4,334 08	
Yorkton	55,326 56	54,762 61	563 95	
	494,066 55	643,775 34	39,710 37	189,419 16
Carried forward	900,774 72	1,208,712 08	40,277 72	307,937 36

NOTE.—Decrease in Yukon Revenue, $158,228.57.
Decrease in Land Agencies, $149,708.79.

DOMINION LANDS REVENUE.

STATEMENT of Dominion Lands Revenue for the fiscal year 1904-1905, compared with the Receipts for the previous fiscal year—*Continued.*

Agencies, &c.	Cash and Scrip 1904-1905.	Cash and Scrip 1903-1904.	Increase.	Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.
Brought forward	900,774 72	1,208,712 08		307,937 36
Crown Timber Agencies.				
Alameda	143 00	466 60		323 60
Battleford	561 80	199 41	362 39	
Brandon	764 75	1,206 89		442 14
Calgary	16,443 09	30,200 51		13,757 42
Dauphin	9,398 26	9,689 84		291 58
Edmonton	37,255 14	42,287 45		5,032 31
Lethbridge	623 62	258 38	365 24	
Minnedosa	890 60	1,733 24		842 64
New Westminster	70,979 27	98,700 62		27,721 35
Prince Albert	38,057 77	38,980 98		923 21
Red Deer	1,017 68	1,299 44		281 76
Regina	292 55	206 36	86 19	
Winnipeg	64,689 16	133,080 16		68,391 00
Yorkton	330 80	226 55	104 25	
	241,447 49	358,536 43	918 07	118,007 01
Miscellaneous.				
Rocky Mountains Park of Canada	14,059 55	9,198 48	4,861 07	
Irrigation fees	303 00	127 04	175 96	
Map sales, office fees, &c.	3,908 48	4,188 63		280 15
Survey fees	122,668 22	55,613 15	67,055 07	
Patent fees	560 00	442 00	118 00	
Examination fees, D.L.S.	906 50	463 50	443 00	
Refunds of refunds	285 50	347 59		62 09
Mining fees	1,147 00	584 00	563 00	
Hay lands	2,152 99	1,777 65	375 34	
Dredging leases	6,730 12	1,062 95	5,667 17	
Grazing leases	41,372 76	34,992 42	6,380 34	
Coal lands	698 90	505 40	193 50	
Rent of water power	49 77	63 87		14 10
Rentals of land	115 74	37 50	78 24	
Assay charges	1,480 67	1,321 61	159 06	
Miscellaneous	720 94	3,535 40		2,814 46
Yoho Park		300 00		300 00
Fees *re* applications for patents		15 00		15 00
	197,160 14	114,576 19	86,069 75	3,485 80
	1,339,382 35	1,681,824 70		342,442 35
Refunds	25,786 90	36,721 75		10,934 85
Total	1,313,595 45	1,645,102 95		331,507 50

NOTE.—Decrease in Crown Timber Agencies, $117,088.94.
Increase in Miscellaneous, including Refunds, $93,518 80.
Net decrease, $331,507.50.

STATEMENT of Receipts of Dominion Lands Revenue for the fiscal year ended June 30, 1905, compared with the Receipts for the previous fiscal year.

(NET CASH REVENUE).

Particulars.	1904-1905.	1903-1904.	Increase.	Decrease.	Net Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Homestead fees	304,806 25	255,772 36	49,033 89	....	
Improvements	21,571 25	15,119 47	6,451 78	....	
General sales of land	154,128 04	196,750 15	....	42,622 11	
Map sales, office fees, &c	4,879 13	5,549 13	....	670 00	
Timber dues	266,951 46	397,344 33	....	130,392 87	
Grazing lands	36,145 32	19,790 27	16,355 05	....	
Coal lands	768 83	510 90	257 93	....	
Hay permits	2,435 99	2,245 20	190 79	....	
Mining fees	94,001 00	145,975 14	....	51,974 14	
Hydraulic leases	6,957 05	10,383 11	....	3,426 06	
Dredging leases	7,115 90	1,703 11	5,412 79	....	
Export tax on gold	206,755 87	272,217 96	....	65,462 09	
Free miners' certificates	46,022 53	62,190 10	....	16,167 57	
Rent of water power	49 77	63 87	....	14 10	
Royalty on water sold	65 65	139 75	....	74 10	
Free certificates for export of gold	452 00	27 00	425 00	....	
Fees *re* applications for patents	....	15 00	....	15 00	
Patent and interchange fees	1,205 00	1,032 00	173 00	....	
Survey fees	122,768 22	56,673 15	66,095 07	....	
Irrigation fees	303 00	127 04	175 96	....	
Extra assay charges	1,480 67	1,321 61	159 06	....	
Rocky Mountains Park of Canada	14,044 55	9,106 48	4.938 07	....	
Yoho Park	....	300 00	....	300 00	
Rental of lands	18,694 48	19,693 21	....	998 73	
Fees *re* examinations, D.L.S	906 50	463 50	443 00	....	
Bonus on timber berth	....	2,231 00	....	2.231 00	
Miscellaneous	1,976 94	1,361 49	615 45	....	
	1,314,485 40	1,478,106 33	150,726 84	314,347 77	
Refunds	22,184 26	35,083 66	12,899 40	....	
Total	1,292,301 14	1,443,022 67	163,626 24	314,347 77	150,721 53

REGISTRATION FEES, NORTHWEST TERRITORIES.

STATEMENT of Registration Fees from commencement to June 30, 1905.

Fiscal Year.	Assiniboia (Regina.)	North Alberta (Edmonton.)	South Alberta (Calgary.)	East Saskatchewan (Pr.-Albert.)	West Saskatchewan (Battleford.)	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1879-1880					190 00	190 00
1880-1881					271 00	271 00
1881-1882					194 50	194 50
1882-1883	343 75					343 75
1883-1884	396 45				50 00	446 45
1884-1885	983 65			177 42	3 00	1,164 07
1885-1886	1,161 90		254 35	212 00	10 80	1,639 05
1886-1887	2,499 29	497 60	216 40	421 85		3,635 14
1887-1888	3,527 75	531 27	2,876 44	1,696 71	99 17	8,731 34
1888-1889	3,601 62	381 97	3,133 86	956 27	105 69	8,179 41
1889-1890	4,901 26	475 62	4,580 12	1,018 79	107 19	11,082 98
1890-1891	5,332 16	585 82	5,554 35	2,021 37	89 61	13,583 31
1891-1892	4,810 89	1,160 56	4,090 52	1,409 34	156 32	11.627 63
1892 1893	6,042 15	1,982 33	4,146 02	1,157 21	110 27	13,437 98
1893-1894	6,236 41	2,722 74	2,852 44	1,049 65	86 29	12,947 53
1894 1895	5,161 74	2,653 97	3,219 50	730 22	89 23	11,854 66
1895-1896	4,489 29	2,713 66	2.097 61	728 20	73 20	10,101 96
1896-1897	5,339 55	1,900 76	1,991 90	848 75	123 78	10,204 74
1897-1898	7,411 33	2,485 45	3,526 85	737 50	102 37	14,263 50
1898-1899	9,275 55	3,553 73	3,608 90	1,151 95	31 75	17,621 88
1899-1900	11,222 65	5,395 50	4,078 44	1,354 10	189 15	22,239 84
1900-1901	14,317 20	6,995 50	5,207 43	1,662 70	51 13	28,233 96
1901-1902	18,893 55	11,700 70	8,190 78	3,081 73	71 18	41,937 94
1902-1903	36,355 00	20,849 90	11,298 55	6,131 90	206 99	74,842 34
1903 1904	55,539 60	23,930 28	18,031 45	7,508 70	456 35	105,466 38
1904-1905	63,645 40	23,836 55	22,673 38	10,389 35	772 58	121,317 26
	271,488 14	114,353 91	111,629 29	44,445 71	3,641 55	545,558 60

STATEMENT of Rocky Mountains Park Revenue for fiscal year ended June 30, 1905, as compared with Revenue for previous year.

Particulars.	Fiscal Year, 1904-1905.	Fiscal Year, 1903-1904.	Increase.	Decrease.	Net Increase.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rent	4,155 75	3,954 27	201 48		
Timber dues	1,405 57	750 52	655 05		
Cave and basin (tickets)	1,885 75	1,124 75	761 00		
Hot springs (tickets)	719 50		719 50		
Water rates	200 00	100 00	100 00		
Dog licenses	132 00	55 00	77 00		
Livery licenses	284 00	291 00		7 00	
Pedlar's licenses	14 00	6 00	8 00		
Billiard licenses	100 00	70 00	30 00		
Boat licenses	80 00		80 00		
Butcher licenses	20 00	20 00			
Camping permits	9 00	29 00		20 00	
Transfer fees	94 00	68 00	26 00		
Grazing lands	165 00	112 50	52 50		
Coal lands	4,223 83	1,207 50	3,016 33		
Sale of vacant buildings	405 25	1,200 00		794 75	
Hay dues		15 00		15 00	
Quarry permits		1 50		1 50	
Miscellaneous	150 90	101 44	49 46		
Cash totals	14,044 55	9,106 48	5,776 32	838 25	4,938 07
Scrip	15 00	92 00		77 00	
Cash and scrip	14,059 55	9,198 48	5,776 32	915 25	4,861 07

STATEMENT showing yearly the Gross Revenue (in cash only) received from all sources during the eighteen years ending June 30, 1905.

Fiscal Year.	Dominion Lands (Cash).	School Lands.	Seed Grain.	Ordnance Lands.	Fines and Forfeitures.	Registration Fees.	Casual Revenue.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1887-1888	223,360 73	42,045 11	....	36,239 88	1,267 05	7,212 02	372 79	310,497 58
1888-1889	243,046 84	52,354 94	26,146 13	42,072 07	739 25	6,543 53	1,075 36	371,978 12
1889-1890	224,770 16	45,188 57	5,017 44	29,921 61	958 75	8,866 39	261 63	314,984 55
1890-1891	268,751 35	38,826 33	3,385 60	54,229 69	1,595 02	10,866 65	627 81	380,282 45
1891-1892	337,106 07	136,131 80	5,957 65	42,360 80	788 92	9,302 11	532 14	532,179 49
1892-1893	303,550 86	82,615 22	5,866 21	33,776 90	777 00	10,750 38	1,331 96	438,668 53
1893-1894	214,540 30	47,574 11	2,339 16	22,318 20	864 15	10,358 02	1,982 04	299,975 98
1894-1895	171,085 48	47,665 10	2,752 56	22,645 97	693 85	9,811 77	875 36	255,530 09
1895-1896	174,509 38	56,584 32	8,748 05	17,550 28	502 00	8,737 87	1,920 66	268,552 56
	2,160,721 17	548,985 50	62,212 80	361,115 40	8,185 99	82,448 74	8,979 75	3,172,649 35
1896-1897	187,424 19	24,292 43	9,887 13	9,831 27	1,316 00	8,997 21	2,683 05	244,431 31
1897-1898	980,313 10	52,410 82	12,351 71	22,537 17	529 06	14,263 50	260 92	1,082,666 28
1898-1899	1,563,020 74	41,249 77	12,388 69	12,349 65	2,801 03	19,220 73	2,620 91	1,653,651 52
1899-1900	1,410,883 18	220,874 78	15,271 84	11,043 53	1,452 92	21,751 90	3,664 00	1,684,942 45
1900-1901	1,533,197 07	48,049 83	15,711 63	14,604 47	1,977 96	33,979 77	1,587 57	1,649,108 30
1901-1902	1,254,333 56	193,410 75	20,293 06	16,967 36	1,955 61	50,854 99	3,900 62	1,541,715 95
1902-1903	1,716,597 20	392,206 93	28,789 97	17,612 79	5,220 88	81,404 18	2,230 26	2,244,062 21
1903-1904	1,478,106 33	233,769 62	26,122 30	30,194 34	5,911 92	109,233 73	3,402 94	1,887,041 18
1904-1905	1,314,485 40	332,914 48	16,471 34	10,346 90	10,018 19	123,082 86	4,258 14	1,811,577 61
	11,438,361 07	1,539,179 41	157,287 67	145,787 48	31,183 87	462,788 90	24,608 41	13,799,196 81
	13,599,082 24	2,088,164 91	219,500 47	446,902 88	39,369 86	545,237 64	33,588 16	16,971,846 16

REVENUE.

The total gross revenue of the department during the past fiscal year has been $1,836,474.56, or a net decrease of $254,284.99, as compared with the previous year. It will be seen, however, by referring to the general statement of receipts that there was an increase of $65,388.94 on account of fees on free homesteads and grazing lands, the decrease in the revenue being chiefly attributable to the falling off in the timber dues and in the receipts from the Yukon Territory. The chief object of the department being the settlement of the vacant lands under its control, it is gratifying to observe that the total revenue on account of homestead fees alone for the nine years ending June 30 last amounted to $1,292,207.26, as compared with $297,323.98 for the preceding nine years.

It will be observed also that the total revenue from all sources during the same period was $13,799,196.81, as compared with $3,172,649.35 for the preceding nine years.

CORRESPONDENCE.

The following statement shows the number of letters received and sent by the department in each year since its establishment:—

Departmental Year ended October 31.	Letters Received.	Letters Sent.	Total.
1874	3,482	4,120	7,632
1875	1,974	2,189	4,163
1876	2,256	3,097	5,353
1877	3,137	3,677	6,814
1878	4,642	6,009	10,651
1879	5,586	6,179	11,755
1880	8,222	9,940	18,162
1881	13,605	15,829	29,434
1882	25,500	30,300	55,800
1883	27,180	33,500	60,680
1884	27,525	33,386	60,911
1885	33,970	43,997	77,967
1886	60,964	67,973	128,937
1887	47,845	60,890	108,735
1888	43,407	52,298	95,705
1889	48,316	50,500	98,816
1890	36,200	36,008	72,208
1891	38,000	36,267	74,267
1892	41,990	42,203	84,193
1893	50,794	48,145	98,939
1894	48,619	50,840	99,459
1895	49,991	45,898	95,889
1896	47,501	44,238	91,739
1897	65,714	64,147	129,861
1898	88,913	87,845	176,758
1899	95,023	91,876	186,899
1900	121,219	133,177	254,396
1901	144,978	136,348	281,326
1902	167,200	185,548	352,748
1903 (From June 30, 1902, to July 1, 1903)	185,582	223,463	409,045
1904 (From June 30, 1903, to July 1, 1904)	222,316	274,675	496,991
1905 (From June 30, 1904, to July 1, 1905)	245,470	302,723	548,193

The number of registered letters during the departmental year 1905 was: received, 6,014; sent. 24,436.

As will be observed from the foregoing statement the correspondence of the department has assumed very large proportions of late years. It is quite safe to say that there is not another branch of the public service which is called upon to deal with such an extensive correspondence. The work in this relation has taxed the department to its utmost capacity during the past year, and I desire to point out here that in the public interest, and in justice to the officers and clerks who are charged more especially with the registration and filing of the correspondence, the time has come when effective means must be adopted for the proper handling of the official records of the department. With the limited space and unsuitable quarters now at their disposal for that purpose, it is impossible to deal promptly with the immense number of letters which reach the department daily, and to keep a proper record of the same. Provision is now being made for the transfer of a portion of the staff to suitable quarters in the new Canadian Building, and this will somewhat relieve the situation for the time being, but such an arrangement can only be of a temporary nature. If the work of the department continues to increase in the same ratio as it has done within the last few years, and there is every reason to believe that this will be the case, owing to the rapid development of the western provinces, steps will have to be taken at an early date to provide a suitable building for the accommodation of all the branches of the department at headquarters.

DOMINION LANDS.

The report of the Commissioner of Dominion Lands will be found under Part I. of the general report.

The statements submitted by the various officers under the control of the Commissioner, both at headquarters and in the outside service, are all of a most satisfactory nature. There has been such an increased interest in free homestead lands that in many districts settlement has overtaken surveys, the evidence of advancement being notable not only in country districts, but in towns and villages that are springing up along the lines of railway.

The following comparative statement showing the amount of work performed in the office of the Commissioner of Dominion Lands at headquarters during the years 1900, 1903 and 1905, respectively, will give an idea as to what the increase of work has been within the period mentioned:—

COMPARATIVE Statement of Work, Dominion Lands Branch.

——	1900.	1903.	1905
Files dealt with	29,263	68,593	102,560
Letters written	33,679	77,200	124,772
Applications for patent (new)	* 1,144	4,960	7,933
" " dealt with	5,601	8,019	10,437
Certificates of recommendation issued	2,946	4,772	6,809

* Last six months only.

STATEMENT of Land Sales by Railway Companies having Government

Year.	Hudson's Bay Company.		Canadian Pacific Railway Company.		Manitoba South-Western Colonization Railway Company.		Qu'Appelle, and Sas- Railroad boat
	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.	Acres.
		$		$		$	
1893........	......	......	93,184	295,288	14,164	57,559	1,603
1894........	7,526	48,225	43,155	131,628	6,312	28,003	640
1895........	4,431	23,209	55,453	176,950	5,623	22,330	2,391
1896........	9,299	52,410	66,624	220,360	21,254	88,568	286
1897........	10,784	53,277	135,681	431,095	63,800	234,644	2,524
1898......	62,000	310,000	242,135	757,792	106,473	363,982	22,534
1899........	56,875	274,625	231,832	814,857	58,019	199,458	61,030
(Fiscal Year)							
1900........	70,196	352,631	379,091	1,152,836	133,507	437,449	18,932
(Fiscal Year)							
1901........	82,308	399,804	339,985	1,046,665	59,749	214,953	22,266
(Fiscal Year)							
1902........	269,577	1,412,332	1,362,478	4,440,500	206,411	713,365	39,835
(Fiscal Year)							
1903........	330,046	1,939,804	2,260,722	8,472,250	250,372	699,210	843,900
(Fiscal Year)							
1904........	144,857	879,910	857,474	3,516,864	29,522	113,303	....
(Fiscal Year)							
1905........	139,721	865,905	411,451	2,045,800	80,342	296,936	....
(Fiscal Year)							
Total.....	1,187,620	6,612,132	6,509,265	23,502,885	1,035,548	3,469,760	1,015,941

Land Grants and by the Hudson's Bay Company.

Long Lake katchewan and Steam- Company.	Calgary and Edmonton Railway Company.		Canadian Northern Railway Company.		Great North-West Central Railway Company.		Totals.	
Amount.	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.	Acres.	Amount.
$		$		$		$		$
....	11,260	.....	....	....	....	....	120,211	352,847
....	11,035	.....	....	....	....	....	68,668	207,856
....	46,815	.....	....	....	....	....	114,713	222,489
....	10,553	.....	....	....	....	....	108,016	361,338
....	9,436	.....	....	....	....	....	222,225	719,016
....	15,481	.....	....	....	....	....	448,623	1,431,774
178,517	24,738	53,335	....	....	....	....	462,494	1,520,792
53,974	46,653	128,256	....	....	....	....	648,379	2,125,146
74,810	116,719	352,037	....	....	....	....	621,027	2,088,269
147,365	323,494	1,033,396	....	....	....	....	2,201,795	7,746,958
1,476,900	231,800	909,600	183,736	631,503	128,435	522,490	4,229,011	14,651,757
....	129,007	563,507	64,469	313,575	41,858	177,081	1,267,187	5,564,240
....	109,191	512,898	231,707	1,221,469	17,593	103,564	990,005	5,046,572
1,931,566	1,086,182	3,553,029	479,912	2,166,547	187,886	803,135	11,502,354	42,039,054

The following is a comparative statement of the homestead entries and sales which have been made at the several agencies of the department during the fiscal year ending June 30, 1904, and June 30, 1905, respectively:—

—	Fiscal Year June 30, 1904.		Fiscal Year June 30, 1905.	
	No. of Entries.	Acres.	No. of Entries.	Acres.
Homesteads	26,073	4,171,680	30,819	4,931,040
Sales	....	225,652	....	51,789

The following statement shows the number of homestead entries reported in each year since 1874:—

Departmental year ended	No. of entries.
October 31, 1874	1,376
" 31, 1875	499
" 31, 1876	347
" 31, 1877	845
" 31, 1878	1,788
" 31, 1879	4,068
" 31, 1880	2,074
" 31, 1881	2,753
" 31, 1882	7,483
" 31, 1883	6,063
" 31, 1884	3,753
" 31, 1885	1,858
" 31, 1886	2,657
" 31, 1887	2,036
" 31, 1888	2,655
" 31, 1889	4,416
" 31, 1890	2,955
" 31, 1891	3,523
" 31, 1892	4,840
" 31, 1893	4,067
" 31, 1894	3,209
December 31, 1895	2,394
" 31, 1896	1,857
" 31, 1897	2,384
" 31, 1898	4,848
" 31, 1899	6,689
June 30, 1900	7,426
" 30, 1901	8,167
" 30, 1902	14,673
" 30, 1903	31,383
" 30, 1904	26,073
" 30, 1905	30,819

STATEMENT showing the number of Homestead Entries by month for the fiscal years ending June 30, 1902, 1903, 1904 and 1905.

Fiscal Year.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Total.
1902	939	773	582	783	762	825	809	928	1,207	2,078	2,199	2,788	14,673
1903	2,622	1,904	1,416	2,142	2,482	1,640	1,169	1,165	2,325	5,778	4,109	4,691	31,383
1904	3,438	2,288	1,845	1,958	2,406	1,570	1,240	1,128	1,330	2,322	2,948	3,600	26,073
1905	3,011	2,360	2,015	2,005	2,652	1,902	1,407	1,169	2,426	3,781	3,916	4,175	30,819

STATEMENT showing the number of Homestead Entries made during the fiscal year ended June 30, 1905, and the Nationality of the Homesteaders, as reported by the several Agencies of the Department in Manitoba, the North-west Territories and British Columbia.

Nationalities.	No. of Entries.	Nationalities.	No. of Entries.
Canadians from Ontario	4,885	Syrians	10
" Quebec,	538	Germans	812
" Nova Scotia	187	Austro-Hungarians	1,931
" New Brunswick	147	Hollanders	28
" Prince Edward Island	115	Danes (other than Icelanders)	50
" Manitoba	1,267	Icelanders	207
" North-west Territories	510	Swedo-Norwegians	721
" British Columbia	73	Russians (other than Mennonites and Doukhobors)	378
Persons who had previous entry	3,151		
Canadians returned from the United States	483	Mennonites	99
Americans	8,532	Doukhobors	207
Newfoundlanders	2	Chinese	2
English	4,284	Japanese	11
Scotch	1,225	Persians	1
Irish	421	Portuguese	2
French	329	New Zealanders	11
Belgians	105	Australians	9
Swiss	33	South Africans	1
Italians	9		
Roumanians	43	Total	30,819
Greeks	......	Representing 77,550 souls.	

STATEMENT showing the number of Homestead Entries made during the fiscal year ended June 30, 1905, by persons coming from the various States and Territories of the American Union.

States.	No. of Entries.	States.	No. of Entries.
Alaska	1	Mississippi	......
Alabama	2	Missouri	121
Arizona	2	Montana	316
Arkansas	18	Nebraska	219
California	83	Nevada	10
Carolina	9	New Hampshire	11
Colorado	67	New Jersey	12
Connecticut	11	New York	85
Dakota	2,579	Ohio	168
Delaware	1	Oklahoma	93
Florida	1	Oregon	150
Georgia	1	Pennsylvania	56
Idaho	219	Rhode Island	10
Illinois	285	Tennessee	6
Indiana	73	Texas	20
Indian Territory	44	Utah	128
Iowa	464	Vermont	20
Kansas	148	Virginia	20
Kentucky	7	Washington	633
Louisiana	1	Wisconsin	422
Maine	15	Wyoming	58
Massachusetts	31	New Mexico	5
Michigan	389	Maryland	1
Minnesota	1,999	District of Columbia	1
		Total	9,015

STATEMENT showing the Number of Letters Patent issued by the Department of the Interior in each year since 1874.

Period.	Number issued.
Year ended October 31, 1874	536
" 1875	492
" 1876	375
" 1877	2,156
" 1878	2,597
" 1879	2,194
" 1880	1,704
" 1881	1,768
" 1882	2,766
" 1883	3,591
" 1884	3,837
" 1885	3,257
" 1886	4,570
" 1887	4,599
" 1888	3,275
" 1889	3,282
" 1890	3,273
" 1891	2,449
" 1892	2,955
" 1893	2,936
" 1894	2,553
Year ended December 31, 1894	2,682
" 1895	2,118
" 1896	2,665
" 1897	2,972
" 1898	3,037
" 1899	3,904
Six months ended June 30, 1900	1,970
Year ended June 30, 1901	6,461
" 1902	8,768
" 1903	7,349
" 1904	6,890
" 1905	8,798

HOMESTEAD ENTRIES.

There were 30,819 entries granted during the past fiscal year, which is an increase of 4,746 over the previous twelve months. This has been the most successful year, with regard to the granting of free homestead entries to actual settlers, since the inception of the department in 1873. It is true that there were more entries granted during the year ending June 30, 1903, but, as was explained in the report for last year, some 2,000 of the entries recorded in 1903 were made by Doukhobors who had been located on their lands for several years previously, but who through conscientious motives refused to register for their holdings.

The 30,819 entries granted last year represented 77,550 souls, and the homesteads taken cover a total acreage of 4,931,040 acres.

In order to form an adequate estimate of the increase which has taken place within the last few years in the number of free homesteads which have been disposed of by the department, it may be pointed out that of the total number of entries that have been made since 1874, 111,115 were recorded within the last five years, or an average of 22,223 for each year, leaving a balance of 88,863 for the previous 26 years.

While there had been a marked improvement in the results obtained from the new methods that were inaugurated some years ago for promoting land settlement, as evidenced by the increase in the number of entries granted as far back as 1898 and 1899, the effect of the department's vigorous immigration policy, both in the United States and in the British Isles, is only now being fully felt. The following statement will help to illustrate this fact more clearly:—

—	Entries.	Acreage.	Revenue.
			$
5 years ending December 31, 1895	18,033	2,884,280	175,128
" June 30, 1900	23,204	3,712,640	205,162
" " 1905	111,115	17,778,400	1,105,323

It may be stated further that the indications are that the number of entries for the present year will be in excess of those granted during the twelve months ending June 30 last.

STATEMENT showing the number of Homestead Entries in the several Dominion Lands Agencies, since January 1, 1900.

Agency.	1900.	1901.	1902.	1903.	1904.	1905.
Alameda	792	658	3,384	2,123	1,366	2,031
Battleford	3	18	487	1,590	2,259	5,183
Brandon	553	441	1,288	685	396	232
Calgary	679	936	1,707	2,383	2,609	2,113
Dauphin	535	299	407	484	490	499
Edmonton	1,309	1,699	2,733	3,244	2,597	3,094
Kamloops	65	52	110	109	192	113
Lethbridge	347	605	1,268	1,543	1,945	1,786
Minnedosa	290	375	445	417	203	200
New Westminster	24	24	33	24	35	29
Prince Albert	359	601	1,637	2,869	1,837	1,960
Regina	985	1,318	4,158	8,134	6,432	9,883
Red Deer	785	890	1,341	1,489	1,460	2,629
Winnipeg	610	722	846	1,158	746	629
Yorkton	514	470	2,371	6,430	3,946	4,264
	7,850	9,108	22,215	32,682	26,513	34,645

TIMBER, GRAZING AND MINERAL LANDS.

Full returns as to the business transacted in connection with the above will be found in the report of the chief clerk in charge, under Part 18 of the Dominion Lands division of the general report.

Although there has been a falling off in the revenue of this branch of the department, due chiefly to a decrease in the collections upon the exportations of gold from the Yukon Territory, and in the receipts on account of timber dues generally, the work of the office has been very heavy, as evidenced by the large increase in the general correspondence of the branch.

It is gratifying to note that although the revenue in connection with timber dues has not been as large as for the previous year, there has been an increase of 37,035,046 feet in board measure, in the quantity of manufactured lumber sold during the past twelve months, and a corresponding falling off in the importation of sawn lumber from outside of Canada.

IRRIGATION AND CANADIAN IRRIGATION SURVEYS, 1904.

The semi-arid region of the territories has experienced another season during 1904 with a good supply of moisture in the shape of rainfall, and in consequence the majority of irrigation ditches owned by individuals have not been operated. This cause has retarded the issue of final licenses, and added to the work of inspection, as many ditch owners do not see the necessity of putting their systems in good working order, when the water is not required on the land irrigable, although plainly notified that this is a necessary condition to obtaining final license; in some instances it has been found necessary to cancel water rights.

In spite of the above conditions applications for water rights have steadily increased, and emanate almost entirely from individual settlers, adding very materially to office work. In the early part of June Mr. P. M. Sauder was appointed to the position of draughtsman in this office, replacing Mr. M. Kimpe, who resigned in the spring.

Owing to the resignation of Mr. R. W. Macintyre, assistant engineer, to take a position with the North-west Government, no hydrographic party was put in the field, but the contour survey was sent out under Mr. J. G. MacIntosh (employed during previous seasons on hydrographic work). The contour work was continued south from close of last year's work, the object in view being to connect the work commenced near Calgary in 1898 with the district contoured south and east of Lethbridge in 1899, so that a complete topographical record of this portion of semi-arid region can be mapped and be available for reference.

The most important irrigation work in progress during the year has been the Canadian Pacific Irrigation Canal, affecting a large tract of country east of Calgary, comprising 3,840,000 acres, of which it is estimated that 60 per cent is irrigable. Survey parties and contractors were hard at work until the fall, and substantial progress in construction, including extensive headgates near the mouth of Nose creek, has been the result.

The Alberta Railway and Irrigation Company (successors to the Canadian North West Irrigation Company) operating canals from the St. Mary river and Milk river, south of Lethbridge, have filed a large number of agreements for the sale and use of water to settlers during the past year, and this enterprise has undoubtedly been instrumental in settling an extensive tract of country, which was practically vacant six years ago, besides starting a new and remunerative industry, viz., the culture of sugar beets to supply the refinery at Raymond.

IMMIGRATION.

The report of the Superintendent of Immigration upon the work of this branch of the department will be found under Part II. of the general report.

As a result of the system of classification which was inaugurated some time ago, a statement is now submitted by the superintendent from which the origin of new arrivals may be readily ascertained. This has involved much careful work of checking on the part of his officers, both at headquarters, at sea-ports and at the Winnipeg office, which is the main distributing point. However, it may be stated that the figures given are strictly accurate.

The past year has been the most successful one in the history of the country, in so far as immigration is concerned. The total number of arrivals has been 146,266, the largest on record, and not only are these results satisfactory from a numerical point of view, but when it is considered that 98,902 of these immigrants, or more than two-thirds of the total arrivals, come from the British Isles and the United States, and that our agents throughout the west are unanimous in their appreciation of the class of settlers who have located in Manitoba and the new provinces during the past season, I think that this is an achievement on the part of those who have been instrumental in framing our present immigration policy for which every Canadian should feel grateful. In a young country like Canada, with its small population, its extensive territory, and unlimited natural resources, it is of paramount importance, from a national standpoint, that the assimilation of the foreign elements that are brought in should proceed gradually, but, under present conditions, when nearly one hundred thousand Englishmen, speaking the same language, and having the same aspirations as ourselves, are added to our population in the short space of twelve months, there is little ground to fear that the national character can ever be impaired. All danger in this respect, if danger there ever was, has now disappeared, and it is to be hoped that the methods followed in the past in this relation will not fail to have the same beneficial results in the future.

BRITISH IMMIGRATION.

There were in all 55,359 arrivals from Great Britain and Ireland during the year, being an increase of 14,985 over the previous twelve months.

There would appear to be no doubt to-day that what determined the movement of population from England to Canada was the systematic propaganda that was inaugurated four or five years ago by the department. Before that time Canada was almost unknown to the rural classes in the old country. Now it is favourably known, and what did more than anything else to bring about a change in the minds of the agricultural classes in England was the dissemination throughout the entire kingdom, by experienced agents, or successful farmers from Manitoba and the North-west, of reliable information with regard to the resources and possibilities of Canada. It is gratifying to note that, judging from present indications, there is every reason to believe that the emigration from the British Isles to Canada during the present fiscal year will far exceed the number of arrivals during the previous twelve months.

UNITED STATES SETTLERS.

There has been a slight falling off in the number of arrivals from the United States. However, the number is still very large, and the general result of our work there has been highly satisfactory. The settlers are of the very best class, and in most cases possessed of considerable means.

It is proposed to continue with increased vigour the efforts put forth in the past to sustain and stimulate this movement of population.

MEDICAL INSPECTION.

Attention is called to the report of the Chief Medical Inspector upon the work of his office during the past season. As will be noted from this report, a very complete and effective system of medical inspection has now been established on a most satisfactory basis.

On the whole the incoming settlers during the past year were found to be of a very healthy class, and it is satisfactory to note that of the 102,723 persons who arrived in the country at ocean ports, only 496 were deported on account of disease. With the effective regulations now in force, there is no possibility of any immigrants suffering from infectious or contagious diseases being allowed to enter the country.

BRITISH IMMIGRANT CHILDREN.

The report of Mr. G. Bogue Smart, Chief Inspector of British Immigrant Children and Receiving Homes, will be read with interest, as the returns which it contains as regards the present condition and progress of this class of immigration are very satisfactory.

The inspection of these children, who are being sent to Canada in ever increasing numbers, is now being conducted on a systematic basis. The work involved is considerable, as thousands of the children are scattered throughout every section of the country, and according to the terms of an arrangement with the home government, each child must be visited annually by one of the inspectors of the department, and a report as to his condition made to the Board of Guardians in England.

It is gratifying to observe from Mr. Smart's report that on the whole these children are doing remarkably well in their new homes, and that a large number of those sent some years ago are turning out to-day to be prosperous and law-abiding citizens.

COMPARATIVE statement of arrivals at inland and ocean ports during the ten years ending June 30, 1905.

ARRIVALS.

Year.	Great Britain and Ireland.	Continent and Iceland.	United States.	Total.
1895-6	12,384	4,451	....	16,835
1896-7	11,383	7,921	2,412	21,716
1897-8	11,173	11,608	9,119	31,900
1898-9	10,660	21,938	11,945	44,543
1899-00	* 5,141	* 10,211	* 8,543	23,895
1900-01	11,810	19,352	17,987	49,149
1901-02	17,259	23,732	26,388	67,379
1902-03	41,792	37,099	49,473	128,364
1903-04	50,374	34,785	45,171	130,330
1904-05	65,359	37,255	43,652	146,266

* Arrivals for six months only.

SURVEYS.

During the year 1904 eighty-two survey parties were engaged in surveying Dominion lands. Of these, seven were working in Manitoba, fifty-nine in the North-west Territories, five in British Columbia and eleven partly in Manitoba and partly in the North-west Territories.

Four of the parties under daily pay were in charge of the Inspector of Surveys, and were engaged in examining the township subdivision surveys which were made under contract.

In 1905, prior to the 1st of July, there were forty parties at work, thirty in the North-west Territories, two in Manitoba, four in British Columbia and four partly in the North-west Territories and partly in Manitoba.

Two of the parties under daily pay were in charge of the inspectors.

The following table shows the distribution of the parties paid by the day and those working under contract:—

Parties.	In Manitoba.	In North-West Territories.	Partly in Manitoba and partly in the North-West Territories.	In British Columbia.	Total.
1904—Paid by the day	2	15	3	5	25
Under contract	5	44	8	....	57
1905—Paid by the day	1	15	4	4	24
Under contract	1	15	....	....	16

The total mileage of the eighty parties engaged on township surveys in 1904 was 37,913 miles, an average of 474 miles per party. The parties of Messrs. Wheeler and Belleau are not included as they were not engaged on township surveys.

The surveys were confined chiefly to the district north of the Red Deer river in the vicinity of the fourth meridian and to the district north-west of Edmonton.

The surveys made during the years 1903 and 1904 have been so extensive that they are now well in advance of settlement. On this account survey operations this year are being carried out on a much smaller scale. It is expected that not more than 210 townships will be subdivided during the present season.

Three parties under daily pay are engaged in surveying base lines and block outlines in the Peace river district, and three other parties in doing similar work between the fifth and sixth meridians. Base lines and block outlines are the governing lines in the system of survey of Dominion lands. The main object of these surveys is to make preparation for the subdivision of the country into townships as the progress of settlement along the new railroads is expected to produce a great demand for the purchase of lands in these districts. Another object of these surveys is to define the boundary of British Columbia in order to facilitate the location of the three and a half millions of acres of land granted by the British Columbia legislature to the Dominion government as compensation for the lands in the railway belt which had become alienated prior to the transfer of the belt to the Dominion government.

Mr. J. A. Macdonell is in charge of a party to select and locate this three and a half million acres. He has as assistant Mr. J. A. Belleau, D.L.S., whose duties are to locate points and otherwise to assist in locating the block of land where technical knowledge is required. He is also to survey the boundaries of the block after it has been selected by Mr. Macdonell.

Mr. W. Thibaudeau, C.E., until recently Territorial Engineer of the Yukon, has been given a contract for a survey of the Klondike region, for the purpose of locating canals for bringing to the mining district the water of the Klondike river or its tributaries to be used for hydraulicking and sluicing purposes. The length of the lines to be surveyed is estimated at 300 miles.

Hereunder will be found the usual tables of subdivision or settlement survey work completed each year since the commencement of the surveys, with the result of last season's operations added:—

—	Acres.	Number of Farms of 160 acres each.
Previous to June, 1873	4,792,292	29,952
1874	4,237,864	26,487
1875	665,000	4,156
1876	420,507	2,628
1877	231,691	1,448
1878	306,936	1,918
1879	1,130,482	7,066
1880	4,472,000	27,950
1881	8,147,000	50,919
1882	10,186,000	63,662
1883	27,234,000	170,212
1884	6,435,000	40,218
1885	391,680	2,448
1886	1,379,010	8,620
1887	643,710	4,023
1888	1,131,840	7,074
1889	516,968	3,231
1890	817,075	5,106
1891	76,560	476
1892	1,395,200	8,720
1893	2,928,640	18,304
1894	300,240	1,876
1895	406,240	2,539
1896	506,560	3.166
1897	428,640	2,679
1898	851,840	5,374
1899	1,022,720	6,392
1900 (first 6 months)	735,480	4,596
1900-1901	1,603,680	10,023
1901-1902	2,553,120	15,957
1902-1903	6.173,440	38,584
1903-1904	12,709,600	79,435
1904-1905	10,671,520	66,697
Total	115,490,535	721,936

INTERNATIONAL BOUNDARIES.

The re-survey and re-demarcation of the international boundary along the 49th parallel has been continued during the year, jointly with the United States, in accordance with a programme of work arranged by Dr. W. F. King, H. M. Commissioner, and Mr. O. H. Tittmann and Dr. C. D. Walcott, United States Commissioners. The Canadian section of the field work has been under the direction of Mr. J. J. McArthur, D.L.S.

The part of this line west of the summit of the Rocky mountains has been practically completed, including the erection of the monuments, as far as the Skagit river, and is well advanced in the lower Fraser valley west of the Cascade mountains. About forty miles remains to be done in the Cascade mountains. This it is hoped to survey and mark next season, thus completing the whole of the southern land boundary of British Columbia.

Mr. J. M. Macoun, as naturalist, and Dr. R. A. Daly, as geologist, to the international boundary surveys, carried on their investigations along the 49th parallel during the summer.

The substance of the award of the London Tribunal with reference to the boundary of the coast strip of Alaska was given in the report of my predecessor for 1902-3. The Tribunal defined the international boundary line from Portland canal to Mt. St. Elias by reference to certain mountains, which they determined to be the mountains referred to in the treaty of 1825 as situated parallel to the coast.

As to the course of the boundary line between two points, however, namely the mountains marked 'P' and 'T' on the map accompanying their award, they say that, 'in the absence of further survey, the evidence is not sufficient to enable the Tribunal to say which are the mountains parallel to the coast within the meaning of the treaty.' They thereby left the course of the boundary line undefined between these points, the northerly one of which, 'P,' lies twelve miles north of Taku river, and the other, 'T,' near the head of Dawes glacier. The distance between these two points is about 120 miles.

In April, 1904, the Commissioners, Messrs. King and Tittmann, who had been appointed to carry out the award of the Tribunal, held a conference at which they agreed upon a joint recommendation as to the course which the line should follow between the points 'P' and 'T.' In this recommendation they followed the principle of selecting mountain peaks near enough to one another to be, with reasonable certainty, intervisible, and at the same time approximately in the straight line joining the terminal peaks. The recommendation of the Commissioners was accepted by the governments of Great Britain and the United States and formally agreed to by exchange of notes on March 25, 1905. Hereby is completed the legal definition of the whole Canada-Alaska boundary line from Prince of Wales island to Mt. St. Elias.

The survey and demarcation in accordance with this definition are in the hands of the Commissioners above named. Operations on the ground in continuation of those of 1904, which are described in last year's departmental report, have been carried on during the season of 1905 by three United States and three Canadian parties.

The details of the distribution of these parties will be found in the report of the Chief Astronomer and Boundary Commissioner.

During the summer an examination was made by Mr. G. C. Rainboth, D.L.S., representing this department, and Mr. J. B. Baylor, of the United States Coast and Geodetic Survey, of the iron posts which were placed, about the year 1845, to mark the international boundary line separating the provinces of Quebec and New Brunswick from the states of Vermont, New Hampshire and Maine. The examination extended from Richelieu river to the source of St. Croix river, with the exception of a part of the line along the highlands which lies in dense forest and could not readily be reached.

OPERATIONS OF THE ASTRONOMICAL BRANCH OF THE DEPARTMENT.

The new building for the Dominion Observatory having been made ready for occupation, the Astronomical Branch moved into it in April, and the business of that branch comprising, besides the astronomical work proper, the administration of the international boundary surveys also is now conducted there.

The building is situated at the north side of the Central Experimental Farm, on the hill overlooking the city. It is a fine specimen of architecture, and well suited to the purposes for which it was built. A full description of it, and of the principal instruments it contains will be found in the report of the Chief Astronomer.

With a view to affording those who take an interest in astronomy an opportunity to see the celestial bodies through the fifteen-inch telescope, the observatory is open to the public every Saturday evening. This opportunity is very largely utilized.

Electric dials, numbering over 200, have been installed in the parliament building, the eastern, western and Langevin departmental blocks, and the observatory. The dials in each building are driven by a master clock. The master clocks themselves are kept in continual synchronization electrically by the principal clock in the observatory, which is regulated by astronomical observation. The signal for the noon gun is also given from the observatory, instead of from Montreal, as formerly. The clock system is working well, and there are many calls for its extension.

The final report of Dr. Klotz upon the determination during the years 1903 and 1904 of longitudes of points along the line of the transpacific cable is printed as an appendix to the report of the Chief Astronomer. The chain of successive differences of longitude carried from Greenwich through Canada was connected at Sydney with that carried eastward from Greenwich through Europe, India, &c., with a closing discrepancy in the circuit of the globe of only one-fifteenth of a second of time. As there are some twenty links in the whole chain, and the determination of the difference of longitude of each link consists of the comparison of time between its extremities, one can get some idea of the extreme accuracy of modern observations.

During last summer, observations were taken for difference of longitude between Vancouver and Seattle, and between Ottawa and the following stations:—

Harvard College Observatory, Father Point, Tadousac, Sharbot lake, Ste. Anne de Bellevue, Trenton, Madoc, Lindsay, Kingston, Whitby, Sutton, St. Catharines, North Bay, Temagami and Renfrew. The latitudes were also observed at all these stations except Harvard. A telegraphic longitude connection was made between Cliff Street Observatory, Ottawa, which has been hitherto the point of reference for longitudes observed in Canada, and the new observatory. The latitudes and longitudes thus determined have an important application in the correction of the maps.

Existing maps of Canada are, to a great extent, based upon imperfect surveys, or upon surveys which, while individually accurate, are not properly co-ordinated with one another. In mapping, when these surveys are joined to one another errors tend to accumulate until serious discrepancies appear; the individual pieces of the map can no longer be fitted together without an 'adjustment.' If this adjustment is to be anything better than mere guesswork on the part of the map-maker a check survey is necessary, which it is usually not possible for him to make or to have made. Astronomical determination of latitudes and longitudes serves the purpose of correction in a limited degree only. Astronomical stations cannot, with due consideration of time and expense, be placed near enough to one another to afford a complete control. The only effectual remedy for the confusion and ultimate expense arising out of imperfect surveys is a triangulation survey, whereby, by means of a net work of triangles covering the country to be surveyed, the exact location of points a few miles apart is effected, to which points all surveys for whatever purpose may be connected with, as nearly as possible, complete elimination of error of position.

The need for this accurate basis having become apparent, it was determined to begin a triangulation survey of the better settled parts of Canada, and the Chief Astronomer was authorized to make a beginning near Ottawa. A considerable amount of preliminary reconnaissance has been made, and it is hoped to begin the actual measurements in the spring.

A total eclipse of the sun, visible in Canada, took place on August 30 last. In November, 1904, the council of the Royal Astronomical Society of Canada memorialized the government on the subject of a Canadian expedition to observe the phenomenon.

Total solar eclipses are not of frequent occurrence and their observation has great value to science by affording an opportunity to study the constitution of the sun. It therefore seemed proper that this occasion should be taken advantage of, and the request of the society was accordingly acceded to. An expedition to North-west river, Ungava district, was organized under the Chief Astronomer. Six members of the Royal Astronomical Society of Canada were invited to accompany the expedition, together with Mr. Maunder, of the Royal Observatory at Greenwich, representing the Astronomer Royal of England, and a number of other astronomers.

Extensive preparations were made by the party from the Dominion Observatory to photograph the eclipse in the most thorough manner. It is most unfortunate that through densely clouded skies on the morning of the eclipse, no results could be obtained.

THE ROCKY MOUNTAINS PARK OF CANADA.

The report of the Superintendent of the Park upon the operations of his office during the past year will be found under Part V. of the general report. It is satisfactory to note that the fame of this national resort, whose natural beauties are acknowledged to be unsurpassed by any other similar mountain park in America or in Europe, continues to attract to Banff an ever increasing number of tourists and health-seekers.

The work of improving the roads and trails within the park is being proceeded with as vigorously as the means at our disposal will permit. However, the road communications which have already been provided are such as to afford visitors ample facilities to reach all points of interest.

Contracts have recently been entered into for the immediate construction of a system of waterworks and sewerage for the park. The combined work will involve an expenditure in the neighbourhood of $100,000. The lack of a proper system of water supply and sewerage has been the source of considerable annoyance to both permanent residents and visitors in the park, and the improvements which have now been contracted for will remove what heretofore has been considered as a serious drawback to the advancement of the park.

The total number of visitors during the past season was 17,605, and the superintendent reports that owing to the lack of sufficient hotel accommodation some five thousand tourists were turned out from Banff during the summer.

The animal preserve is reported as making satisfactory progress. The buffalo herd has now increased to fifty-one head, and all are reported in healthy condition, as well as the other animals in the preserve, which include specimens of elk, moose, and seven other animals whose habitat is the Rocky mountains.

I desire to call attention also to the reference made in the superintendent's report to the discovery of certain caves in the vicinity of Glacier House, near the Roger's Pass summit of the Selkirk range. The existence of these caves was first brought to the attention of the department by Mr. C. H. Deutschman, who while prospecting, accidentally discovered the same. The department has caused several examinations to be made by competent officers of the country in which the caves are situated, with a view to ascertaining the best means of communication that could be established. It is proposed to build a trail to the caves at an early date so that the cave system may be made accessible to the travelling public. The scenery of the surrounding country is reported to be of very great beauty, and as for the caves themselves, according to the reports of those who have visited the same, there would appear to be no doubt that they will not fail in the near future to be a source of much interest to tourists who visit the park.

THE YUKON TERRITORY.

Mr. W. W. B. McInnes, barrister, of Victoria, B.C., was appointed Commissioner of the Yukon Territory, on May 26, 1905, in the place of Mr. Fred T. Congdon, who had previously resigned. Mr. McInnes is a man of high standing in his profession and one whose superior administrative abilities will enable him to successfully discharge the important duties attaching to his office.

The report upon the operation of the Yukon offices, together with full returns and statements from the officers in charge, will be found under Part VII. of the general report.

There has been a decrease of $158,228.57 in the total revenue from this source, as compared with the previous year. This decrease is chiefly attributable to a falling off in the gold production, and from the report of the Assistant Gold Commissioner, whose opinion in the matter is worthy of the utmost consideration, it would appear that the decrease in mining dues is accounted for by the fact that the diggings at the chief points of mining do not give the same opportunity for staking new grounds, or for relocating old claims, as in the past, coupled with the fact that there have not been any new discoveries of any importance made during the past year. In consequence, a portion of the population have left for the Tanana diggings in Alaska, and a certain proportion have otherwise left the district. From this it does not follow that the country has been worked out, as there are still a large number of claims that will continue for years to come to be profitably worked by ordinary placer mining methods. Moreover, steps are being taken by the department to have a careful hydrographic survey made of the hills and bench claims in the vicinity of Bonanza and Hunker creeks. There is a large area of ground here that could be worked successfully if a steady supply of water could be obtained, and it is with this object in view that the department is now having an examination made of the ground by a competent engineer. If a proper system for distributing the water from adjacent streams can be devised, there is no doubt that the district in question can be worked profitably for many years to come, and this, of course, will materially increase the gold production of the territory.

It is satisfactory to note that the dredging operations that have been conducted on Bonanza creek are meeting with success, and that steps are being taken to have dredges installed at Bear creek and at other points in the district.

I may point out also that owing to the decrease in the general work of the Yukon offices, it became necessary to dispense with the services of a large number of officials, and with a view to further economy an arrangement has been made with the Royal North-west Mounted Police authorities, under which a number of non-commissioned officers act as agents to mining recorders in the districts of Dawson and White Horse. These officers are competent to perform this class of work properly, and as they do so in addition to their ordinary duties, without any extra remuneration, it will effect a considerable saving in the expenditure for this service.

OFFICE OF THE SUPERINTENDENT OF MINES.

The report of the Superintendent of Mines forms Part VIII. of the general report.

Considering that this office was only established on its present basis at a comparatively recent date the results of the work accomplished will be found very satisfactory.

Although the field work has been confined to a limited number of investigations, very valuable reports have been issued under the supervision of the superintendent, chief amongst which may be mentioned that of Mr. J. Waller Wells, upon hydraulic cements, clays and shales, and limestones and lime industry in Manitoba, three preliminary reports which contain much reliable information upon these important subjects. Two very interesting reports have also been issued upon the mica and asbestos fields of the Dominion, the first of a series of reports upon the economic minerals of Canada. These reports were prepared by Mr. Fritz Cirkel, an engineer of well known ability, and the demand that is being made upon the department for copies of these publications is the very best proof of the necessity which exists for the dissemination of accurate information with regard to the mining resources of the country. It is proposed to continue the issue of similar reports upon all the economic minerals of Canada, special attention being paid, as pointed out by the superintendent, to such features as may prove of value to those commercially interested.

Two magnetic surveys were also made during the past season, one which was undertaken by Mr. Erik Nystrom, of the mining office, for the purpose of verifying the conclusions of a previous survey made of the iron ore deposits in Charlotte county, N.B., and another by Mr. B. F. Haanel, also of the mining office, with a view to determining the value of certain magnetic ore deposits in the township of Lavant, Lanark county, Ontario. The results of these surveys are found in the preliminary reports of the officers in charge, which form part of the superintendent's report.

An examination was also made by Mr. Wells of the Pembina district, near Snowflake, Manitoba, for the purpose of studying the coal occurrences reported to have been observed in that locality. The conclusions arrived at would appear to point to the absence of lignite coal of workable size in the district examined.

The superintendent's report covers full statements and returns upon the operations of the Dominion of Canada assay office at Vancouver, and in the Yukon.

FORESTRY.

The report of the Superintendent of Forestry, which forms Part X. of the general report, will be found to contain very interesting information with regard to this important subject.

The question of tree planting is gradually growing in favour amongst the farming community of western Canada, as evidenced by the large increase in the demand for seedling trees and cuttings. The forestry branch is one of comparatively recent formation, and the results, necessarily, cannot be such as to serve as an object lesson to those who may not believe in the possibility of afforestation on the western plains. Nevertheless, the results obtained so far have amply demonstrated the fact that under proper supervision tree planting in the west can be successfully undertaken, and it will not be many years now before this fact is made manifest by the full development of the trees that have been planted under the direction of the forestry bureau, but which are still of a comparatively recent growth.

Special attention is called to the able report of Mr. Norman F. Ross, Assistant Superintendent, with regard to tree planting and nurseries, and to that of Mr. Roland D. Craig on forest protection.

The system inaugurated some years ago for protecting from fire the timber areas under the control of the Dominion is working very satisfactorily. Millions of dollars' worth of merchantable timber has been saved from destruction through the timely efforts of the forest rangers, and the service is one which is being highly commended by the public, especially in the province of British Columbia.

SCHOOL LANDS.

There were no sales of school lands held during the past fiscal year, those that had been arranged for having been subsequently postponed. There were, however, a number of sales held at the beginning of the present year, but as the returns do not belong to the present report they will form part of the report for the year 1905-1906. It may be stated in the meantime that the lands offered were situated along the lines of the Calgary and Edmonton and the Crow's Nest railways in Western Alberta, as well as in the eastern portion of the old district of Assiniboia. There was a keen competition for the lands disposed of, and the price secured was highly satisfactory.

As will be observed from the figures given in the report of Mr. Checkley, the officer in charge of school lands, the total area of school lands sold in Manitoba to July 1 last, was 271,384·45 acres, representing a capital of $2,181,066.91, the average price paid per acre being $8.04. In the territories 147,245·32 acres had up to that date been disposed of, at an average price of $10.01 per acre, representing a principal of $1,473,-949.90. It will, therefore, be seen that the combined net revenue for Manitoba and the territories has been $331,997.13, and the combined cost of management $12,390.71, which is slightly in excess of 3 per cent of the total revenue. I have no doubt that this result is one which will be considered as being highly satisfactory, as it indicates that the trust has been economically administered.

THE DISTRICT OF KEEWATIN.

The report of His Honour the Lieutenant Governor of Keewatin, upon the conditions of this district during the past year, will be found under Part VI. of the general report.

As mentioned by His Honour, an epidemic of measles, scarlet fever, and mumps, prevented the natives from following their usual avocations of fishing and hunting, which resulted in numerous cases of destitution, but relief in all deserving cases was furnished by the government.

It is satisfactory to observe that law and order prevail amongst the scattered population who inhabit this district, the Indians being reported to be law-abiding and peaceful.

Under the special legislation which was passed during the last session of parliament, the district of Keewatin, from September 1 last, has ceased to exist as a separate district under that name, having been merged into what will hereafter be known and designated as the North-west Territories of Canada. These, besides Keewatin, will comprise the unorganized districts that were formerly known as Mackenzie, Ungava and Franklin. This change was considered necessary as a result of the establishment of the two new western provinces which formerly constituted the North-west Territories of Assiniboia, Saskatchewan and Alberta. The extensive regions now designated as the North-west Territories have been placed under the immediate control of the Comptroller of the Royal North-west Mounted Police, who is now charged with the administration of the affairs of the whole district. There is no doubt that such an arrangement will have very satisfactory results, as it will insure uniformity of laws and regulations as regards the protection of life and property, and conduce to the development of the resources of the territories.

THE NEW PROVINCES OF SASKATCHEWAN AND ALBERTA.

In submitting this annual report which is the thirty-second since the inception of the department in 1873, and the thirty-fifth since the first official report was issued by the Honourable, the Secretary of State of Canada, in the year 1871, upon the first steps that had been taken to open up to settlement the newly formed province of Manitoba and the vast territory of Rupert's Land, of which it formed part, I wish to refer briefly to the enactments of the last session of parliament, providing for the establishment of the two new provinces of Saskatchewan and Alberta. This is without doubt the most important event that will ever be recorded in the history of the department. That during the life of some of those who personally contributed by their counsel to bring about the rudimentary North-west legislation of thirty-five years ago, it should have become necessary to-day, in the interest of the country, to add to confederation two new provinces, fully matured for autonomy, both as regards population and physical development, is an achievement unparalleled in the history of the United States or the British colonies, and for which every Canadian has just reason to feel proud. I, therefore, consider it a duty which is due to the memory of those who, by their work and energy, and by reason of the public offices which they held under the Crown, have been instrumental in bringing about the establishment of these new provinces, to make mention here of their names, and of the offices which they held, and also to give a brief summary of some of the leading events that have occurred during the time that the territories have been under federal administration.

The first legislative enactments which we find in this relation were those made during the session of 1869, when an Act was assented to on June 22 of that year, entitled 'An Act for the Temporary Government of Rupert's Land and the North-western Territory when united with Canada,' chapter 3 of 32-33 Victoria. At that time the province of Manitoba had not been formed, but during the following session by the Act, chapter 3 of 33 Victoria, a constitutional government was provided for this province, leaving the remainder of Rupert's Land and the North-western Territory under the operation of the Act of the previous session. Matters remained in this position until the session of 1871, when the Act of 1869 was re-enacted so as to apply more particularly to the North-west Territories outside of Manitoba, 34 Victoria, chapter 16. This Act provided for the appointment of a Lieutenant Governor and of a Council to administer the territories, all existing laws remaining in force and all public officers retaining office until other provisions to the contrary were made. The Honourable Alex. Campbell who was at that time Postmaster General under the first ministry, looked after the passage of this Act in the House of Commons. On May 20, 1870, the Honourable Adams George Archibald was appointed Lieutenant Governor of the North-west Territories, by Order in Council of that date, upon the recommendation of Sir George Etienne Cartier, Bart., Minister of Militia and Defence.

The following letter of instructions, which was addressed on August 4, 1870, to His Honour the Honourable Mr. Archibald, the draft of which had been approved by Order in Council on the recommendation of Sir George Cartier, acting for the Minister of Justice, is very interesting, as it indicates the initiatory steps that were taken at that time to open up the territories:—

OFFICE OF SECRETARY OF STATE FOR THE PROVINCES,
OTTAWA, August 4, 1870.

To His Honour the Honourable
ADAMS G. ARCHIBALD,
Lieutenant Governor of the North-west Territories.

SIR,—In reference to my letter of July 30 last transmitting to you a Commission from the Governor General appointing you Lieutenant Governor of the North-west Territories, I have the honour by command of His Excellency to forward to you the following instructions for your guidance in the government of those territories.

1. You will with as little delay as possible open communication with the Indian bands occupying the country lying between Lake Superior and the province of Manitoba, with a view to the establishment of such friendly relations as may make the route from Thunder bay to Fort Garry secure at all seasons of the year, and facilitate the settlement of such portions of the country as it may be practicable to improve.

2. You will also turn your attention promptly to the condition of the country outside of the province of Manitoba on the north and west, and while assuring the Indians of your desire to establish friendly relations with them, you will ascertain and report to His Excellency the course you may think most advisable to pursue whether by treaty or otherwise for the removal of any obstructions that might be presented to the flow of population into the fertile lands that lie between Manitoba and the Rocky mountains.

3. You will have the goodness to report with all convenient speed, for the information of His Excellency, on the state of the laws now existing in the territories, transmitting copies of any laws, ordinances or regulations of the Hudson's Bay Company now in force there, together with a full report as to the mode of administering justice, the organization of the courts, the number and mode of appointment of justices of the peace, the police arrangements and the means adopted for keeping the peace, &c.

4. You will have the goodness to report also upon the system of taxation (if any) now in force in the territories, the system of licensing shops, taverns, &c., the mode of regulating or prohibiting the sale of wines, spirituous and malt liquors, and further as to the mode of keeping up the roads, and generally on the municipal organization (if any) existing in the territories.

5. You will also make a full report upon the state of the Indian tribes now in the territories, their numbers, wants and claims, the system heretofore pursued by the Hudson's Bay Company in dealing with them—accompanied by any suggestions you may desire to offer with reference to their protection, and to the improvement of their condition.

6. You will have the goodness to report also on the nature and amount of currency or circulating medium now employed in the territories, and of the probable requirements of the territories in that respect in the future.

7. You will also please to report as to such lands in the territories as it may be desirable to open up at once for settlement, transmitting such sketch or plan as may be necessary, with an estimate of the probable cost of survey, a statement of the conditions as to settlement or otherwise suggested for grants of land—such sketch or plan to show the number of townships it is proposed to lay out at once, their size and situation, and the size of the lots, making the necessary reservation for churches, schools, roads and other public purposes.

8. You will also report as to the number of officers now employed by the Hudson's Bay Company in the administration of government in the territories, stating the duties and salaries of such officers, and specifying those who should in your opinion be retained; you will also report as to the number of persons whom it will be necessary hereafter to employ in the administration of the government, and you will report gen-

erally on all subjects connected with the welfare of the territories upon which it may seem to you desirable to communicate with the government of the Dominion.

These instructions may be altered or amended from time to time.

I have, &c.,

(Signed) E. A. MEREDITH.

By Order in Council of March 1, 1871, the control and management of Crown lands in the territories were confided to the Secretary of State, all Crown lands the property of the Dominion having already been placed under his control by section 36 of the Act 31 Victoria, chapter 42, providing for the organization of the Department of the Secretary of State of Canada, and matters remained in this position until the year 1873, when the affairs of the territories were placed under the control of the Department of the Interior which was constituted chiefly for that purpose.

LIST OF THE LIEUTENANT GOVERNORS OF THE NORTH-WEST TERRITORIES FROM 1870 TO 1905.

Name.	From Assumption of Office.	To.
His Honour Adams George Archibald, C.M.G	July 15, 1870	Dec. 1, 1872
His Honour Alexander Morris	Dec. 2, 1872	Oct. 6, 1876
His Honour David Laird	Oct. 7, 1876	Dec. 2, 1881
His Honour Edgar Dewdney	Dec. 3, 1881	July 3, 1888
His Honour Joseph Royal	July 4, 1888	Oct. 31, 1893
His Honour Charles Herbert Mackintosh	Nov. 1, 1893	June 6, 1898
His Honour Malcolm Colin Cameron	June 7, 1898	Sept. 26, 1898
His Honour Amédée Emmanuel Forget	Oct. 13, 1898	Sept. 1, 1905

LIST OF THE MINISTERS OF THE INTERIOR FROM 1873 TO 1905.

Name.	From.	To.
Hon. Alexander Campbell	July 1, 1873	Nov. 6, 1873
" David Laird	Nov. 7, 1873	Oct. 6, 1876
" David Mills	Oct. 24, 1876	Oct. 16, 1878
The Right Hon. Sir John Alexander Macdonald, P.C., K.C.B.	Oct. 17, 1878	Oct. 16, 1883
Hon. Sir David Lewis Macpherson, K.C.M.G	Oct. 17, 1883	Aug. 4, 1885
" Thomas White	Aug. 5, 1885	April 21, 1888
" Edgar Dewdney	Aug. 3, 1888	Oct 16, 1892
" Thomas Mayne Daly	Oct. 17, 1892	April 30, 1896
" Hugh John Macdonald	May 1, 1896	July 12, 1896
" Clifford Sifton	Nov. 17, 1896	Feb. 28, 1905
" Frank Oliver	April 8, 1905	....

The first document on record with regard to the administration of Dominion lands is that contained in the annual report of the Honourable J. C. Aikins, Secretary of State, for the year ending June 30, 1871, from which the following extract may prove interesting:—

'Since my last report the North-west Territories have been transferred to and become part of the Dominion of Canada, and by section 34, chapter 42, of 31 Victoria, are under the management of this department.

'The extensive territory thus transferred possesses a very large area suitable for the growth of wheat and coarse grains, roots and vegetables, second to no country on this continent.

'A branch has been added to this department, known as the Dominion Lands branch, at the head of which John Stoughton Dennis, Esq., has been placed, with the title of Surveyor General.

'It may be of some interest to add that Mr. McMicken, Land Agent at Winnipeg, has been furnished with maps of the townships surveyed, so that he is now prepared to deal with all parties who may desire to make entries for lands either by sale, pre-emption or homestead.'

LIST OF DEPUTY MINISTERS OF THE INTERIOR FROM 1873 TO 1905.

Name.	From.	To.
Edmund Allen Meredith	July 1, 1873	October 7, 1878
William Buckingham	October 8, 1878	Nov. 13, 1878
Lieut.-Col. John Stoughton Dennis, C.M.G	Nov. 14, 1878	Dec. 31, 1883
Lindsay Russell	January 1, 1882	June 30, 1881
Alexander Mackinnon Burgess	July 1, 1883	March 31, 1897
James Allan Smart	April 1, 1897	Dec. 31, 1904
William Wallace Cory	January 1, 1905	....

LIST OF SURVEYORS GENERAL FROM 1871 TO 1905.

Name.	From.	To.
Lieut.-Col. John Stoughton Dennis	March 7, 1871	Nov. 13, 1878
Lindsay Russell	Nov. 14, 1878	June 30, 1884
Edouard Deville	January 1, 1885	. ...

In recording the names of persons who have taken an active part in the settlement of the North-west Territories, special mention is due to that of the late Colonel Dennis, who held the position of Surveyor General from the very inception of the Dominion Lands Branch under the Secretary of State in 1871, and who continued in charge of this important work until November 13, 1878.

Colonel Dennis was the originator of the present system of surveys. It was under his personal instructions that the first lines were laid of what were to be the permanent boundaries of the millions of homes that these vast territories are destined to contain. No stronger testimony could be offered as to his professional skill and remarkable forethought than the success with which the survey of these territories has been effected in accordance with the plans which he had been chiefly instrumental in devising.

The following passage from the first report which Colonel Dennis submitted to the Secretary of State, on March 1, 1872, will no doubt prove interesting as it indicates that its author had, even at that time, formed a very accurate estimate of the possibilities of the western prairies:—

'I have the honour to submit the following report on the operation of this branch since its establishment on March 7 last.

'A few preliminary remarks, however, on the extent and general character of the territory which has lately become the property of Canada, with the management of which, designated as Dominion lands, this branch has been charged, will prove, at the present time not uninteresting.

'The extent of the territory is immense, as will appear from the following estimate of areas which has been made up from the most reliable data.

'The total area is calculated within the coast lines as laid down on the Admiralty charts, and is exclusive of Labrador and the islands in the Arctic sea.

'The classification of productive areas is based upon the most reliable practical evidence so far attainable, that is to say: reports of official explorations, information obtained from the Hudson's Bay Company's posts, from mission stations, and from other trustworthy sources.

STATEMENT OF AREAS DOMINION LANDS.

1.	2.	3.	4.	5.
'Unavailable for 'cultivation, being 'the portion of the 'Great American 'Desert which ex- 'tends into British 'territory.	Prairie country the greater part of which is unsurpassed for agricultural purposes, with occasional groves, and belts of timber.	Timbered land with occasional large prairies (as in Peace River District) adapted for growth of wheat and other cereals. Possesses abundance of timber.	Belt lying outside of No. 2 and 3 (or agricultural zone proper) in which potatoes, barley, and grasses may be successfully cultivated. Sufficiently supplied with timber.	Rock and swamp, barren lands, in which the timber growth extending up from south gradually disappears. Fur producing region.
'Square miles, 50,000	Square miles, 120,000	Square miles, 466,225	Square miles, 928,200	Square miles, 642,300
'In acres, 32,000,000	In acres, 76,800,000	In acres, 298,384,000	In acres, 594,048,000	In acres, 411,072,000

'Showing a total area of 2,206,725 square miles, equal to 1,412,304,000 acres, of which, saying nothing of tracts 1 and 4 above, (which are of more or less value for grazing and other producing purposes), we have 2 and 3, containing 375,184,000 acres of agricultural land, and the greater part of which is beyond question specially well adapted for wheat growing.

The winter climate is somewhat severe, but not more so than in parts of Ontario and Quebec; on the other hand, the country is undoubtedly one of the healthiest in the world, and the particular portion to which allusion has just been made, is calculated to sustain a farming population of many millions of souls.'

The following passage also from a report addressed to the Honourable the Secretary of State on March 1, 1873, by Colonel Dennis goes to show how little was known of the North-west Territories at that time:—

'The request of the Chief Commissioner of the Hudson Bay Company to have surveys of the blocks around the posts of the company, reserved under the deed of surrender, effected by the Surveyor General of Dominion lands (the company paying the expenses), having been complied with, your instructions in relation thereto have been carried out. The reserves alluded to are at certain posts of the company, distributed throughout the North-west Territory, and their survey will afford facilities to acquire information respecting the climate and resources of many parts of the country, in regard to which little is as yet publicly known.'

The total extent of lands surveyed in the west in 1872 was 1,156,654 acres, all within the boundaries of the province of Manitoba, or 7,229 farms of 160 acres each. The issue of letters patent for land began in 1873, the total number granted in that year being 46, covering an area of 12,553 acres.

These few particulars will give an idea of the existing conditions in the early seventies as regards the western territories, and as to what was done at that time to open up the country. Within the comparatively short period that has elapsed since then, 115,490,535 acres of land have been surveyed and made available for settlement; nearly two hundred thousand free farms, of 160 acres each, have been granted to actual settlers; a gross revenue of over twenty-two million dollars has been collected, and two autonomous provinces, with an estimated population of close on half a million people, have been established on solid foundations, and with the brightest prospects for future development.

While the task of the department has been partly accomplished, there still remains much work to be done. Only a very limited area of the vast western domain is yet occupied. The construction of the Grand Trunk Pacific and Canadian Northern railways, and the extensive systems of branch lines in connection therewith which will eventually be found necessary in order to keep up with the development of the country, will open up to settlement extensive areas of some of the best agricultural lands in the new western provinces, and it is therefore proposed to prosecute with increased vigour in future the methods inaugurated some ten years ago for promoting immigration to these western fields, and which would appear to have given such satisfactory results.

I have the honour to be, sir,

Your obedient servant,

W. W. CORY,

Deputy Minister of the Interior.

PART I

DOMINION LANDS

No. 1.

REPORT OF THE DOMINION LANDS COMMISSIONER.

DEPARTMENT OF THE INTERIOR,
OTTAWA, September 29, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit my report for the year ending June 30, 1905, on the Dominion Lands Branch of this department, together with the reports of the Inspector of Dominion Lands Agencies and the several local agents.

The transactions of this office have steadily increased and there is every prospect of the work becoming heavier. The correspondence arising from settlement, voluminous as it is, may be counted upon as becoming still more so with each succeeding year.

I submit a comparative statement for the past seven years, which sets forth the transactions of the office:—

STATEMENT OF WORK.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.
Files dealt with	24,611	26,527	31,153	35,877	54,784	76,426	90,474
Correspondence—							
Letters sent	16,284	18,897	21,620	25,954	37,169	52,458	66,411
Triplicates	8,884	10,585	16,978	18,887	28,271	35,865	44,573
Total	25,128	29,482	38,598	44,841	65,440	88,323	110,984
Applications for patent—							
No. examined	4,418	5,464	5,456	6,929	8,051	8,961	9,482
New applications	2,590	2,373	2,262	3,116	4,062	5,039	6,443
Certificates issued	2,740	2,895	2,131	3,686	4,071	4,854	5,849

I would again draw attention to the inconvenience resulting from insufficiency of space for the accommodation of my staff. For hygienic reasons alone, this is much to be regretted, and it is hoped that steps may be taken at an early date to provide for a necessity which each year becomes more pressing.

The reports of the local agents show that the crop prospects were most excellent. It is satisfactory to note that these anticipations have been fully realized, and that in quantity as well as in quality the harvest of the Canadian North-west is the greatest yet recorded.

In districts where the land is adapted to the purpose, mixed farming, including poultry raising, is receiving more attention than heretofore, whilst Southern Alberta has shown that beet sugar can be manufactured profitably, and in some districts dairying is being successfully carried out, creameries running full time. The progressiveness of the west is not lacking in the adoption of modern methods. Farmers are importing thorough-bred stock, and much improvement may be looked for in local herds. The general prosperity of the country is readily apparent. Substantial buildings are taking the place of earlier erections, whilst villages develop into towns, and new ones spring up rapidly as the lines of railway extend westward, whilst schools and churches follow. In the cities, the population is increasing greatly, keeping pace with unprecedented building construction, the effect of business resulting from the present condition.

As might be expected, there is a great demand for land, and there is great activity in the market for both wild and improved farms, at prices which would not have been credited a few years ago. The influx of immigrants has resulted in the rapid settlement of lands, the tendency being towards the townships recently surveyed and along the line of the railway extension; in many cases, the surveyors are overtaken, and squatting takes place ahead of them. Those lands already entered for are closely watched, and cancellation proceedings are soon instituted when duties are known to be in default. New surveys will have to be undertaken in order to keep pace with the demands of settlement. The construction of the Canadian Northern Railway and other extensions, has had a marked effect in directing settlement, which has proceeded rapidly, it being particularly noticeable along the valleys of the Saskatchewan, there being perhaps an inclination to pass by lands in the older parts of the provinces for the wider choice in the new districts. It might be mentioned that the North Saskatchewan river is being used for transportation purposes, greatly to the advantage of settlers.

The immigrants now arriving are of an excellent class, and are likely to prove good and permanent settlers. In addition to the fact that there is a large increase in the number of homestead entries it is evident that far fewer are being made which might be considered as speculative, a difficulty with which this department has had to contend. Further, it is satisfactory to note that many now arriving have come out on the advice of friends already located in the country.

There have been no bush or prairie fires of any importance, and it is hoped that the preventive measures now taken may effectually keep them in check.

The homestead inspection service has been strengthened by the addition of several new inspectors, this being necessary in order to cope with the increase of settlement and the requirements resulting therefrom.

Your obedient servant,

J. W. GREENWAY,
Commissioner.

No. 2.

REPORT OF THE INSPECTOR OF AGENCIES.

Department of the Interior,
Office of Inspector of Dominion Lands Agencies,
Brandon, September 12, 1905.

J. W. Greenway, Esq.,
Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—In submitting my report for the departmental year ending June 30, 1905, it is perhaps well to say that I entered upon my duties as Inspector of Dominion Lands Agencies on January 1, 1905. Although filling the position of inspector for the latter half of the departmental year only, the statements herewith of work done, &c., are for the full departmental year. About six weeks' time was spent at head office, Ottawa, conferring with the heads of the different branches, and familiarizing myself with the work.

The work in connection with the Lands Branch of the department has materially increased, especially in the offices in the North-west Territories. I have visited each lands office in Manitoba, North-west Territories and British Columbia, and also a number of the sub-agencies, and have called upon each homestead inspector. To keep up with the increasing work it has been necessary to give additional help in some offices, and to do considerable overtime work in most all the offices. It is a matter for congratulation that the lands agents and their staffs, sub-agents and homestead inspectors, are with very few exceptions, careful, painstaking, efficient and obliging in their work, and notwithstanding the great amount of work falling upon them, the utmost attention and civility are shown to every inquirer and prospective settler.

The increase in homestead entries over 1903-4 amounts to....	4,757
Increase in applications for patent over 1903-4 amounts to....	1,664
Increase in cancellations of land entries over 1903-4 amounts to	2,130
Increase in letters received at the local land offices for 1903-4 amounts to..........................	42,972
Increase in letters sent out by the local lands offices over 1903-4 amounts to..........................	53,482

The increase of the homestead inspection work has necessitated the appointment of a number of additional homestead inspectors, and the better equipping of all with travelling outfits.

My duties have been increased by adding thereto the inspection of Banff and Yoho Parks, which also includes the timber and mines work in connection with the same. Since I assumed office my time has been largely spent in visiting the offices and facilitating the work generally. This has occasioned much travelling, a statement of which is as follows:—

—	Miles by Rail.	Miles Driven.	Total.
January	1,436		1,436
February	1,870		1,870
March	2,675		2,675
April	3,635	80	3,715
May	3,056	80	3,136
June	2,910	482	3,392
	15,582	642	16,224

Statement 'A' attached hereto shows the principal transactions for the year by the Dominion Lands Agents.

Statement 'B,' a list of the sub-agents and a statement of the principal work performed by them.

Statement 'C,' a list of the homestead inspectors, and a statement of the principal work performed by them.

Owing to the present abundant crop, and the increasing prosperity of the Canadian West, it is highly probable that the ensuing year's work will far exceed that of any previous year.

Your obedient servant,

R. E. A. LEECH,

Inspector of Dominion Lands Agencies.

A.—DOMINION Lands Agencies, principal transactions for the year ending June 30, 1905.

Agencies.	Homestead Entries granted.	Land Sales.	Land Scrip Located. No.	Land Scrip Located. Acres.	Applications for Patent received.	Land Entries cancelled.	Timber Permits issued.	Hay Permits issued.	Letters. Received.	Letters. Sent.	Revenue. Scrip.	Revenue. Total Scrip and Cash.	No. of Staff.	Expenditure. Salary.	Expenditure. Contingencies.
											$ cts.	$ cts.		$ cts.	$ cts.
Alameda	1,657	13	7	800	682	1,047	455	110	17,029	17,169	688 00	22,578 75	4	4,905 50	542 56
Battleford	3,618	10	21	3,200	11	298	131	46	16,730	14,009	....	38,752 18	5	2,888 39	285 27
Brandon	305	44	.....	......	493	270	461	12	13,167	12,822	1,991 77	21,758 39	4	4,117 50	497 76
Calgary	2,181	90	.....	......	353	574	906	74	33,180	20,644	1,090 27	51,791 41	9	6,511 86	892 11
Dauphin	520	8	.....	......	345	159	1,329	104	7,503	4,928	40 00	16,753 95	2	2,299 92	1,344 77
Edmonton	2,903	56	23	2,700	1,040	1,229	1,469	46	18,463	17,591	755 33	43,682 36	7	5,288 99	815 09
Kamloops	149	128	.....	......	46	39	.....	18	4,425	3,747	1,196 74	17,902 12	1	1,400 00	118 35
Lethbridge	1,968	83	.....	......	256	729	642	131	17,712	14,715	308 55	34,185 56	5	4,041 59	350 03
Minnedosa	220	10	.....	......	253	92	183	153	5,196	3,878	960 00	6,186 67	2	2,200 00	195 52
New Westminster	40	17	.....	......	14	.....	.....	.....	1,917	1,507	....	3,891 85	1	1,400 00	200 00
Prince Albert	2,138	21	.....	......	514	930	1,409	44	12,539	11,434	792 00	44,228 56	5	4,408 83	546 31
Red Deer	2,115	19	.....	......	325	705	704	37	11,985	8,668	160 00	26,004 43	3	2,455 00	377 65
Regina	7,968	102	44	5,087	1,073	2,735	747	200	47,511	45,378	1,685 81	100,595 29	17	12,164 55	1,554 79
Winnipeg	671	110	.....	......	505	392	1,199	206	20,118	16,066	2,486 74	84,899 68	16	15,179 96	4,324 22
Yorkton	4,471	48	78	16,238·50	407	1,385	389	32	17,982	18,229	445 21	53,040 49	7	4,730 44	472 41
	30,924	759	173	28,025·50	6,317	10,584	10,024	1,213	245,457	210,785	12,600 42	566,251 69	88	73,992 53	12,516 84
Compared with year 1904	26,167	831	480	70,490·48	4,653	8,454	10,274	1,098	202,485	157,303	55,812 27	552,250 65	72	63,800 01	12,997 34

B.—List of Sub-Agents of Dominion Lands and Statement of principal work performed by them during the year ended June 30, 1905.

Name.	Place.	Applications for homestead entries taken.	Applications for patents taken.	Applications for timber permits taken.	Applications for hay permits taken.	Amount remitted to Land Office.	Salary.	Expenses, Postage, exchange and commission.	Remarks.
						$ cts.	$ cts.	$ cts.	
Bender, John M	Nanton, Alta	520	12	90	9	5,567 10	300 00	35 96	
Bunn, J. R.	Milestone, Assa.	181	90	9	7	1,836 25	300 00	20 54	
Bobier, J	Dubuc, Assa	23	14	....	....	230 00	300 00	4 05	
Bailey, Chas. Musgrave, F. J	Estevan, Assa	259	88	6	18	2,603 59	300 00	4 26	1 month. 11 months.
Cox, A. E	Pincher Creek	158	81	59	7	4,477 49	300 00	25 63	
Cochran, L. B.	Medicine Hat	244	54	136	24	3,674 41	900 00	47 41	
Cook, R. H Cook, A. B	Arcola, Ass.	222	153	244	66	2,674 75	300 00	25 60	3 months. 9 "
Carroll, J. W	Saddle Lake, Alta	3	....	....	....	30 00	15 00	0 30	1 month.
Dubois, M. J	Duck Lake, Sask.	143	23	106	18	1,875 00	300 00	12 13	
Elton, D. H	Cardston, Alta	32	37	58	....	351 50	325 00	....	
English, J. J	Maple Creek, Assa.	148	15	24	18	1,574 50	300 00	15 62	
Flamank, Geo	Lloydminster, Sask.	610	....	15	4	6,028 60	300 00	23 13	
Fysh, O. B.	Moose Jaw, Assa	532	104	1	....	5,320 00	480 00	43 71	
Goodwin, A. H	Vegreville, Alta	....	....	....	....	....	37 50	....	Appointed May 15, 1905. No returns.
Gwynn, J	Kutawa, Assa.	76	2	12	....	763 00	75 00	3 79	Feb. 6 to June 30, 1905.
Harley, Hugh	Swan River, Man	120	101	252	32	2,067 40	300 00	13 21	
Hauser, F. I.	Humboldt, Sask	268	....	2	....	2,680 50	112 50	15 90	April 15 to June 30, 1905.
Holden, J. B	Leduc, Alta	101	50	61	8	1,041 00	300 00	7 62	
Holmes, W. E. G.	High River, Alta	300	41	148	9	3,123 60	300 00	32 84	
Jansen, J.	Jansen Lake, Assa.	10	....	....	....	100 00	....	....	To October 31, 1904. Resigned.
Deftal, H. De. Langley, Geo	Rosthern, Sask	820	319	343	13	9,307 50	850 00	43 47	
Lapointe, Joseph.	Willow Bunch, Assa.	3	1	5	....	32 50	135 00	0 41	October 1 to June 30, 1905.
Martineau, H.	Touchwood Hills	27	3	....	....	270 00	75 00	1 25	To Nov. 30, 1904. No return received for Dec.
Malcolm, H. A.	Innisfail, Alta	295	110	160	14	3,496 80	450 00	31 92	
Moore, O. S	Olds, Alta	373	121	88	21	3,888 50	600 00	30 23	
Milburn, Wm	Swift Current, Alta.	233	1	10	13	2,367 50	420 00	18 49	
Moffet, Frank	Weyburn, Assa	69	17	....	1	724 00	50 00	4 71	1 month, June, 1905.
Mitchell, R. M	"	559	180	6	7	5,684 00	500 00	42 98	11 months. Resigned June 1, 1905.
McDonald, D. J	Kamloops, B.C	4	31	9	....	251 74	....	5 85	
McGregor, A. B.	Davidson, Assa.	451	5	12	1	4,763 00	300 00	32 70	
McIntosh, Robt.	Saskatoon, Sask.	2,142	31	61	45	21,928 75	625 00	126 01	
Newth, R	Fort Qu'Appelle	584	47	12	16	5,876 60	315 00	53 02	10½ months.
"	Lipton, Assa.	138	5	....	2	1,383 50	45 00	10 13	1½ "
Nixon, Jos.	Macleod, Alta	166	26	72	17	2,705 60	450 00	11 18	9 months to March 31. Resigned.

Page, Spencer	Wapella, Assa	55	41	16	10	2,916 07	300 00	9 37	
Palmasson, P	Pine Valley, Man	28	16	80	1	598 18	180 00		
Paul, S. B	Moosomin, Assa	54	53	1		540 25	300 00	10 39	
Oxley, R. W	Hanley, Assa	446	5	60		4,470 00	300 00	35 73	
Reed, C. C	Ponoka, Alta	179	166	88	12	5,565 46	300 00	36 34	
Stephens, A	Redvers, Assa	23	123			300 00	300 00	6 01	
Stewart, Robt	Whitford, Alta	10	7			100 00	37 50	0 85	1½ months.
Taylor, R. B	Grenfell, Assa	115	30	46	11	1,335 35	300 00	25 70	
Thomson, Wm	Fort Qu'Appelle	31	2		2	316 00	46 45	4 11	1½ "
Vickerson, Frank	Lacombe, Alta	670	200	112	34	7,950 42	450 00	38 41	
Wakefield, A. G	Ranchvale, Man	9	10	2	5	109 85	150 00	2 38	No returns since Dec. 31, 1904.
Wilson, H. G. W	Indian Head, Assa	241	18		5	2,605 50	300 00	25 35	
Walker, F. A	Fort Saskatchewan	193		103	13	2,173 86	300 00	19 77	
Ward, D. A	Wetaskiwin, Alta	1,209	185	113	17	12,617 10	450 00	70 43	
Wilde, A. E	Melfort, Sask	470	49	187	5	4,873 10	306 00	35 68	
Yeo, J. W	Stuartburn, Man	60	24	299	15	700 00	300 00		
		13,617	2,691	3,108	500	155,869 73	14,673 95	1,064 60	
Compared with year 1904		11,917	1,711	2,995	499	144,167 41	12,352 50	959 98	

C.—STATEMENT showing the work of the Homestead Inspectors for the Year ended June 30, 1905.

Name.	Headquarters.	Land Inspections made.	Applications for Patent taken.	Miles travelled by Wagon.	Miles travelled by Rail.	Travelling and Living Expenses self and team.	Expenses for new and on old travelling Equipment.	Remarks.
						$ cts.	$ cts.	
Bannerman, Jas. A	Red Deer, Alta	450	251	4,628	1,662	582 95	124 09	
Bell, Geo. A	Alameda, Assa	461	272	3,857	1,795	717 96	97 30	
Borthwick, Thos	Duck Lake, Sask	326	191	4,272	2,196	829 77	100 00	
Brooke, A. W	Moosejaw, Assa	350	98	3,131	1,699	672 05	377 00	Commenced work September 21, 1904.
Bryant, T. W	Calgary, Alta	474	193	4,687	1,944	916 61	6 25	
Buchanan, D	Minnedosa, Man	323	184	4,994	593	723 65	131 00	
Clouston, G. H	Battleford, Sask	162	31	4,500		477 46	503 00	
Dunbar, D. C	Oxbow, Assa				40	9 00		Commenced work June 13, 1905.
Gibson, Jas. S	Brandon, Man	354	155	2,675	3,688	415 95	96 50	
Gladstone, W. E	Prince Albert	128	59	3,405	180	541 30	79 25	Commenced work September 22, 1904.
Jerome, Martin	Winnipeg, Man	63	39	1,301	781	235 60	471 55	Off duty from December 1, 1904.
Jonasson, S	"	205	158	2,744	2,006	615 25	30 54	
Kennedy, Findlay	Whitewood, Assa	178	124	2,361	1,306	441 12	402 10	Commenced work January 1, 1905.
Lagimodiere, Wm	Winnipeg, Man	113	65	1,554	780	307 90		Commenced work February 1, 1905.
Link, Adam	Lethbridge, Alta							Reported for duty June 26, 1905.
McCallum, N. G	Yorkton, Assa	368	321	5,643	563	509 48	6 65	
McDiarmid, Jas	Edmonton. Alta	369	301	6,045		886 73	110 00	
McDonald, D. J	Kamloops, B.C	86	31	1,320	4,927	593 60		
Magee, W. D	Lamerton, Alta							Reported for duty June 26, 1905.
McGregor, R. E	Dauphin, Man	123	93	3,581	300	726 75	125 00	
McMillan, Wm	Treherne, Man	147	104	3,772	783	495 53		
McNab, D. C	Brandon, Man	40	28	555	536	89 25		April 1 to June 30, 1905. (Inspections include the Saskatchewan Valley Land Co.'s dist.)
Pollock, J. R	Regina, Assa	1,483	167	6,014	1,905	794 95	145 75	April 1 to June 30, 1905.
Porter, S. P	"	192	10	918	1,450	311 00		
Ridington, W. R	Lloydminster	4		674		83 85		Commenced work June 1, 1905.
Seale, John	Dauphin, Man	44	17	811	250	127 25		Commenced work May 1, 1905.
Stuart, W. W	Calgary, Alta	81	11	2,704	9,478	1,094 61	20 85	(Ranch Inspector.)
White, W. H	Fort Saskatchewan	52	36	1,191		84 44		Commenced work April 27th, 1905.
		6,576	2,942	77,340	38,862	13,284 01	2,827 64	
Compared with	the year 1904	3,134	1,889	44,535	26,421	7,863 33	1,690 24	

No. 3.

REPORT OF THE AGENT AT ALAMEDA.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS AND CROWN TIMBER OFFICE,
ALAMEDA, ASSA., August 16, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit the annual report of this office for the year ending June 30, 1905.

I am pleased to be able to report that the crop outlook at present could not be better. Climatic conditions have been most favourable throughout the season, and with a continuation of the warm weather the wheat will be ripe in six or seven days.

The crop of last year was fully as good as expected, wheat averaged throughout the district over 18 bushels to the acre.

As the available homesteads in this district were mostly taken up, it was found necessary to survey new townships to the west and south-west of Weyburn; four of these, viz.: townships 8, ranges 19, 20 and 21, and township 7, range 21, west 2nd meridian, are now open, and so great has been the demand for homesteads that some of these townships are already nearly settled.

There has been a large increase in many branches of the office work. The correspondence and the large number of applications for patent occupy a great deal of time. Large numbers of applications for cancellation continue to be received, necessitating a great amount of work for the homestead inspector.

Appended is a statement of work performed during the fiscal year.

Letters received	17,029
Letters written	17,169
Patents recommended	682
Entries cancelled	1,047
Homestead entries	1,657
Land sales (cash)	12
Land sales (scrip)	1
Land scrip located . . . acres	800
Timber permits issued	455
Hay permits issued	110
Grazing rents	$4
Mining fees	$5
Total revenue	$22,578.75

Your obedient servant,

R. CLAUD KISBEY,
Agent of Dominion Lands.

No. 4.

REPORT OF THE AGENT AT BATTLEFORD.

Department of the Interior,
Dominion Lands Office,
Battleford, Saskatchewan, July 15, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I have the honour to submit the annual report of this agency for the fiscal year 1904-5.

The past year will go down as an epoch-marking one for this district, owing mainly to the arrival of the line of the Canadian Northern Railway to Battleford. Intending settlers are now spared the annoyance and loss of time occasioned by having to drive over 90 miles of prairie from Saskatoon to reach here. Many would not undertake the trip, and others would make their entries at Saskatoon, without seeing the land; but now they can see the country for themselves, and they are, most evidently, taking advantage of the new facilities of travel, if we judge of it by the increase of work in this office.

There were more homestead entries made during the last three months of April, May and June than for the rest of the whole year, while the general increase over the previous year is over 100 per cent, as seen below:—

1903-4		1904-5.	
Homestead entries.	1,774	Homestead entries.	3,618
Total revenue . . .	$17,789.11	Total revenue . . .	$38,752.18

The line of the Canadian Northern Railway, starting from the eastern boundary of this land district, runs on the north side of the Saskatchewan, parallel with the river, a distance of about 70 miles, until it crosses the river to the south, some 8 miles west of Battleford. That part of the country is now thickly settled. In fact, it was comparatively so for some time before the coming of the railway, and the current of immigration is now almost entirely going south of the Battle river. Several townships have been completely taken since spring, and while expecting somewhat of a lull during the harvest time, we shall undoubtedly have to reckon with another great rush, such as we experienced last month, as soon as the crops are gathered in.

One remarkable and most satisfactory feature of the immigration that is now coming in is the large number of homesteaders that are immediately taking possession of the land. The element of speculation seems to have entirely disappeared.

Since spring opened the weather conditions have been most excellent, and the crops and country could never look better. We had a slight frost about the middle of June, but its effects were local, and only touched garden stuff and potatoes. It is estimated that there are 20,000 acres under crop this year, which by all accounts will certainly be doubled next year.

The British colony at Lloydminster has been largely reinforced this spring, and signs of prosperity are to be seen on all sides.

A colony of Germans are settling in the region of what is known as the Tramping Lake district. It is expected that over 1,000 families will be located there by next fall. They are all from the United States, and having sold land there are in good financial condition. They are thrifty and industrious, and with a good knowledge of the modern ways of farming, which they possess, will make the very best of citizens.

The value of the land is steadily increasing and much of it is purchased by settlers who are not satisfied with their 160-acre homestead.

The cattle industry continues to be an important one. It is not likely to be seriously disturbed by incoming settlers for several years to come. The past winter was most favourable for stock.

The following is a statement of business transacted during the year ended June 30, 1905:—

Homestead entries	3,618
Land scrip located	21
Land sales	10
Town-site sales	40
Timber permits issued	131
Hay permits issued	60
Applications for patent	11
Homestead entries cancelled	298
Letters received	16,730
Letters written	14,009
Total revenue	$38,752.18

Your obedient servant,

L. R. O. NOEL,
Agent of Dominion Lands.

No. 5.

REPORT OF THE AGENT AT BRANDON.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
BRANDON, MAN., July 11, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—In accordance with the regulations, I submit the annual report for year ending June 30 last.

The acreage in crop is fully 15 per cent in excess of last year. For the past two years spring has been early, allowing the farmer ample time to get a large area sown in the proper time, and to increase his acreage. Heavy rains prevailed during the latter part of May and all through June, making the growth very rapid, and the warm weather of the present month should produce one of the largest crops harvested in the country.

The homestead entries granted are less than in former years, owing to the fact that there are now no vacant lands, not to want of applicants, and it is only through cancellation a settler can secure a quarter section. The applications to cancel existing entries keep increasing, but the entries cancelled are less. Homesteaders all being anxious to keep their lands go into residence when notified 'to show cause why their entries should not be cancelled.' The lands applied for are chiefly in that part of my district lying in Eastern Assiniboia, to the north and south of the Pipestone Branch of railway.

There has been a large immigration of a good class of settlers. The new immigration hall, fitted with all modern conveniences, under the charge of a very competent man, is a great convenience and comfort to the new settlers, giving them good quarters until they secure suitable employment, and making them more contented with their surroundings in a new country.

The following is a statement of work performed during the past year:—

Homestead entries granted	305
Applications for patents	493
Cancellation of entries	270
Letters received	13,167
Letters sent	12,822

I am, sir,

Your obedient servant,

L. J. CLEMENT,

Agent of Dominion Lands.

No. 6.

REPORT OF THE AGENT AT CALGARY.

Department of the Interior,
Dominion Lands Office,
Calgary, Alberta, July 15, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I have the honour to submit my report of the work performed in this office during the year ended June 30, 1905.

The number of homestead entries, 2,181, is a decrease from the previous year, of 495. This I attribute to the fact that during the present year settlers have had to go forty miles from the railway to obtain entries.

The revenue from lands amounts to $39,791.39, exclusive of a very large amount paid at head office on account of sales of lands, coal lands, grazing leases, &c., being a decrease of $2,027.92 from the revenue of the previous year.

As the business for the timber and mines branch for this district is also conducted at this office, I may mention that the revenue from this branch amounts to $11,797.97, which exceeds the amount for the previous year by $1,213.95. A separate report in connection with the timber and mines branch is being prepared.

The crops never looked better in the history of this country. I do not think any one could desire anything better. There is a large area under fall wheat, which, if the present ripening weather continues for another three weeks, will be ready to cut.

The winter was a very good one, and stock wintered well on the ranges.

The cattle and lumbering industries are in a flourishing condition.

The settlers throughout Alberta appear to be doing well, and are perfectly satisfied and contented, and, as I stated in my last annual report that the city of Calgary had doubled its population in the last four years, I am pleased to say that, although there has been no boom, this city is still going ahead at a remarkable rate.

The number of people accommodated at the immigration hall here during the year is, according to the report furnished by Mr. Jas. Winn, caretaker, 1,431, but this does not give any adequate idea of the number of people who came into the country. Settlement this season has directed itself north-easterly from Calgary, in the Knee Hill country, and directly north of same up as far as township 34, as all the available land was homesteaded last season along the line of the Calgary and Edmonton Railway.

The immigration into the whole of Alberta has been very large, and the settlers are of an excellent class.

I append hereto a detailed statement of receipts on account of Dominion Lands Attached hereto is also a statement of work performed at this office. Although there has been a decrease in the number of entries there has been a very large increase in the number of letters received and written; also applications for patent, timber permits issued, &c.

Your obedient servant,

J. R. SUTHERLAND,

Agent of Dominion Lands.

CALGARY DOMINION LANDS AGENCY.

Statement of receipts on account of Dominion Lands, for the year ending June 30, 1905.

2,181	Homestead entries	$21,520 00
51	Payments on account of improvements	2,194 20
90	Land sales	15,868 94
8	Sundry payments	28 25
36	Coal lands location fees	180 00
5	Seed grain collections	202 05
3	Half-breed scrip locations	
	Total	$39,993 44

CALGARY DOMINION LANDS OFFICE.

Statement of work performed during the year ended June 30, 1905.

Letters written	20,644
Letters received	33,180
Applications for patent received	353
Entries cancelled	574
Entries granted (homestead)	2,181
Land sales	90
Half-breed scrip locations	3
Payments on account of improvements	51
Ground rent collections	24
Payments, royalty on sales (timber)	64
Timber permits	906
Timber seizures	10
Hay permits	74
Grazing rent collections	55
Mining application fees	43
Coal land fees, &c	24
Seed grain collections	5
Sundry payments	10

No. 7.

REPORT OF THE AGENT AT DAUPHIN.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
DAUPHIN, MANITOBA, June 30, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—Once more I have the great pleasure of submitting a favourable yearly report from the Dauphin district.

We have been favoured with a period of general prosperity, business in all lines having been brisk, and with good prospects of a continuance.

The year ending this day has been prosperous to the district as a whole, the crops of last season having realized all expectations, while the prices obtained were even better than looked for.

The present indications are very good, recent rains generally over the district having been sufficient to assure good crops, barring accidents.

I am advised that in the neighbourhood of 500,000 bushels of wheat were marketed last fall and winter, for export, and in addition to this, considerable quantities were manufactured at the local mills, the grades were Nos. 1 and 2 Northern, as a rule, and the price averaged not less than 80 cents. Large quantities of oats and barley were produced, these finding a ready market, locally, for use in the railway construction and lumbering camps. I may say that all lines of farm produce have commanded good prices, the supply in many instances falling short of the demand.

I would again advocate more attention being paid to mixed farming, but am pleased to notice some advance in this, as well as the introduction of many good stud animals, which will no doubt result in the marked improvement of stock.

Butter, eggs, poultry, sheep and hogs command high prices, and more attention should be paid to these lines by the settlers as a whole.

The various municipalities, several new ones having been formed during the year, continue to improve the roads by grading, ditching and bridging, thus making the marketing of produce much more easy than formerly, as well as enhancing the values of land. Taxes have as a result been fairly high, but as the expenditure was justified, and judiciously made, this has not been looked on as a hardship.

The influx of settlers has been steady, embracing homesteaders as well as buyers of wild and improved lands, some of the latter having changed hands at $50 per acre.

The recently opened lands in the vicinity of lines of railway have been settled rapidly, but it is found somewhat difficult to direct settlement to those more remote, the Galician being the principal element that can be so directed.

Lumbering operations were carried out to a large extent during the past winter, though the somewhat early advent of spring in a measure curtailed the output, and added to the expense of production, still it is thought that the regular dealers will have sufficient stocks to meet the demand. In so far as these operations were managed from this office, a good check was possible in a measure, due to the introduction of two additional officers, members of the R.N.W.M. Police, whose services were highly appreciated by the staff, and whose activity resulted in many seizures of illegally cut timber, and lightened the work of the regular rangers.

Bush fires, I am able to say, did little or no damage, and have, owing to the effective work of the fire rangers, been kept well under control.

Education is receiving all due attention, many new school districts being opened from time to time as conditions warrant; churches also being built where new settlements are formed. In the towns many fine buildings both business and private are being erected.

The health of the district has been good, no epidemic having visited us, and though the resources of our hospitals may have been taxed somewhat, this being largely due to accidents attendant on railway construction and lumbering operations, still these institutions have been able to cope with the business at all times, and are deserving of great credit, as well as of any support which they may receive from either public or private sources.

I subjoin a tabulated statement of some of the chief lines of work performed in the office for the year.

Your obedient servant,

F. K. HERCHMER,

Agent of Dominion Lands.

Statement of work performed in Dauphin office, for the year ending June 30, 1905.

Homesteads granted	520
Timber permits issued	1,329
Timber seizures	40
Hay permits issued	104
Letters received	7,503
Letters written	4,928
Applications for patent taken	345
Entries cancelled	159
Cash received from all sources	$16,753.95

No. 8.

REPORT OF THE AGENT AT EDMONTON.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
EDMONTON, ALBERTA, July 3, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit the annual report of this office for the year ending June 30, 1905.

There has been a uniform increase of settlement in all directions; in fact, settlement has overtaken the survey work, and squatters have become very numerous in this district.

Canadians, Americans, Norwegians and Swedes are coming in increased numbers. New Brunswick, Nova Scotia and Ontario are sending out homesteaders of the best class in greatly increased numbers.

The North Saskatchewan valley is at last filling up rapidly, and it will not be many years until the Peace River valley lands will be in demand. Very many inquiries are received about the Peace River country, and it should be surveyed into townships as soon as possible.

The weather has been good, and the prospects for a good crop are very bright.

Timber, coal and petroleum lands are being taken up in the country to the north and north-west of Edmonton. There has been very little if any gold mining done on the North Saskatchewan river this year.

HOMESTEAD ENTRIES AND REVENUE.

1902-3.		1903-4.		1904-5.	
Entries.	Revenue.	Entries.	Revenue.	Entries.	Revenue.
3,183	$47,436.90	2,584	$41,816.38	2,903	$43,682.36

SUMMARY OF ACTUAL BUSINESS DONE.

Letters received	18,463
Letters sent	17,591
Applications for patent	1,040
Homestead entries cancelled	1,229
Hay permits issued	46
Timber permits issued	1,469
Homestead entries granted	2,903
Land scrips located	23
Revenue	$43,682.36

Your obedient servant,

A. G. HARRISON,

Agent of Dominion Lands.

No. 9.

REPORT OF THE AGENT AT KAMLOOPS.

Department of the Interior,
Dominion Lands Office,
Kamloops, B.C., July 5, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I have the honour to submit the annual report of this office for the year ending June 30, 1905.

There is a slight reduction in revenue and the number of homestead entries, while there is an increase in the quantity of land sold.

A number of applications have been received for coal lands in townships 18 and 19, range 8, west 6th meridian. Some development work has been done, but not enough to determine whether coal is there in quantity.

The proprietors of the Iron Mask mine, in township 19, range 18, west 6th meridian, have installed a concentrator and smelter in connection with the mine, and their success has given an impetus to mining in that locality such as it has not had since the days of the mining boom.

The past winter was mild and the snowfall light, with a consequent scarcity of water for irrigation purposes. This will mean a short crop, especially in hay.

The following is a partial list of the work performed during the year under consideration:—

Letters received	4,425
Letters sent	3,747
Homestead entries granted	149
Homestead entries cancelled	39
Applications for patent received	46
Land sales	38
Number of acres sold:	4,160
Revenue	$17,902.12

Your obedient servant,

JAMES BANNERMAN,

Agent of Dominion Lands.

No. 10.

REPORT OF THE AGENT AT LETHBRIDGE.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
LETHBRIDGE, ALTA., July 29, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit the annual report of this office for the fiscal year ending June 30, 1905.

In my last annual report I had much pleasure in stating that the general work in the Lethbridge office had greatly increased, and that many more settlers had come into Southern Alberta than had arrived during any previous period. This year, it will be noticed, has again found the work much heavier in nearly all its branches.

The number of homestead entries granted during the year just closed is far in excess of 1904, and from the number of cancellations carried out it may be seen that new arrivals are watching the delinquent homesteaders and are desirous of securing their lands for the purpose of going into occupation of them themselves. Applications to purchase odd sections are still being received in large numbers from actual settlers who wish more land, and from people desiring to settle in parts where there is not available homesteading land, for the purpose of being close to relatives and friends.

The settlers who have been locating in this part of the country are mostly from the United States, and have had experience in farming and stock raising, and will no doubt prove successful in their new undertaking.

Coal mining will be an important industry in the west shortly, and at present there are several companies operating their plants, shipping in large quantities to different points. The latest and one of the largest companies organized is the Taber Coal Company, which is operating close to the town of Taber, about thirty miles east of Lethbridge.

The returns of the timber berths in this district are sent to the Calgary agency so that this office revenue on this account is not large. The total revenue is not quite as heavy as last year, but this is caused by a reduction in the number of land sales. The revenues of the different branches, with this exception, have increased.

Applications for grazing leases are still pouring in, but not many leases have been issued, on account of changes in the regulations being under consideration by the department.

The sugar beet industry in Southern Alberta is still flourishing. The company operating at Raymond paid a good dividend last year.

The crop outlook this season is very good, and the yield will be above the average. Grain growing is no longer an uncertainty and success has been attained in the cultivation of small fruits.

The work of the office has been quite satisfactory, but the staff is somewhat handicapped by the smallness of the office.

Below will be found a partial list of the work performed at this agency during the past year, as compared with 1904:—

	1905.	1904.
Letters received	17,712	13,622
Letters written	14,715	8,977
Homestead entries granted	1,968	1,731
Homestead entries cancelled	729	417
General sales	83	189
Hay permits issued	131	80
Timber permits issued	642	300
Timber seizures	59	8
Applications for patent	256	230
Grazing rents collected	133	124
Mining fees	39	19

Your obedient servant,

J. W. MARTIN,

Agent of Dominion Lands.

No. 11.

REPORT OF THE AGENT AT MINNEDOSA.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
MINNEDOSA, MANITOBA, July 8, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit my report of the work done in this office during the year ending the 30th ult.

Letters received	5,196
Letters sent	3,878
Homestead entries granted	220
Homestead entries cancelled	92
Applications for patent received	253
Hay permits issued	153
Timber permits issued	183

From the above it will be seen that the number of homestead entries granted is less than in previous years, not because of an abatement in the demand, but because desirable homesteads in this district are nearly all taken up, and immigrants and others on ascertaining this go west into the newer districts, where there are plenty of homestead lands to choose from.

A considerable portion of the entries granted are for lands the previous entries for which have been cancelled. In this connection it is to be noted that in previous years some held homesteads for years without performing their homestead duties, but now they are held to a strict observance of the homestead requirements, in default of which applications to cancel are promptly filed.

Consequent on plenty of rain the crops have made wonderful progress, and present conditions indicate an abundant yield. Then, too, the grazing is excellent, and cattle are in prime condition.

The condition of the settlers in this district is vastly improved; a glance at the map shows that railroads have been extended in all directions, and markets for the disposal of grain and cattle are within easy reach, while the villages springing up at the railway stations furnish a home market for all kinds of farm produce.

Your obedient servant,

JOHN FLESHER,

Agent of Dominion Lands.

No. 12.

REPORT OF THE AGENT AT NEW WESTMINSTER.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
NEW WESTMINSTER, B.C., July 5, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit my report for the year ended June 30, 1905.

Besides the usual routine work of receiving many letters from various places, and supplying information on many points incidental to the conditions in British Columbia, I have been able to overtake the adjustment of several old cases—as the surveys service reached them.

The subdivision and sale by private parties of many of their holdings meet the views and expectations of many who arrive from older settlements in the east and south, for the purpose of engaging in mixed farming on a smaller scale in a milder climate, such as this is.

And the improvement of transportation by the opening of the steel railway and wagon bridge at New Westminster and the extension of electric railway branches by the Vancouver Power Company stimulate farm development. The said company contemplate further extensions, as there is now abundant power since the completion of the tunnel two and a half miles through a rocky mountain to Coquitlam lake.

This year has been very favourable for farming operations, and the crops do well.

The dairying and fruit canning meet with deserved success.

A summary of the monthly schedules sent to your office shows:—

Letters received	1,917
Letters sent, beside circulars	1,507
Homestead entries	40
Applications for patent recommended	14
Entries and sales cancelled	11
Total receipts, sales, &c	$3,891.85

Respectfully submitted,

JOHN McKENZIE,

Agent of Dominion Lands.

No. 13.

REPORT OF THE AGENT AT PRINCE ALBERT.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS AND CROWN TIMBER OFFICE,
PRINCE ALBERT, SASKATCHEWAN, July 7, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit the annual report of this agency for the fiscal year just closed.

A marked feature of the homestead entries of this year as compared with recent years has been the evenness with which they have been made throughout the year. No month has run very high and no month has fallen very low, but an unusually steady average has been maintained throughout the year. As will be observed, the entries are slightly more than one-fourth greater than those of last year, and the total revenue shows nearly the same proportionate increase. In point of revenue and homestead entries, the year is the second best in the history of the office, being slightly exceeded only by the year 1902-3, when the total revenue was $50,835.95, as compared with $44,228.56 this year.

The entrants have been mainly Americans, Canadians, Scandinavians, British and French, and almost without exception of an excellent class. Splendid settlements are being made on the Hoodoo Plains, at Tisdale, Shellbrook, and in the Great Bend country. A feature of the year was the opening of the Doukhobor reservation in the vicinity of Great Bend, when an Oklahoma rush on a small scale took place, lasting three days. I am glad to report, however, that no difficulty was experienced in dealing with applicants.

It is with particular pleasure that I report the main line of the Canadian Northern Railway, running through the southern portion of this district, as now being in operation as far west as Battleford, and the Prince Albert branch as now in operation as far as the South branch of the Saskatchewan river. The bridge there is now under construction, and it is expected that the remaining fifteen miles of road to this city will be completed this fall. I need not dwell upon the advantage that this will be to the districts served. The advance right-of-way camp has just been pitched in this city.

In connection with transportation, I might notice that the Hudson's Bay Company are now operating a stern-wheel steamer on the North Saskatchewan river, and a larger boat operated by Messrs. Coates and Mosher also makes its headquarters at this city, and is bidding for public freight and passenger traffic between Grand Rapids and Edmonton. Some smaller tugs also make headquarters here. I might further note the construction of a large gold dredge by Dr. Roughsedge & Co., which has been launched and is expected shortly to be in operation at this point.

The commercial activities are keeping pace with the agricultural development, as evidenced by the springing up of new villages and the opening of new post offices, stores, and banks throughout the district, particularly on the lines of railway being constructed. In this city the Bank of Commerce are erecting a substantial building this year, and the Bank of Ottawa have also secured premises for the same purpose.

The crop prospect is reported on all sides as unequalled for years, and as all danger of frost should now be past, another large harvest is anticipated. In every respect the outlook of the new province of Saskatchewan is very bright.

I would draw attention to the very great increase in the correspondence of the office, which is nearly one-half greater than that of last year. I am pleased also to be able to direct attention to the large proportion of letters received that have been answered. The material increase in the applications for patent and in cancellations, the former of which is double, and the latter over a third greater than those of last year, will be noted.

The following is the statement of the business transacted during the year:—

Letters received	12,539
Letters sent	11,434
Homestead entries granted	2,138
Homestead entries cancelled	930
Hay permits issued	44
Timber permits issued	1,409
Applications for patent received	514

Your obedient servant,

J. W. HANNON,

Agent of Dominion Lands.

No. 14.

REPORT OF THE AGENT AT RED DEER.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS OFFICE,
RED DEER, ALBERTA, August 29, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I beg to submit my annual report for the fiscal year ending June 30, 1905.

The past has been the most prosperous year ever experienced in Alberta, and the cities, towns and country have advanced by leaps and bounds. Last winter was very fine, and cattle came through in excellent shape, little if any feeding being required, and I failed to hear of any losses. The creameries throughout the district have been kept running full time, but have been unable to keep up to the demand. Considerable work has been done on the extension of the branch line of the Calgary and Edmonton Railway running east from Lacombe, and there has been a large rush of settlers to the eastern portion of the district in anticipation of the advent of the railway, transportation being a question of vital importance to the new settler. A much larger area of land was sown to crop last spring than the previous year, and all kinds of grain promise a bountiful harvest, the summer being an exceptionally favourable one for the growing crops; and this will undoubtedly be the most prosperous year ever experienced in Alberta. There are now at least ten steam ploughs at work in the district, and consequently a much larger area of land will be prepared for crop during the coming season. Fall wheat has passed the experimental stage, and the contract has been let for a 200-barrel a day flour mill, to be erected in Red Deer and completed by January 1, 1906. Large numbers have been added to the Swiss and French colonists, and immigration from the United States has very materially increased during this summer. Many of the cattlemen in this district are reducing their herds, or disposing of them entirely, and turning their attention to the raising of thorough-bred stock. This is certainly a good move, and an indication that the ranchers are prospering. We have had some local hail storms during the summer, but, as I have stated in a previous report, this is eminently a mixed farming district, and even the loss of a season's entire crop does not cripple the farmer to anything like the extent it would in the east, and I have personal knowledge of cases where fields were swept clean by hail early in the season, and a second crop, apparently quite equal to the first, has sprung up and is now well headed out; and even if the grain does not mature the straw will make excellent green feed for stock.

All branches of the work in this office have very largely increased, as will be seen from the following statement of business transacted during the year ending June 30, 1905:—

	Number.	Revenue.
Homestead entries	2,115	$20,970 00
Cancellations	705	
Improvements	......	1,858 94
Land sales	19	1,645 10
Sundries	......	2 00
Timber permits	704	419 58
Timber seizures	4	597 85
Hay permits	86	206 20
Grazing	11	96 26
Coal lands	29	156 20
Seed grain collections	2	52 30
Revenue from sale of Indian lands	......	5,079 81
Total		$31,084 24
Letters received		11,985
Letters written		8,668
Applications for patent		506
Entries cancelled		705

Your obedient servant,

W. H. COTTINGHAM,

Agent of Dominion Lands.

No. 15.

REPORT OF THE AGENT AT REGINA.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS AND CROWN TIMBER OFFICE,
REGINA, ASSA., July 26, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to submit my report for the year ending June 30, 1905, the statement of work performed being as follows:—

	Number.	Revenue.
Letters received	47,511	
Letters written	45,387	
Homestead entries granted	7,968	$78,830 00
Land sales	102	13,397 34
Improvements	141	4,521 41
Sundries	......	152 00
Timber permits issued	747	303 05
Timber seizures	4	20 75
Hay permits issued	200	469 95
Grazing rents	28	253 73
Mining fees	......	1 00
School land sales	......	330 68
Seed grain collections	62	2,315 38
Land scrip located . . acres	5,087	
Applications for patent	1,073	
Entries cancelled	2,735	
Total revenue		$100,595 29

This amount does not include payments made direct to head office.

The increase in all departments of the work of the office over previous years indicates an increasing interest in the free homestead lands of the west. Marked evidences of advancement are to be noted, not only in the country districts, but also in the towns and villages springing up along the lines of railway.

The information furnished by prosperous and contented homesteaders to prospective settlers has very materially assisted in inducing their friends to come and share their prosperity.

The prospects of an abundant harvest are bright, and if we may judge from the amount of labour expended and skill exercised in preparing the soil for next year's crop, the faith of the settlers in their adopted or native land is evidently well established.

Your obedient servant,

D. S. McCANNEL,

Agent of Dominion Lands.

No. 16.

REPORT OF THE AGENT AT WINNIPEG.

Department of the Interior,
Dominion Lands Office,
Winnipeg, Man., September 1, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I beg to submit the following report upon the business of the Dominion Lands office at Winnipeg, for the departmental year ended June 30, 1905.

The figures given hereunder show the number of transactions dealt with, also the amount of revenue collected during the year, and the same information for the preceding year:—

	1904-05.		1903-04.	
	Number.	Collections.	Number.	Collections.
		$		$
Homestead entries	671	6,460 00	871	8,305 00
Improvements	7	147 00	14	596 56
Land sales	340	16,042 88	136	8,644 28
Sundries	392	426 75	476	369 25
	1,410	23,076 63	1,497	17,915 09
Increase in revenue				5,161 54

It will be observed there is a falling off in the number of homestead entries granted. This, however, does not indicate that there was a falling off in the number who have settled with their families upon Dominion Lands in the district. Squatting upon lands that are not available for homestead has taken place to a considerable extent in southeastern Manitoba, also along the Winnipeg river, and north between Lakes Winnipeg and Manitoba. Their cases in many instances have been brought to the attention of the department, and are now under consideration.

To meet the demand for homestead land, which continues to be very active, the tract of country lying between township 24 and township 36 and Lakes Winnipeg and Manitoba, should be surveyed. From personal knowledge gained in travelling over portions of the land described, it is practically all of the class suitable for settlement.

The Canadian Pacific Railway Company contemplate extending either the Teulon branch line, or the one running to Winnipeg Beach northward immediately, having as an objective point Fisher bay on Lake Winnipeg. Provided this line were built and the Canadian Northern Railway Company would extend their line from St. Laurent, to the Narrows at Lake St. Martin, as has been given out is their intention in the near future to do, settlers entering upon lands within the tract described would be well served for a railway.

LAND SALES.

During the year there was sold at public auction the last of the property held by the department within the city of Winnipeg, which comprised twenty-seven lots in blocks 66-71 and 76 in part of sub-division of parish lots 35 and 36, St. John. These lots were valued by one of our leading real estate men in February, 1902, at $100, $80 and $75 each, aggregating a total of $2,360. The sale took place in July, 1904, the amount realized therefrom being $22,170.

There were also sold to first applicant 230 lots in the townsite of Gimli. This townsite was surveyed by the department many years ago for the benefit of the Icelanders settled on the west shore of the lake. It was only recently, however, that a demand for the purchase of the lots was made, due to the fact that it is soon to be reached by a branch line of the Canadian Pacific Railway.

The only railway construction which actually took place in this district within short distance of Gimli, has been bought up by a company which has made a subdivision of a portion thereof into lots, which are being sold for summer camping purposes. The prices realized are from $100 to $500 per lot. The lots in the townsite of Gimli which will be equally well situated for summer homes when the railway reaches that point, are practically all sold; the small charge of $10 and $15 per lot induced speculation. Those remaining unsold are all covered many times over by applications.

As an indication of the popularity of Lake Winnipeg as a place for a summer outing, I am informed by the Canadian Pacific Railway Company that their trains carried no less than 60,000 people to Winnipeg Beach thus far this season.

The only railway construction which actually took place in this district within the year is the extension of the Emerson branch of the Canadian Northern Railway. The grade is now within a short distance of Vassar, at which point it will join the main line.

I am informed by our travelling officials that there is much good land in the townships crossed by the road, but that at present it is for the most part heavily timbered.

The opening up for settlement of townships 8 and 9 in ranges 12 and 13, which lie south of Whitemouth station, has brought numerous inquiries from intending homesteaders.

From reports received the land in these townships is generally low and swampy. There is a considerable area of good land in the forks of the Whitemouth and Birch rivers, and along those streams which afford drainage for a distance of from a half mile to a mile back therefrom. The good land, according to reports received, has all been entered upon by squatters.

GENERAL.

It is gratifying to be able to refer to the continued evidence of prosperity throughout my district along all lines of financial, agricultural and business effort.

In the city of Winnipeg the buildings erected in 1903 were of an aggregate value of nearly $6,000,000. In 1904 the very large expenditure by the Canadian Pacific Railway Company in shops, depot and hotel, brought the amount up to nearly $7,500,000, and this year the building inspector reports already that the $9,000,000 mark has been passed. The value of farm buildings erected in Manitoba in 1903 and 1904 was, as near as could be ascertained by the provincial government, $3,000,000 in each year. The figures for this year are not yet obtainable, but it is thought the amount will greatly exceed the expenditure in either 1903 or 1904. This is outside altogether of the growth of other cities. towns and villages, which is healthy but not taking place as rapidly in proportion as Winnipeg and the surrounding country.

From early spring the climatic and weather conditions throughout the province have been exceptionally favourable. The area of land reported in December, 1904, as prepared for the crop of 1905, was 2,423,721 acres. In June, 1905, with the spring ploughing, the area actually in crop was: wheat, 2,643,588 acres; oats, 1,031,239 acres; barley, 432,298 acres, and other grains and products brought the total area under all crops to 4,256,838 acres. It is, of course, too early to give accurate figures of the amount of the coming crop, but a very conservative estimate of the wheat crop alone, now in sight, places it at 58,157,936 bushels, while oats, barley, flax, and in fact all grains in crop, promise an exceptionally heavy yield.

That the Manitoba farmer is giving attention to all classes of agricultural production is shown by the following striking figures, taken from a recent report by the Provincial Department of Agriculture, and showing farm productions in Manitoba outside of grain:—

Vegetables—	
1904.	Bushels.
Potatoes	3,799,569
Other roots	3,741,580
	Number.
Poultry sold—	
Turkeys	87,517
Geese	54,618
Chickens	458,238
Live stock—	
Cattle fattened	11,928
Milch cows	127,562
Value of butter and cheese produced, 1904	$768,457.38
Live stock owned in province—	
Horses	14,386
Cattle	306,943
Sheep	18,228
Pigs	118,986

Your obedient servant,

E. F. STEPHENSON,

Agent of Dominion Lands.

No. 17.

REPORT OF THE AGENT AT YORKTON.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS AND CROWN TIMBER OFFICE,
YORKTON, ASSINIBOIA, July 17, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I beg to submit for your consideration the annual report of work transacted at this office for the year ending the 30th ultimo.

The number of entries granted for the year was 4,471, an increase of 481. The lands adjacent to the railways and proposed routes of railways, are now all taken, and another year at the same rate of entries as previously, will leave no townships without homesteaders. The settlers of this season have largely availed themselves of the transportation facilities offered by the running of regular trains by the Canadian Northern Railway, and Yorkton is no longer the busy scene of expectant land seekers. The nationalities preponderating are Canadian, English and Scotch.

The clerical work of the office is much larger, in consequence of correspondence and cancellations having increased.

Throughout the whole agency there is prosperity and an unbounded confidence in the future. The crops last year were good, and prices the same, and as a result big areas of wild land are being brought under cultivation, substantial and modern buildings are being erected on the farms, and new centres of trade are springing up along the railways. There were never better prospects for a crop than now.

The following is a summary of the work for the year:—

Homestead entries		4,471
Sales		48
Scrip located	acres	16,238·50
Timber permits		389
Timber seizures		6
Hay permits (Dominion lands)		32
Hay permits (school lands)		75
Letters received		17,982
Letters written		18,229
Applications for patent		407
Entries cancelled		1,385
Revenue		$53,040.49

Your obedient servant,

JAS. E. PEAKER,

Agent of Dominion Lands.

No. 18.

REPORT ON TIMBER, MINERAL, GRAZING AND IRRIGATION.

Department of the Interior,
Ottawa, September 29, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ontario.

Sir,—I have the honour to submit the twenty-fifth annual report of the Timber and Mines Branch of the Department of the Interior.

The revenue derived from timber, grazing, hay, irrigation and mineral on Dominion lands for the fiscal year which ended June 30 last, amounted to $679,057.13.

Statement lettered 'A,' showing how this amount was made up, will be found at the end of this report.

The total revenue received from July 1, 1872, to July 1, 1905, was $10,135,983.58.

Reports received from the Crown Timber agents at Winnipeg, Edmonton, Calgary, Prince Albert and New Westminster showing the revenue collected on Dominion lands within their respective agencies and other information are appended hereto.

The total revenue of the Winnipeg agency for the fiscal year 1904-5 was $66,345.66.

The price of lumber within the Winnipeg agency was from $10 to $19.75 per thousand feet B.M. There are twenty-seven mills in operation within the agency, cutting timber under government license.

The revenue received from the British Columbia agency during the fiscal year 1904-5 was $71,079.27.

Lumber sold at the average price of $10 to $14.95 per thousand feet B.M.

There are thirty-one mills within the agency operating under license from the Dominion government.

The total amount of dues collected within the Calgary agency during the fiscal year 1904-5 amounted to $18,629.08.

The price of lumber at Calgary was $13 to $18.25 per thousand feet B.M.

Sixteen saw-mills were operating within the agency last year under government license.

The total amount of dues collected within the Edmonton agency during the fiscal year amounted to $37,628.46.

The price of lumber during the year was $13 to $17.35 per thousand feet B.M.

There are fourteen saw-mills in operation within this agency.

The total amount of dues collected within the Prince Albert agency during the year amounted to $38,284.27.

Lumber sold at Prince Albert at $16 to $17.07 per thousand feet B.M.

There are four saw-mills in this agency cutting timber under license.

The total amount of dues collected within the Yukon Territory on account of timber dues during the fiscal year was $25,503.97.

There are ten saw-mills in this agency cutting timber under license.

Saw-mill returns received at this department give the following quantities of building materials as having been manufactured and sold during the year within the above mentioned agencies:—

	Manufactured.	Sold.
Sawn lumber..	114,756,083	103,390,404
Shingles..	51,567,000	81,392,750
Laths..	6,796,484	5,370,490

The quantity of lumber manufactured and sold within each agency will be found in the agents' reports appended hereto.

Seven hundred and eighteen licenses were prepared. The areas in the province of Manitoba, the four provisional territorial districts, on Dominion lands in the province of British Columbia, and in the Yukon Territory in force on July 1, 1905, are as follows:—

	Square Miles.
Manitoba..	1,053·07
Alberta..	2,131·44
Assiniboia..	49·24
Saskatchewan..	2,408·10
Athabaska..	330·00
British Columbia..	1,727·64
Yukon Territory..	274·11

The number of applications received during the year to cut timber was 196; the number of berths granted was 92.

Within the past year thirty-three berths were cancelled or relinquished by the owners thereof.

The number of berths under license or authorized to be licensed in the province of Manitoba and the territories is 278, and on Dominion lands in the province of British Columbia, 308. In the Yukon Territory 116 berths have been granted, covering a total area of 274·11 square miles.

The number of berths covered by permits on July 1, 1905, was 112.

MINING LANDS OTHER THAN COAL.

During the past fiscal year 40 entries for quartz claims were granted by the agents of Dominion lands in Manitoba and the North-west Territories.

In the Yukon Territory 33,973 placer claims, 5,513 quartz claims, 43,987 renewals and re-locations were recorded up to July 1, 1905.

The returns for the fiscal year ending June 30, 1905, show that 795 entries for placer claims, 232 entries for quartz claims, 5,949 renewals and re-locations were recorded during the year. The revenue collected from this source and for fees collected for registering other documents in connection with mining operations was $92,854.

Up to July 1, 1905, 89,088 free miners' certificates were issued, producing a revenue of $905,317.99. During the fiscal year 5,247 free miners' certificates were issued, and the revenue derived therefrom was $46,022.53.

The following is a list of the government agencies whereat free miners' certificates were issued during the year, and the number issued at each within the year:—

Dominion Lands Agency at—	
Calgary, Alta	26
Edmonton, Alta	10
Lethbridge, Alta	21
Winnipeg, Man	35
Prince Albert, Sask	12
Agencies within the Yukon Territory—	
Clear Creek	66
Dawson	2,824
Dominion Creek	310
Duncan	131
Forty-Mile	53
Grand Forks	351
Gold Run	170
Hunker Creek	211
Hootalinqua	35
Kluahne	120
Selkirk	27
Sulphur Creek	142
Stewart River	45
Sixty-Mile	77
White Horse	507
Other Agencies and Agents—	
Ottawa, Ont., Department of the Interior	33
London, Eng., the High Commissioner's Office	11
Vancouver, B.C., the Dominion Assay Office	20
Victoria, B.C., the Collector of Customs	10
Total	5,247

The total revenue received for dredging leases in the Yukon Territory up to July, 1905, was $148,682.90, and for the fiscal year, $385.78.

The total revenue received for the rent of the lease-holds in the North-west Territory up to July 1, 1905, was $33,715.69, and for the past fiscal year, $6,730.12.

The total sum collected up to July 1, 1905, for royalty on the gross output of placer mining claims in the Yukon Territory, after deducting the exemption allowed by the regulations, was $3,306,049.76. Of this amount the sum of $206,760.87 was collected during the last fiscal year.

The royalty was collected at the following places:—

Dawson	$203,670 77
White Horse	2,998 31
Forty-Mile	91 79
Total	$206,760 87

DREDGING.

Fifty-five leases to dredge for minerals other than coal in the submerged beds of rivers in the Yukon Territory are in force, covering a total mileage of 269 miles.

One hundred and twenty-four leases to dredge for minerals in the beds of rivers in the North-west Territories are in force, covering a total mileage of 652·75 miles.

HYDRAULIC MINING.

Twenty-eight leases are in force. The total frontage of the leaseholds is 86·00 miles. The leaseholds are all situated in the Yukon Territory within a radius of 100 miles of Dawson.

COAL MINING LANDS.

The number of applications received during the year was 682. The revenue for the year derived from the sale of coal mining lands was $35,695. The area sold was 16,014·25 acres. The total area of coal lands sold up to July 1, 1905, was 102,181·43 acres, and the total amount received therefor was $418,813.45.

Twenty-three coal mining licenses embracing an area of 8,436 acres in the Rocky Mountains Park of Canada have been issued.

The revenue derived therefrom during the year ending on July 1, 1905, is as follows, viz.:—$4,223.83, made up as follows: Rental, $1,916.83; royalty collected on coal mined thereunder, $2,307.

Total amount rental collected to July 1, 1905, $4,394.97.

Total amount royalty collected to July 1, 1905, $2,405.50.

GRAZING LANDS.

The total number of leases in force is 745, including a total area of 2,328,113 acres, distributed as follows:—

Province of Manitoba	12,910	acres.
District of Saskatchewan	3,726	"
District of Assiniboia	923,059	"
District of Alberta	996,838	"
Railway Belt, B.C.	391,580	"

IRRIGATION.

During the year 93 applications for authority to divert water for irrigation and other purposes were received, and 66 authorizations to construct works in accordance with the provisions of the North-west Irrigation Act were issued. One hundred and seventy-four licenses have been issued up to date to divert water.

The following is a statement of the office work performed from July 1, 1904, to June 30, 1905:—

Letters sent	36,278
Pages of memoranda and schedule	7,957
Plans and sketches prepared	404

Timber—	
Berths applied for	196
Berths granted	92
Berths cancelled	33
Licenses for timber berths prepared in duplicate	718
Instructions issued for survey of timber berths	31
Returns of surveys of timber berths examined	74
Returns of saw-mills received and verified	1,942
Permits to cut timber issued by agents, also entered and checked	8,843
Accounts kept posted	816
Timber seizures entered and checked	405
Grazing—	
Applications for grazing lands received	1,068
Leases of grazing lands issued	80
Number of leases cancelled and relinquished	74
Applications for hay lands	15
Accounts kept posted—Grazing	743
Accounts kept posted—Hay	7
Hay permit forms used by the Dominion lands agents, also entered and checked over at this office	794
Mining—	
Accounts kept posted—Dredging 178 and hydraulic 25	203
Applications for coal locations received	682
Coal mining leases issued	5
Applications for mining locations other than coal	58
New entries and renewals for mining locations granted in Manitoba and North-west	40
New entries and renewals for mining locations granted in Yukon Territory	6,976
Applications for petroleum	91
Water-power	15
Applications for reservoir sites	8
Applications for gold dredging	32
Hydraulic mining leases prepared	3
Gold dredging leases prepared	15
Returns of survey of hydraulic concessions examined	3
Irrigation—	
Applications *re* irrigation recorded	93
Memorials examined	107
Plans examined	138
Authorizations for construction of ditches issued	66
Assignments of irrigation applications examined and recorded	14
Certificates issued by inspector, examined and recorded	28
Cancellation of irrigation applications issued and recorded	44
Irrigation licenses issued (in triplicate)	25
Miscellaneous—	
Applications to purchase or lease land in the Yukon Territory received and dealt with during the course of the year	129
Applications for water frontage	4
Leases for agricultural lands issued	1
Leases for agricultural lands cancelled	4
Leases for water frontage issued	1

Your obedient servant,

G. U. RYLEY,

Chief Clerk.

REVENUE OF DOMINION LANDS

A.—STATEMENT of Receipts on account of Timber, Grazing,

Month.	Timber Dues.	Grazing Lands.		Hay Lands.	Coal Lands.	Irrigation Fees.	Dredging Lands, N.W.T.
		Cash.	Scrip.				
1904.	$ cts	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	16,247 77	1,393 90	746 88	740 85	508 20	10 00	....
August	11,652 68	1,586 88	813 10	295 50	15 00	10 00	1,470 00
September	23,731 42	4,553 74	244 12	22 35	531 59	30 00	25 75
October	16,871 46	3,919 96	117 48	12 30	171 60	....	3,360 80
November	18,965 30	1,851 74	581 01	8 80	347 10	20 00	300 00
December	24,542 18	2,212 39	25 60	2 00	748 00	40 00	15 00
1905.							
January	15,977 15	1,036 19	1,756 50	3 04	1,169 27	40 00	....
February	15,918 27	2,505 69	744 30	....	74 22	30 00	57 50
March	21,642 13	6,680 51	127 25	......	354 30	40 00	....
April	36,783 21	3,509 41	....	468 45	135 40	....	....
May	36,715 40	2,722 89	80 00	482 25	683 53	54 00	30 00
June	29,310 06	4,337 02	1 12	400 45	254 45	25 00	1,471 07
	268,357 03	36,310 32	5,237 36	2,435 99	4,992 66	299 00	6,730 12

(YUKON INCLUDED).

Hay, Mineral and Irrigation, for the Fiscal Year, 1904-1905.

Mining Fees.	Hydraulic Leases, Yukon.	Dredging Leases, Yukon.	Free Miner's Certificates.	Gold, Yukon.	Rent of Water Power.	Royalty on Water Sold, Yukon.	Free Certificates for Export of Gold.	Total.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
11,895 50	1,193 53	100 00	5,752 50	32,659 36	....	....	77 50	71,325 99
11,224 50	755 55	....	5,052 50	38,586 12	....	4 25	59 00	71,525 08
13,164 50	855 58	....	5,518 00	47,728 87	....	....	153 50	96,559 42
8,358 50	302 14	....	4,314 50	15,421 50	....	....	36 50	52,886 74
5,900 00	....	....	3,264 50	2,224 71	....	61 40	3 50	33,528 06
6,927 50	....	230 00	2,525 00	2,851 99	38 27	....	3 50	40,161 43
4,198 50	1,012 75	....	1,897 00	3,152 02	11 50	....	9 00	30,262 92
5,477 00	950 00	....	2,480 00	1,038 86	....	....	18 00	29,293 84
4,934 00	487 50	....	2,770 00	1,466 51	....	....	8 00	38,510 20
6,437 50	750 00	....	3,285 00	27 52	....	....	7 00	51,403 49
6,820 50	....	55 78	4,025 03	12,170 60	....	....	11 00	63,850 98
8,663 00	650 00	....	5,138 50	49,432 81	....	....	65 50	99,748 98
94,003 00	6,957 05	385 78	46,022 53	206,760 87	49 77	65 65	452 00	679,057 13

REVENUE ON ACCOUNT OF

C.—STATEMENT of Receipts from Timber, Grazing, Hay, Hydraulic Mining,

Revenue from.	1894-1895.	1895-1896.	1896-1897.	1897-1898.
	$ cts.	$ cts.	$ cts.	$ cts.
Timber Dues				43,911 71
Grazing Lands				
Hay Lands				29 50
Coal Lands				
Hydraulic Leases				500 00
Dredging "				132,505 50
Gold				287,423 55
Free Certificates for Export of Gold				
Royalty on Water Sold				
Mining Fees—				
Grants —Placer			1,140 00	108,396 00
Renewals "				33,524 94
Re-locations "				
Grants—Quartz	5 00	22 00	60 00	243 00
Certificates of Partnership—Placer and Quartz				30 00
" Work " "				
Assignments " "				3,060 00
Abstracts " "				
Abandonments				
Bed Rock Flumes				
Forfeited Fees			20 00	
Lay Overs				
Payment in lieu of Work—Placer and Quartz				
" " " with penalty				
Registered Documents—Placer and Quartz				633 00
Water Grants				
Sale of Government claims on Dominion Creek				
" " " Hunker Creek, &c.				
Infringements				
Inspectors' Certificates				
Court Fees				
Certificates of Improvements				
Advance Deposit Account				
Over-deposit				
Unclassified				
Amended descriptions and Names				
Hydraulic Mining				
Free Miners' Certificates				116,243 89
	5 00	22 00	1,220 00	726,501 09
Less Mining Fees misappropriated $3,284.00, also transferred to Patent Branch, $58.00				
	5 00	22 00	1,220 00	726,501 09

THE YUKON TERRITORY.

Gold, and Mining Fees for each fiscal year from July 1, 1904, to June 30, 1905.

1898-1899.	1899-1900.	1900-1901.	1901-1902.	1902-1903.	1903-1904.	1904-1905.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
54,097 64	35,468 46	74,893 80	42,452 29	61,197 39	38,807 90	25,503 97	376,333 16
....	100 00	51 20	91 95	....	....	9 92	253 07
1,733 50	7,596 75	4,057 42	1,978 50	277 67	467 55	283 00	16,423 89
....	....	....	....	....	5 50	69 93	75 43
8,525 00	6,868 15	11,412 32	19,582 40	12,467 39	10,383 11	6,957 05	76,695 42
3,500 00	1,000 00	2,650 00	4,355 00	3,646 46	640 16	385 78	148,682 90
575,812 79	733,041 04	596,368 03	331,532 04	302,893 48	272,217 96	206,760 87	3,306,049 76
....	....	....	....	....	27 00	452 00	479 00
....	....	....	....	....	139 75	65 65	205 40
179,415 00	20,240 00	79,358 00	63,070 00	26,761 25	34,415 00	7,810 00	520,605 25
64,980 10	62,280 00	49,905 00	75,345 00	77,895 00	55,575 00	48,770 00	468,275 04
17,625 00	11,070 00	45,137 00	35,660 00	28,165 00	17,455 00	11,300 00	166,412 00
3,270 00	4,585 00	6,260 00	5,890 00	5,220 00	1,360 00	1,190 00	28,105 00
2 50	291 50	681 50	1,074 50	247 00	934 50	753 50	4,015 00
115 00	3,416 50	7,651 00	12,040 50	13,719 00	12,910 00	11,952 00	61,804 00
23,419 00	12,644 50	11,531 00	10,273 00	....	....	....	60,927 50
3,750 95	5,551 00	2,739 25	1,455 00	633 00	301 50	127 00	14,557 70
205 00	....	....	....	....	....	....	205 00
1.400 00	....	....	....	....	....	....	1,400 00
780 00	620 00	9,518 00	2,695 00	....	....	....	13,633 00
507 50	....	....	....	....	....	....	507 50
100 00	7,600 00	28,409 40	21,650 00	21,300 00	5,950 00	300 00	85,309 40
....	3,000 00	10,500 00	....	....	....	....	13,500 00
7,935 60	8,032 50	7,343 40	12,375 00	20,026 60	15,527 05	9,715 00	81,588 15
160 00	762 50	550 00	390 00	632 50	880 00	854 50	4,229 50
....	13,593 20	1,056 00	52 87	....	....	....	14,702 07
....	150 00	87,241 50	111 87	....	....	....	87,503 37
....	525 00	....	....	....	....	....	525 00
....	....	30 00	240 00	217 00	32 50	22 00	541 50
....	....	686 75	3,124 25	59 00	....	....	3,870 00
....	....	....	7 50	40 00	35 00	45 00	127 50
....	....	....	12,449 75	....	....	....	12,449 75
....	....	0 50	....	....	....	....	0 50
....	....	....	1,603 86	5,233 14	....	....	6,837 00
....	25 00	60 00	90 00	60 00	15 00	15 00	265 00
....	....	....	....	....	0 59	....	0 59
227,354 13	126,709 80	125,861 00	118,312 02	82,624 52	62,190 10	46,022 53	905,317 99
1,174,688 71	1,065,170 90	1,163,952 07	777,902 30	663,315 40	530,270 17	379,364 70	6,482,412 34
....	....	....	3,342 00	....	....	....	3,342 00
1,174,688 71	1,065,170 90	1,163,952 07	774,560 30	663,315 40	530,270 17	379,364 70	6,479,070 34

REVENUE FROM THE YUKON TERRITORY.

B.—Statement of Receipts from Timber, Hay, Coal, Hydraulic Mining, Royalty on Gold and Mining Fees for the Fiscal Year 1904–1905.

Month.	Timber Dues.	Grazing Lands.	Hay Lands.	Coal Lands.	Hydraulic Leases.	Dredging Leases.	Free Miner's Certificates.	Gold.	Free Certificates for Export of Gold.	Mining Fees.	Royalty on Water sold.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	2,724 70	....	88 00	....	1,193 53	100 00	5,752 50	32,659 36	77 50	11,853 00	....	54,448 59
August	2,721 84	....	84 00	....	755 55	....	5,052 50	38,586 12	59 00	11,077 00	4 25	58,340 26
September	2,552 68	4 97	5 00	28 30	855 58	....	5,518 00	47,728 87	153 50	12,524 50	....	69,371 40
October	2,244 53	....	5 00	15 60	302 14	....	4,314 50	15,421 50	36 50	8,323 50	....	30,663 27
November	2,446 52	....	....	....	....	....	3,264 50	2,224 71	3 50	5,792 50	61 40	13,793 13
December	619 06	....	....	5 10	....	230 00	2,525 00	2,851 99	3 50	6,927 50	....	13,162 15
1905.												
January	1,145 97	4 95	....	7 50	1,012 75	....	1,897 00	3,152 02	9 00	4,148 50	....	11,377 69
February	519 50	....	....	0 70	950 00	....	2,480 00	1,038 86	18 00	5,472 00	....	10,478 86
March	963 87	....	....	7 00	487 50	....	2,770 00	1,466 51	8 00	4,911 50	....	10,614 38
April	2,541 85	....	....	....	750 00	....	3,285 00	27 52	7 00	6,425 50	....	13,036 87
May	5,136 34	....	71 00	5 73	....	55 78	4,025 03	12,170 60	11 00	6,778 00	....	28,253 48
June	1,887 31	....	30 00	....	650 00	....	5,138 50	49,432 81	65 50	8,620 50	....	65,824 62
	25,503 97	9 92	283 00	69 93	6,957 05	385 78	46,022 53	206,760 87	452 00	92,854 00	65 65	379,364 70

YUKON REVENUE.

D.—STATEMENT showing the total Gold Production, the total Exemption, the total subject to Royalty, and the total Royalty collected for each Fiscal Year from May 1, 1898, to June 30, 1905.

Fiscal Year.	Gold Production.	Exemption.	Subject to Royalty.	Royalty Collected.	Infringements.	Total Revenue.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1897-1898	3,072,773 20	339,845 00	2,732 928 20	273,292 82	....	273,292 82
1898-1899	7,582,283 02	1,699,657 02	5,882,626 00	588,262 37	1,681 15	589,943 52
1899-1900	9,809,464 64	2,501,744 64	7,307,720 00	730,771 99	2,269 05	733,041 04
1900-1901	9,162,082 79	1,927,666 62	7,234,416 17	592,660 98	3,707 05	596,368 03
1901-1902	9,566,340 52	1,199,114 64	8,367,225 88	331,436 79	95 25	331,532 04
1902-1903	12,113,015 34	....	12,113,015 34	302,893 48	....	302,893 48
1903-1904	10,790,663 12	....	10,790,663 12	272,217 96	....	272,217 96
1904-1905	8,222,053 91	....	8,222,053 91	206,760 87	....	206,760 87
	70,318,676 54	7,668,027 92	62,650,648 62	3,298,297 26	7,752 50	3,306,049 76
Summary for 1904-5.						
Dawson	8,146,232 10	....	....	203,670 77	....	203,670 77
White Horse	72,150 56	....	....	2,998 31	....	2,998 31
Forty Mile	3,671 25	....	....	91 79	....	91 79
	8,222,053 91	....	....	206,760 87	....	206,760 87

YUKON REVENUE.

E.—STATEMENT showing the Revenue collected on Free Miner's certificates issued during the Fiscal Years 1898 to June 30, 1905.

Fiscal Year.	Amount.
	$ cts.
1897-1898	116,243 89
1898-1899	227,354 13
1899-1900	126,709 80
1900-1901	125,861 00
1901-1902	118,312 02
1902-1903	82,624 52
1903-1904	62,190 10
1904-1905	46,022 53
Total	905,317 99

AGENCIES where Free Miner's Certificates were issued during the Fiscal Year 1904-1905.

—	Amount.
Dominion Lands Agencies.	$ cts.
Calgary, Alta	187 50
Edmonton, Alta	86 00
Lethbridge "	177 50
Prince Albert, Sask	90 00
Winnipeg, Man	390 00
Yukon Agencies.	
Clear Creek	537 50
Dawson	25,344 00
Dominion Creek	2,560 00
Duncan	1,067 50
Forty-Mile	402 50
Gold Run	1,384 00
Grand Forks	2,832 00
Hootalinqua	312 50
Hunker	1,717 50
Klaune	840 50
Selkirk	202 50
Sixty-mile	905 00
Stewart River	375 00
Sulphur	1,114 00
White Horse	4,457 50
Other Agents.	
Ottawa, Ont., Interior Dept	717 00
London, Eng., High Commissioner	82 53
Vancouver, B.C., Assay office	142 50
Victoria, B.C., Collector of Customs	97 50
	46,022 53

No. 18A.

REPORT OF THE INSPECTOR OF CROWN TIMBER OFFICES.

DEPARTMENT OF THE INTERIOR,
WINNIPEG, July 1, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—The duties devolving upon me as Inspector of Departmental Agencies for the past eight years were divided in the month of January last, by the appointment of Mr. R. E. A. Leech, as Inspector of Dominion Lands Agencies, leaving me the inspection and supervision of the business pertaining to the Crown Timber Offices.

Owing to being thus relieved of a portion of the work which formerly fell to me, I am enabled to give closer attention to timber and mining interests, which, as you are aware, are rapidly assuming larger proportions and from which an increasing revenue is being received.

During the six months ending December 31, 1904, I made a round of inspection of a majority of the agencies, and during this year to 30th ultimo the following offices were inspected, namely, Lethbridge, Calgary, Edmonton, Red Deer and Banff.

I have been endeavouring, through the agents and forest rangers, to bring about a closer supervision over the cutting of timber upon Dominion lands, and a better enforcement of the laws and regulations that govern same.

My efforts have been met generally with the active co-operation of these officials, and it is gratifying to note a steady improvement taking place in the manner of conducting the work and, as a result, in the observance of the law by the public.

During the year, in company with the district officers, I visited a number of the saw-mills of licensees and made an inspection of their books, and investigated into their back business with the department.

It is regrettable to have to report that I found in a number of cases that the proper accounting of timber, lumber, &c., manufactured, had not been made.

The department have been accepting in the past returns from the millmen, the correctness of which is attested to upon oath, without question. While I would not advance the opinion that frauds were being perpetrated by the licensees of timber berths upon the government to any large extent, or in many cases, still the result of recent findings makes it advisable in the public interest that a closer supervision over their operations be maintained.

The timber regulations provide for governmental inspection of the millmen's books and records, and their operations of cutting on land held under license, and it is proposed that such will regularly take place in future in the case of each licensee.

This work at my instance is being carried on in the Calgary and Edmonton districts by Chief Forest Ranger Margach. His reports have reached you, no doubt, through the district agents.

The amount of lumber manufactured during the year in the provinces of Manitoba, Saskatchewan, Alberta and British Columbia, from timber cut upon Dominion lands shows an increase over the previous year of about twenty per cent.

The following statement of quantities was prepared from figures obtained from the local offices, and may be taken as fairly accurate as representing the manufactures in the respective districts during the twelve months ending June 30, 1905.

TIMBER DISTRICTS.

	Feet.
Winnipeg—	
Comprising Manitoba and Eastern Saskatchewan.. ..	56,885,363
Calgary—	
Comprising Western Saskatchewan and Southern Alberta..	13,870,892
Edmonton—	
Comprising Northern Alberta..	20,792,589
Prince Albert—	
Comprising Northern Saskatchewan..	21,974,894
British Columbia—	
Comprising the Railway Belt..	23,328,432
	136,852,175

For fuller information respecting the timber business in the Winnipeg district I would refer you to my report under the heading of Crown Timber Agent.

Accompanying this report will be found two statements designated 'A' and 'B.'

'A' gives a summary of the year's work performed at the Timber and Mines Branch. You will observe therefrom that the collection of revenue amounted to $154,811.39. To this must be added a large additional sum paid in direct to the department on account of the agencies.

It is worthy of note that settlers' timber permits issued during the year number nearly 10,000, and hay permits 1,184.

'B' gives a summary of the year's work, in so far as it is practicable to record it, performed by the forest ranger staff, to which I have added, as has been my practice in former years, a statement of their disbursements, incurred in prosecuting their work, also the number of days spent in the field and at headquarters.

FOREST FIRES.

The reports which have reached me regarding the damage by fire to the timber on Dominion lands indicate that it was extremely small.

This can be accounted for, in a large measure, by the excessive rainfall during the year.

Your obedient servant,

E. F. STEPHENSON,

Inspector Crown Timber Agencies.

CROWN TIMBER AGENCIES.

STATEMENT A.

SUMMARY OF WORK performed during the year ending June 30, 1905, showing number of transactions under various heads and amount of revenue collected.

Agencies.	Bonus.	Ground Rent.	Royalty on Sales.	Timber permits.	Timber Seizures	Hay permits.	Grazing Rents.	Mining Fees.	Coal Lands Royalty, etc.	Stone quarries.	Sundries.	School Lands and Hay, Timber and Grazing.	Revenue.
													$ cts.
Alameda	......	......	......	455	......	110	4	5	......	......	......	......	492 55
Battleford	......	......	......	131	3	46	3	......	......	......	......	21	842 03
Brandon	......	......	......	461	2	12	18	......	......	......	......	221	1,446 10
Banff	......	......	......	51	......	......	3	......	26	......	......	......	4,947 96
Calgary	......	24	64	906	10	74	55	43	24	......	2	......	11,797 97
Dauphin	......	......	......	1,329	40	104	8	1	......	......	......	1	9,877 57
Edmonton	......	34	30	1,469	12	46	......	34	3	......	2	110	9,552 69
Lethbridge	......	......	......	642	59	131	133	39	12	......	......	......	4,931 34
Minnedosa	......	......	......	183	5	153	......	......	......	......	......	2	1,336 30
New Westminster	......	204	72	60	......	......	......	......	......	......	......	......	27,706 85
Prince Albert	......	43	18	1,409	69	44	......	12	......	......	......	66	18,577 93
Red Deer	......	......	......	704	4	37	3	......	10	......	......	19	1,276 92
Regina	......	......	......	591	1	189	20	......	......	......	......	......	828 07
Yorkton	......	......	......	389	6	32	3	......	......	......	......	75	645 15
Winnipeg	......	88	108	1,199	63	206	3	83	......	......	1	525	60,551 96
	......	393	292	9,980	274	1,184	253	217	75	......	5	1,040	154,811 39

E. F. STEPHENSON,

Inspector Crown Timber Agencies.

STATEMENT B.

SUMMARY OF WORK performed by Forest Rangers and Sub-timber Agents for the year ended June 30, 1905.

Name.	Headquarters.	Timber permit Applications received.	Hay permit Applications received.	Seizures made.	Land inspections made.	Applications for patent taken.	Number of days at field work.	Number of days at Headquarters.	Miles Travelled. By Wagon.	Miles Travelled. By Rail.	Travelling and living expenses for self and team.	Expense for new and on old trav'ng equipment.	Remarks.
											$	$ cts.	
Coxe, Joseph	Douglas						249	116	5,067	314	360 00		Paid through Forestry Branch.
Cameron, J. A. C.	Edmonton	2		11	43		256	109	7,767	88	712 30	122 20	21 dys. Annual Vacation.
Lusted, John	Selkirk	5		3	76		162	46	2,638	1,463	344 22	237 20	Commenced work, 5 Dec., 1904.
Margach, W. I.	Calgary			11	54		207	158	4,187	6,164	897 51	254 58	2 dys. off duty.
McDonald, D. J.	Kamloops	5		1	81	25	98	267	1,158	1,717	593 60		Also Homestead Inspector, 13 dys. vacation.
Rutherford, John	Carlyle	217		6			202	59	3,552		362 84		Off duty, 20 Dec., 1904, to 3 April, 1905.
Robertson, A. L.	Prince Albert	25		66	1		232	133	3,852	1,040	439 49	87 35	22 dys. Annual Vacation.
Stauffer, Jos. E.	Didsbury						2	28		91	3 85		Commenced work, 1 June, 1905.
Walkinshaw, C. A.	Boissevain	166	12				326	39	3,948		648 51		
White, J. B.	Winnipeg	132		27	2		285	80	2,059	7,869	601 25		38 dys. off duty.
Young, Thos.	Dauphin	4		29	132	60	314	51	4,321	7,940	673 75		Also Homestead Inspector, 13 dys. off duty.
		595	12	154	389	85	2,333	1,086	38,549	29,629	5,637 32	701 33	

E. F. STEPHENSON,
Inspector Crown Timber Agencies.

No. 19.

REPORT OF THE CROWN TIMBER AGENT AT WINNIPEG.

Department of the Interior,
Crown Timber Office,
Winnipeg, July 1, 1905.

The Commissioner of Dominion Lands,
Ottawa.

Sir,—I have the honour to forward herewith the twenty-sixth annual report of this office for the departmental year ended June 30, 1905.

The following tabulated statements will be found appended thereto, namely:—

'A.' Classified statement showing revenue collected on account of timber, hay and mines during the year.

'B.' Schedule giving list of names of the respective holders of timber berths under license who are engaged in operations thereunder, and the extent thereof.

Of the twenty-nine whose names appear in our first annual report for year 1879, as engaged in the lumbering business, only one appears on our list to-day, that of Theo. A. Burrows, M.P., he having been continuously engaged thereat during the intervening years, and at present is operating on an extensive scale.

RECEIPTS.

The total amount of revenue for the year collected at this office was $61,018.22, being an increase of $4,183.46 over the amount for last year. The collections at the department on account of this agency during the year were $8,817.31, making the total revenue $69,835.53.

Payments have generally been promptly made as amounts fell due, and there are practically no arrears. The business has been conducted without loss of revenue, due in a large measure to the vigilance of the members of the staff, all of whom, it is a pleasure to testify, take a deep interest in the work of the office.

LUMBER SALES.

The statement given hereunder purporting to show the amount of lumber and other products of timber sold within this district during the year was carefully prepared from the office records, and those of the Department of Customs at Ottawa, and from information procured from the Lumbermen's Association of Manitoba and the North-west Territories, and the railway companies, and may be taken as approximately correct.

For purposes of comparison is shown also the amount of lumber sold during the preceding year:—

——	1903-04.	1904-05.
	Ft. B.M.	Ft. B.M.
From mills being operated in Ontario west of Lake Superior—		
Canadian Logs	125,000,000	82,000,000
American Logs	....	88,000,000
British Columbia manufacture	105,000,000	116,000,000
Dominion Lands (License)	28,866,143	40,385,368
" (Permit)	14,000,000	16,500,000
	272,866,143	342,885,368
Sawn lumber imported from United States	70,000,000	37,015,821
	342,866,143	379,901,189
Increase	37,035,046	....

These figures indicate a large increase in the sales of Canadian manufacture and the falling off in larger proportion in the amount of imported sawn lumber. In past years a considerable quantity of round timber has annually been brought in from the state of Minnesota by water and rail, for manufacture at Canadian mills on Rainy Lake, Lake of the Woods and at Port Arthur, and to Winnipeg by the D. E. Sprague and Rat Portage Lumber Companies, respectively.

During the past year round timber that produced in the manufacture about 88,000,000 feet was imported and found a market in the province of Manitoba and Saskatchewan.

The Rainy River Lumber Company have a mill in operation on the Canadian side, at the town of Rainy River, which has a capacity of 200,000 feet B.M. per day of ten hours. Last year 30,000,000 feet were manufactured by this company, exclusively from round timber cut in Minnesota, and brought by American and Canadian waters to the mill.

The figures given below represent approximately the wholesale prices at which lumber has been selling during the twelve months ending June 30, last:—

Pine and fir—

Dimension lumber	\$16 to \$23	according to grade.
Fir for finishing purposes	30 to 40	" "
Flooring, siding and ceiling	25 to 30	" "
Ship-lap and common boards	18 to 21	" "

Spruce—

Dimension and boards	16 to 18	" "
Siding, flooring and ceiling	17 to 18	" "
Ship-lap and common boards	16 to 18	" "
Lath	\$2.75 to \$3.75	(including pine and fir).
Shingles (cedar)	2.00 to 2.50.	

The prices quoted above are very much the same as those of the preceding year with the exception of a slight reduction in the price of dimension lumber as shown.

FUEL.

The figures given hereunder show approximately the consumption of coal in Manitoba and the Territories as far west as Regina during the year, exclusive of that used by the railway companies:—

	Tons.
American Anthracite	54,000
" Bituminous	11,000
Canadian Anthracite	2,000
" Bituminous (Galt)	70,000
" Lignite (Souris)	96,000
Total	233,000
The sales for the preceding year were approximated at	232,500

CORDWOOD.

It is impossible to ascertain even approximately the amount of cordwood consumed in Manitoba during the year. From careful inquiry, however, I have been able to ascertain fairly accurately the amount used in the city of Winnipeg and the town of St. Boniface, which would be about 140,000 cords. The prices for cordwood in car lots f.o.b. were about as follows:—

Poplar	$3 00 to $4 00
Spruce	3 75 to 4 50
Tamarac	4 25 to 5 00
Jackpine	3 75 to 4 75
Oak	5 50 to 6 25

During the year 19,815 cords of wood were brought in from the state of Minnesota over the Canadian Northern Railway. This wood, for the most part, was placed on the Winnipeg market.

FOREST FIRES.

This district was particularly free from bush fires during the year, primarily due to the wet autumn of last year and spring of this.

It was consequently not found necessary to engage the services of fire guardians for patrol work excepting in the western portion thereof.

The action taken by the department in past years of annually posting notices warning settlers and others against contravention of the Fire Act has, no doubt, had a deterring effect.

There has been no attempt made by the provincial governments or municipalities in the west at organized effort for dealing with this question which is of such vital importance to the welfare of the people. The personal losses sustained by settlers in past years in the destruction of property from running fires have been very great, and to the country in its woods and forests incalculable.

Steps, in my opinion, should be taken to bring about, if possible, the co-operation of the provincial governments in the west in dealing with this matter.

HAY.

The demand for hay permits upon the vacant lands of the Crown increases as the years go by. The following number were granted during the year:—

		Tons.
On school lands	438 for	12,242½
On Dominion lands	208 for	4,156½
Total	646 for	16,399

The hay crop was particularly good last season, as it is this, and an ample supply was obtained for all needs.

The failure of this crop would mean incalculable loss to the country and disaster to many of our settlers engaged exclusively in the raising of stock. Happily there never has been a total failure, but in those years when the crop was short great suffering to stock and loss were sustained. The 16,399 tons of hay granted under permit this season, if all cut, will provide feed for at least 6,000 head of stock. The area producing native hay is rapidly diminishing in Manitoba and the western provinces, through the land being brought under cultivation for grain growing, and by drainage.

The price of wild hay in the Winnipeg market in the month of March last was \$12.50 per ton, and on June 30, \$12 to \$13.

The cultivation of grasses by the settlers, for feed, is becoming more extensive each year.

MINING.

During the year fourteen mineral claims were recorded. There were also thirty claims upon which assessment work was done, certificates having issued therefor.

There have been no recent discoveries of minerals made in the district. Gold bearing rock is to be found in many places in the eastern part of Manitoba, also on the east and north shores of Lake Winnipeg, but the work done upon the claims staked so far has not been at a profit.

The Manitoba Gypsum Co., (Ltd.), during the year acquired the interests of the Manitoba Union Mining Co., in the gypsum lands and plant situated on Lake Manitoba and near Lake St. Martin.

It is claimed for the new company that they have installed new machinery in the mill that has increased its capacity for turning out finished plaster from 50 tons to 100 tons per day.

This product finds a ready sale in the markets of Manitoba and the North-west.

Your obedient servant,

E. F. STEPHENSON,

Crown Timber Agent.

SCHEDULE A.

STATEMENT of Receipts from Timber, Grazing, Hay and Mining Lands, collected at the Winnipeg Agency, for the Year ending June 30, 1905.

Month.	Dominion Lands.								School Lands.							
	Bonus.	Ground Rent.	Royalty.	Timber Permits.	Seizures.	Grazing.	Hay Permits.	Mining Fees.	Timber Permits	Seizures.	Grazing.	Hay Permits.	Seizures.	Cultivation Permits.	Sales.	Totals.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	....	317 38	660 31	682 05	5 25	....	79 30	65 00	95 25	....	9 60	267 55	....	11 50	....	2,193 19
August	....	....	1,767 25	732 58	1,005 00	4 45	28 40	27 50	60 00	....	48 00	135 95	....	......	....	3,809 13
September	....	95 00	89 43	1,907 20	1,310 68	......	2 50	697 50	79 50	....	19 20	6 10	14 50	.....	....	4,221 61
October	....	298 17	1,050 18	1,353 18	30 30	.....	5 80	50 00	....	1 30	57 60	....	....	.. .	39 00	2,885 53
November	....	41 03	1,952 74	7,603 37	460 00	. ..	.....	35 00	13 50	0 25	....	8 40	....	....	152 87	10,267 16
December	....	.....	715 43	5,694 85	42 60	......	2 00	20 00	107 25	....	....	1 90	....	......	99 47	6,683 50
1905.																
January	....	465 45	709 54	1,423 80	266 70	4 45	...	37 50	445 19	31 30	19 20	2 00	....	......	167 85	3,572 98
February	....	....	2,684 70	3,555 12	509 64	......	......	5 00	41 00	....	19 20	3 70	....	......	....	6,818 36
March	....	....	614 04	1,752 45	178 91	0 60	.....	37 50	128 60	....	....	11 10	....	11 50	7 39	2,742 09
April	....	1,602 77	756 87	334 96	364 18	......	218 50	12 50	18 00	....	....	383 20	....	......	....	3,690 98
May	....	2,493 00	2,407 80	907 72	302 25	......	81 80	10 00	353 75	....	48 00	138 30	....	......	....	6,742 62
June	....	1,215 91	2,918 15	1,676 92	916 99	......	88 70	142 50	113 50	....	35 60	282 80	....	.....	....	7,391 07
	....	6,528 71	16,326 44	27,624 20	5,392 50	9 50	507 00	1,140 00	1,455 54	32 85	256 40	1,241 00	14 50	23 00	466 58	61,018 22
Paid at Head Office	6,211 00	2,561 06	....	0 25	45 00	. .	....	....	....	....	....	....	....	......	....	8,817 31
Totals	6,211 00	9,089 77	16,326 44	27,624 45	5,437 50	9 50	507 00	1,140 00	1,455 54	32 85	256 40	1,241 00	14 50	23 00	466 58	69,835 53

E. F. STEPHENSON,
Crown Timber Agent.

WINNIPEG, July 1, 1905.

SCHED

SHOWING Saw Mills in the Province of Manitoba operating under

Name.	Location of Mill.	Kind of Power	Location of Limits.	Lumber manufactured.	Lumber sold from quantity manufactured and from that on hand from previous years.	Lumber on hand.
				Ft.	Ft.	Ft.
Theo. A. Burrows, M.P.	Garland and Grand View.	Steam	Pine River and Valley River.	9,387,958	3,025,793	6,362,165
Bank of Ottawa	Mafeking	"	Mafeking	2,206,820	977,174	1,229,646
Jefferson Caverly	Bowsman	"	38-29, W. 1	841,000	557,406	283,594
Jas. Drake Lumber Co.	Bad Throat River	"	Lake Winnipeg	1,713,607	1,830,207	336,600
F. L. Engman	Scandinavia	"	19-18, W. 1	48,000	30,000	18,000
Thomas Fulton	38-5, W. 2	"	38-5, W. 2	223,000	159,125	341,105
Grigg & Perrin	No Mill	"	Duck Mountains	74,104	52,204	21,900
John Hanbury	Brandon	"	" "	5,988,494	4,576,166	2,625,460
Knox Bros. & Faija	22-13, W. 1	"	22-13, W. 1	760,796	760,796	....
Manning & Jefferson	20-1, W. 1	"	East of L. Manitoba.	436,542	411,867	194,675
J. D. McArthur	Lac du Bonnet	"	Winnipeg River	3,835,323	3,338,555	496,768
Peter McArthur	Winnipegosis	"	Lake Winnipegosis	3,269,480	3,635,069	653,347
Mackenzie, Mann & Co.	Mistatein	"	Etoimami River	2,890,160	1,134,500	1,755,660
J. H. McClure	19-2, E. 1	"	19-2, E. 1,	225,000	266,274	149,500
William Peden	Rossburn	"	Riding Mountain	314,704	314,704	100,000
Wm. Payne & Sons	Riding Mountain	"	" "	255,817	255,817	....
David Ross	Whitemouth	"	Whitemouth River	....	....	....
Wm. Robinson	Selkirk	"	Lake Winnipeg	5,351,729	3,424,605	2,100,913
Ritchie Bros	Ochre River	"	Ochre River	303,000	413,116	397,996
Red Deer Lumber Co.	Red Deer Lake	"	Sask. District.	11,959,366	10,272,908	3,916,858
Shaw Bros.	Dauphin	"	Riding Mountain	1,912,733	2,076,141	1,559,994
D. E. Sprague	Winnipeg	"	Rosseau River	2,382,582	595,419	1,787,163
Swan River Lumber Co	Minitonas	"	36-24-W. 1	1,193,766	1,241,998	1,421,494
James Stuart	Bad Throat River,	"	Lake Winnipeg	41,600	41,600	....
Thomas & Co	10-18-3, E.	"	W. side L. Winnipeg	399,895	214,895	185,000
A. L. Wells	Washow Bay	"	Lake Winnipeg	772,000	772,000	....
W. J. F. Williams	Lake Dauphin	"	28 & 29-R. 17, W. 1	7,029	7,029	....
			Total	56,794,505	40,385,368	25,937,838

ULE B.

Government License for the twelve months ending June 30, 1905.

Shingles manufactured.	Shingles sold from quantity mfctd. and from that on hand from last year.	Shingles on hand.	Lath manufactured.	Lath sold from quantity manufactured and on hand from last year.	Lath on hand.	Railway ties manufactured.	Railway ties sold from qty. manufactured and on hand from last year.	Piling manufactured.	Piling sold from quantity manufactured and on hand from last year.	Remarks.
Cds.	Cds.	Cds.	M.	M.	M.	Pcs.	Pcs.			
......	......	......	142,650	142,650	......	....	......	32,218	1,302	1,075 cords of wood also cut.
......	......	......	......	......	......	......	......	......	......	400 " "
......	......	......	......	......	......	......	......	......	......	Operated under permit.
310,000	175,000	135,000	......	......	......	......	......	8,752	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	13,346	13,346	11,610	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	3,604	4,029	13,676	13,676	11,335 cords of wood also cut under permits.
......	......	......	7,950	7,950	......	6,560	6,360	......	......	
......	......	......	......	......	......	22,574	93,995	......	......	Also cut under permit, upwards of 300,000 ry. ties, 88,860 lin. ft. of piling, and 2,000,000 ft. b.m. of bridge timber, &c.
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	1,954	1,954	
......	......	......	......	......	......	7,400	7,400	14,900	......	300 cords of wood, 1,400 fence posts and 570 telegraph poles also cut.
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	7,161	7,161	
......	......	......	4,583,984	3,869,750	714,234	......	......	......	......	A large number of logs on hand not sawn, containing upwards of 30,000,000 ft. b.m.
......	172,750	......	168,000	220,000	36,350	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	Upwards of 4,000 cords of wood also cut.
......	......	......	75,000	......	75,000	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
......	......	......	......	......	......	......	......	......	......	
310,000	347,750	135,000	4,977,584	4,240,350	825,584	53,484	125,130	90,271	24,093	

E. F. STEPHENSON,

Crown Timber Agent.

No. 20.

REPORT OF THE CROWN TIMBER AGENT AT NEW WESTMINSTER.

Department of the Interior,
Crown Timber Office,
New Westminster, B.C., September 19, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I have the honour to submit herewith my annual report for the twelve months ending June 30, 1905; I also inclose herewith schedule of mills situated in the province of British Columbia in the Dominion Railway Belt, which gives the usual statistics respecting the timber trade.

The receipts of this agency for the fiscal year ending June 30, 1905, amounted to $71,079.27.

There has been a slight falling off in the quantity of timber manufactured in the province of British Columbia, from the lands held under license from the Dominion government, owing to the fact that the lumbermen of this province are cutting more extensively upon lands held by them from the provincial government, as under these licenses they are obliged to get the timber off the lands so leased in as short a time as possible.

The export trade to foreign countries has been very satisfactory.

We have had very considerable trouble from forest fires, owing to this season being excessively dry and hot; for some three months hardly any rain fell, but we have fortunately been able to control the fires in such a way that very little damage has been caused thereby.

I would again respectfully urge that the provincial government be asked to pass more stringent laws concerning the setting out of fires and that a close season be proclaimed, during which time it shall be illegal to set fires for any purpose, unless a permit shall have been first obtained, said permit to be issued by the officer in charge of the district where such fire is intended to be set out. The fire warden would then be able to look after the fire, and if necessary, prevent it from spreading.

Your obedient servant,

JAMES LEAMY,

Crown Timber Agent.

A.—STATEMENT of Receipts of New Westminster Crown Timber Agency, for the Fiscal Year ended June 30, 1905.

Year.	Month.	Ground Rent.	Royalty.	Permit Dues.	Total.
		$ cts.	$ cts.	$ cts.	$ cts.
1904	July	826 59	111 27	45 50	983 36
	August	84 42	282 15	75 50	442 07
	September	142 31	539 78	34 50	716 59
	October	69 00	3,400 03	0 25	3,469 28
	November	....	429 90	....	429 90
	December	37 85	1,294 72	39 92	1,372 49
1905	January	8 15	1,200 45	318 00	1,526 60
	February	....	136 00	229 50	365 50
	March	....	3,813 72	589 21	4,402 93
	April	1,603 64	272 53	79 73	1,955 90
	May	5,739 85	554 64	604 69	6,899 18
	June	766 58	4,521 22	125 25	5,143 05
		9,278 39	16,286 41	2,142 05	27,706 85
	Amount collected at head office	....	....	....	43,372 42
	Total	....	....	....	71,079 27

B.—List of Mills operating in Dominion Railway Belt of British Columbia and Statement showing Quantity of Timber manufactured during fiscal year ended June 30, 1905.

Name of Owner.	Where Situated.	Capacity of Mill.	Power.	Operating on Limit No.	Locality of Limit.	Quantity of lumber manufactured.	Quantity of lumber sold from quantity manufactured, and quantity on hand from previous year.	Quantity of lumber on hand.
		Ft.				Ft.	Ft.	Ft.
W. C. Wells	Palliser	30,000	Steam	406, 3 and 29	Beaver Foot and Kicking Horse	3,281,329	7,425,257	1,478,113
Columbia River Lumber Co.	Golden	40,000	"	258, 257, 278, 231	Columbia River	205,957	205,957	
" "	Beaver	100,000	"	15 and 16	"	3,577,716	4,026,809	1,740,364
" "	Knalt	40,000	"	250, 71, 72, 78, 45, 242	Shuswap Lake			
" "	Carlin	15,000	"	239		345,855	1,290,829	1,093,982
Yale Columbia Lumber Co.	Nakusp	30,000	"	88, 114	Columbia River	91,787	91,787	
Bowman Lumber Co.	Revelstoke	30,000	"	112, 113, 123, 207, 249	"	6,869,568	9,372,905	
"	Comaplix	50,000	"	Not operating	"			
"	Wigwam	*30,000	"	118				
Revelstoke Lumber Co	Big Eddy	40,000	"	Not operating				
Ashcroft Water, Elec. and Imp. Co.	Kamloops	50,000	"	271, 263	Shuswap Lake	172,412	344,824	
Harrison River Mills T. and T. Co.	Harrison River	75,000	"	63, 254, 248	Harrison Lake		3,200,142	3,200,142
E. H. Heaps & Co	Ruskin	25,000	"	185, 96, 33	Stave River and Lake	140,713	1,195,623	
"	Cedar Cove	100,000	"	Not operating				
Peter Ryan	Kamloops	75,000	"	240	Shuswap Lake	2,001,788	749,426	1,970,362
North Pacific Lumber Co	Barnet	120,000	"	Not operating	Chilliwack River			
Brunette Saw Mill Co.	Sapperton	75,000	"	33, blk 2, 138	Stave River and Lake	966,503	966,503	
B. C. Mills Timber and Trading Co.	New Westminster.	90,000	"	Not operating	Mud Bay			
" "	Vancouver	225,000	"	"	"			
Grant & Kerr	Ladner	25,000	"	234	Mud Bay and Stave Lake		671,120	
Pacific Coast Lumber Co	Vancouver	125,000	"	Not operating	Coquitlam River			
Hastings Shingle Manufactur'g Co.	"	125,000	"	52	Port Moody			
K. Mikuni	"	No mill	"	246	North Arm Burrard Inlet	60,000	22,000	14,000
Vancouver Power Co	"	"	"	O	Burrard Inlet	268,233	268,233	
West Coast Timber Co	"	"	"	Not operating	"			
W. H. Pratt	Revelstoke	"	"	64	Greeley Creek	1,640,210	1,200,000	440,210
Big Bend Lumber Co.	Arrowhead	100,000	"	316	Arrowhead			
Arrowhead Lumber Co	"	125,000	"	333, 335	"	1,745,645	1,745,645	

Okanagan Lumber Co.	Enderby	50,000	"	Not operating	Enderby			
Kamloops Lumber Co.	Annis	*70,000	"	"				
Eagle River Lumber Co	Three Valley Lake	50,000	"	"				
						21,367,716	32,777,060	9,937,173

*Shingles.

B.—List of Mills operating in Dominion Railway Belt of British Columbia, &c.—*Concluded.*

Name of Owner.	Quantity of shingle bolts manufactured.	Quantity of shingle bolts sold out of quantity manufactured, and quantity on hand from previous year.	Quantity of shingle bolts on hand.	Quantity of lath manufactured.	Quantity of lath sold.	Quantity of lath on hand.	Quantity of railway ties manufactured.	Quantity of railway ties sold.	Quantity of railway ties on hand.	No. of mill returns received.	Date of last return.
	Cords.	Cords.	Cords.	M.	M.	M.	Pieces.	Pieces.	Pieces.		1904.
W. C. Wells										12	June 30.
Columbia River Lumber Co.										12	" 30.
" "					2,000	954,067	41,098	41,098		8	" 30.
" "							5,871	5,871		24	" 30.
" "										28	" 30.
Yale Columbia Lumber Co.										4	" 30.
Bowman Lumber Co				697,000	697,000					20	" 30.
"										4	" 30.
"	313	639	240							4	" 30.
Revelstoke Lumber Co										4	" 30.
Ashcroft Water, Elec. and Imp. Co.										4	" 30.
Harrison River Mills T. and T. Co.									3,766	12	" 30.
E. H. Heaps & Co	3,796	6,877	3,823							12	" 30.
"										4	" 30.
Peter Ryan										4	" 30.
North Pacific Lumber Co.										4	" 30.
Brunette Saw Mill Co.										16	" 20.
B. C. Mills Timber and Trading Co.										4	" 30.
" "										4	" 30.
Grant and Kerr.										4	" 30.
Pacific Coast Lumber Co.										4	" 30.
Hastings Shingle Manufactur'g Co.	2,035	3,035								4	" 30.
K. Mikuni.	1,125	987	258							4	" 30.
Vancouver Power Co.										4	" 30.
West Coast Timber Co										4	" 30.
W. H. Pratt	13		27							4	" 30.
Big Bend Lumber Co.										4	" 30.
Arrowhead Lumber Co.										4	" 30.

Okanagan Lumber Co.	....	....	....	....	....	....	....	....	....	8	"	30.
Kamloops Lumber Co.	....	....	....	....	....	....	....	....	....	4	"	30.
Eagle River Lumber Co.	....	....	....	....	....	....	....	....	....	4	"	30.
	7,282	11,538	4,348	697,000	717,000	954,067	46,969	46,969	3,766			

No. 21.

REPORT OF THE CROWN TIMBER AGENT AT EDMONTON.

Department of the Interior,
Dominion Lands Office,
Edmonton, Alberta, July 25, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

Sir,—I have the honour to inclose herewith schedules 'A' and 'B' relating to the work of the Timber and Mines Branch of this agency, for the year ending June 30, 1905.

The total amount cut in B.M. by berth owners was 11,541,785 feet, and for the settlers by the portable mills the estimated cut in round figures was 5,500,000 feet B.M.

Your obedient servant,
A. G. HARRISON,
Crown Timber Agent.

SCHEDULE A.

Statement of Receipts from Timber, Grazing, Hay and Mines at Edmonton Office for twelve months ending June 30, 1905.

Months.	Dominion Lands.	School Lands.
1904.	$ cts.	$ cts.
July	1,569 86	82 20
August	88 61	5 80
September	149 69	2 15
October	634 85	14 05
November	804 71	15 80
December	412 54	60 85
1905.		
January	882 38	11 15
February	1,045 69	13 75
March	439 15	22 21
April	2,003 10	57 40
May	671 53	40 85
June	540 68	67 80
	9,242 79	394 01
Head office	28,385 67	
	37,628 46	

Certified correct,
A. G. HARRISON,
Crown Timber Agent.

SCHEDULE B.

Return of Saw-mills operating in Edmonton Crown Timber Agency under Government License during the Year ending June 30, 1905.

Name of Owner.	Where situated.	Kind of Power.	Number of Horse Power.	Operations began.	Logs cut on Limit.	Lumber Manufactured in Period.	Lumber Sold in Period.	Date of Last Return.	Kind of Timber.	Number of Returns made.
					No.	B.M.	B.M.			
D. R. Fraser & Co.	Edmonton	Steam	150	1899	788	500,000	41,130	June 30, '05	Spruce	23
"	"	"	150		812	Nil.	Nil.	" 30, '05		6
"	"	"	150		1,008	"	"	" 30, '05		10
"	"	"	150		1,141	"	"	" 30, '05		4
"	"	"	150		1,150	"	"	" 30, '05		4
John Walter	Strathcona	"	150	1900	881	"	"	" 30, '05		17
"	"	"	150	1900	864	1,388,007	694,000	Mar. 31, '05	Spruce	18
"	"	"	150		1,140	Nil.	Nil.	June 30, '05		6
"	"	"	150		1,163	"	"	" 30, '05		5
"	"	"	150		1,196	"	"	" 30, '05		1
D. R. Fraser & Co. and John Walter	Edmonton & Strathcona.	"	150 & 150	1900	496	804,200	804,200	" 30, '05	Spruce	27
" "	" "	"	150 & 150	1900	9 bl. 5 & 6	4,265,574	2,866,622	Mar. 31, '05 June 30, '05	"	39
" "	" "	"	150 & 150		302	Nil.	Nil.	" 30, '05		19
" "	" "	"	150 & 150		1,091	"	"	" 30, '05		9
" "	" "	"	150 & 150		1,161	"	"	" 30, '05		6
" "	" "	"	150 & 150		1,160	"	"	" 30, '05		7
" "	" "	"	150 & 150		1,211	"	"	" 30, '05		1
Deering Implement Co.	Stony Plain	"		1900	887	600,903	565,903	Dec. 31, '04	Spruce	13
Foulger & Rowley	Ponoka	"	100	1901	949	549,573	274,573	" 31, '04	"	17
S. J. Eccles	Spruce Grove	"		1904	1,030	Nil.	20,197	Sept. 7, '04	"	6
Hugh McPhee	"	"		1903	1,042	191,730	217,472	June 30, '05	"	9
J. A. Powell	Half Moon Lake	"		1903	849	20,000	Nil.	" 30, '05	"	10
W. S. Dwinnell					955	Nil.	"	Dec. 30, '04		12
"					962	"	"	" 30, '04		12
"					963	"	"	" 30, '04		12
"					968	"	"	" 30, '04		12
"					970	"	"	" 30, '04		11
"					971	"	"	" 30, '04		11
"					972	"	"	" 30, '04		11

SCHEDULE B—*Concluded.*

RETURN of Saw-mills operating in Edmonton Crown Timber Agency under Government License during the year ended June 30, 1905—*Concluded.*

Name of Owner.	Where situated.	Kind of Power.	Number of Horse Power.	Operations began.	Logs Cut on Limit.	Lumber Manufactured in Period.	Lumber Sold in Period.	Date of Last Return.	Kind of Timber.	Number of Returns made.
					No.	B.M.	B.M.			
W. S. Dwinnell					1,007	Nil.	Nil.	Dec. 31, '04		7
"					1,009	"	"	" 31, '04		8
"					1,020	"	"	" 31, '04		6
"					1,202			April 30, '05		0
"					1,204					0
F. Fetherstonhaugh	Fort Saskatchewan	Steam		1901	956	Nil.	Nil.	June 30, '05		17
Blain & McKelvey	Ponoka	"	100	1901	1,019	"	"	" 30, '05		9
"	"	"	100	1903	1,022	"	"	Dec. 31, '04		9
"	"	"	100	1905	1,190	"	"	June 30, '05		2
W. J. Webster	Stony Plain				1,056	"	"	Dec. 31, '04		5
Imperial Pulp Co					1,031	"	"	June 30, '04		4
"					1,052	"	"	Mar. 31, '04		3
"					1,058	"	"	June 30, '04		4
"					1,097	"	"	" 30, '04		1
"					1,098	"	"	" 30, '04		1
McDonald & Frith					1,040	"	"	Dec. 21, '04		3
T. A. Burrows					1,046	"	"	Mar. 1, '05		4
"					1,099	"	"	Dec. 31, '04		4
"					1,093	"	"	" 31, '04		4
"					1,094	"	"	" 31, '04		4
"					1,068	"	"	Mar. 1, '05		4
"					1,191	"	"	" 3, '05		1
"					1,192	"	"	" 3, '05		1
W. B. McPherson	Bentley	Steam		1903	1,065	265,436	178,830	" 31, '05	Spruce	7
N. S. Edgar					1,076	Nil.	Nil.	June 30, '04		2
Mutchenbacker Bros					1,077	"	"	Dec. 31, '04		2
"					1,087	"	"	" 31, '04		2
J. G. Edgar					1,137	"	"	" 31, '04		3
R. T. Telford					1.084	"	"	June 30, '05		4
Finlayson, Stuart & McDougall					1,082			June 30, '05		4

" "					1,088			" 30, '05		5
" "					1,104			" 30, '05		5
" "					1,156			" 30, '05		4
" "					1,125			" 30, '05		4
T. H. Stewart	Stony Plain	Steam		1903	1,026			May 8, '05		3
"	"	"		1904	1,111			" 8, '05		3
Wood & Cinnamon	"	"		1904	1,103			Aug. 26, '04		4
John Gentles					1,096			Dec. 31, '04		2
"					1,092			" 31, '04		1
"					1,095			" 31, '04		1
*John Fraser				1904	1,043	15,922	15,922	" 31, '04		3
D. E. Noyes & Sons					1,109			Sept. 30, '04		3
A. W. Fraser					1,122			Dec. 21, '04		1
Edmund Lyons					1,131			" 31, '04		2
J. H. Morris					1,149			Jan. 17, '05		2
Pollock & Young	Onaway	Steam		1904	1,155	70,000	27,825	May 17, '05	Spruce	6
Thomas Swift					1,185			June 30, '05		1
Arthur Mowatt					1,199					0
H. McDonald					1,208			June 30, '05		0
Huff & Carter					1,213					0
J. A. Bradley					1,214					0
D. N. McDonald					1,216					0
Total						8,671,345	5,706,674			

* No report since May, 1904, showing operations.

Certified correct,

A. G. HARRISON,

Crown Timber Agent.

No. 22.

REPORT OF THE CROWN TIMBER AGENT AT CALGARY.

DEPARTMENT OF THE INTERIOR,
CROWN TIMBER OFFICE,
CALGARY, ALBERTA, July 15, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to inclose herewith the following statements for the twelve months ending June 30, 1905:—

Schedule A.—Statement of receipts on account of Crown timber covering the period referred to, amounting to $18,629.08.

Schedule B.—General office work.

Schedule C.—Showing the saw-mills within the Crown timber agency in operation under government license to June 30, 1905. The lumber business is in a very flourishing condition notwithstanding large quantities have been brought in from the United States. You will observe that there are three more mills in operation this year than last, 47 more mill returns have been received and 215 more timber permits issued. The correspondence has also been very much heavier.

Your obedient servant,
J. R. SUTHERLAND,
Crown Timber Agent.

CALGARY CROWN TIMBER AGENCY.

SCHEDULE A.

Statement of receipts on account of Crown timber on Dominion lands, for year ending June 30, 1905:—

July, 1904	$1,191 23
August, 1904	1,034 64
September, 1904	151 05
October, 1904	863 50
November, 1904	650 79
December, 1904	1,563 90
January, 1905	1,304 27
February, 1905	281 24
March, 1905	880 93
April, 1905	1,934 78
May, 1905	831 25
June, 1905	386 88
Total	$11,074 46
Amount collected at head office	7,554 62
Grand total	$18,629 08

SCHEDULE B.

General Office Return of the Calgary Crown Timber Office for the year ending June 30, 1905.

Class of Work.	Number.	Increase.	Remarks.
Letters written	20,644	6,094	Including Dominion Lands.
Letters received	33,180	9,609	" "
Permits issued subject to dues	14	Decrease 24	
Free permits issued	892	Increase 215	
Mill returns received and verified	88	47	

SCHEDULE C.

SHOWING the Saw-mills in the Calgary Crown Timber Agency operating under Government Licenses, for the year ending June 30, 1905.

Number.	Owner or Assignee.	Where Situated.	Kind of Power.	No. of Horse Power.	Commenced Operations.	Description of Timber.	Logs Cut at	Logs on hand, Logs Manufactured and Sold, Logs on hand at date of last return.		Shingles Manufactured and sold.	Date of last return.	No. of Returns.	Remarks.
									Feet.				
1	G. H. Bawtenheimer....	Little Red Deer River.	Steam	....	1900	Fir and Spruce	T. 32, R. 5-6, W. 5 M.	On hand March 31, 1904.	Nil.	Nil.	Mar. 31, 1905.	4	*
								Manufactured........	956,583				
								Sold.................	611,779				
								On hand March 31, 1905.	344,804				
2	DeWolfe & Carscadden..	S. 28, T. 9 R. 3, W. 4 M.	Steam	......	1903	Fir and Spruce	W½ 36-14-1-5...	On hand March 31, 1904.	198,950	"	Mar. 31, 1905.	3	Timber berth 1036.
								Manufactured...... ..	85,136				
									284,086				
								Sold.......	284,086				
								On hand 31 March, 1905.	Nil.				
3	The Eau Claire and Bow River Lumber Co., Ltd.	Calgary	Steam	65	1887	Fir, Spruce, Cypress and Pine.	Spray River.....	On hand March 31, 1904.	1,734,547	"	Mar. 31, 1905.	4	Timber berth 318.
								Manufactured..	3,494,059				
									5,228,606				
								Sold.	2,991,020				
								On hand March 31, 1905.	2,237,586				
4	James & Otterbine.....	Didsbury.....	Steam	......	1904	Fir and Spruce	....	On hand......	Nil.	"	Mar. 31, 1905.	3	Timber berth 1143.
								Manufactured..	131,845				
								Sold.	105,255				
								On hand March 31, 1905.	26,590				

5	James & Otterbine....	Didsbury.....	Steam	......	1902	Fir and Spruce	... .	On hand June 30, 1904..	135,402	"	Mar. 31, 1905.	3	Timber berth 1021.
								Manufactured.... ...	Nil.				
								Sold................	135,402				
								On hand March 31, 1905.	Nil.				
6	Hon. P. McLaren......	Mill Creek....	Water	20	1882	Spruce and Fir	Mill Creek......	On hand June 30, 1904..	91,647	"	June 30, 1905.	4	†
								Manufactured.......	Nil.				
								Sold.......	3,661				
								On hand March 31, 1905.	Nil.				
7	Hon. P. McLaren..	Blairmore	Steam	40	1882	Spruce and Fir	Old Man's River	On hand June 30, 1904 .	1,122,532	"	June 30, 1905.	4	Timber berth 36A.
								Manufactured..	2,304,125				
									3,426,657				
								Sold.....	2,491,656				
								On hand June 30, 1905..	935,001				
8	J. Bailey Powell........	High River...	Steam	......	1903	Fir and Spruce	High River.. ..	On hand June 30, 1904..	321,471	"	Mar. 31, 1905.	3	Timber berth 1124.
								Manufactured...	180,000				
									501,471				
								Sold.	501,471				
								On hand March 31, 1905.	Nil.				
9	J. Bailey Powell........	Okotoks......	Steam	50	1890	Fir and Spruce	Sheep Creek....	On hand June 30, 1904..	315,792	"	Mar. 31, 1905.	3	Timber berth 569.
								Manufactured.......	182,000				
									497,792				
								Sold................	497,792				
								On hand March 31, 1905.	Nil.				

* 521,000 ft. B.M. in the log, reported to have been lost down the river, timber berth 252. † Timber berth 36. Over estimate of 87,986 ft. B.M. not on hand.

SCHEDULE C.

Showing the Saw-mills in the Calgary Crown Timber Agency operating under Government Licenses, for year the ending June 30, 1905.

Number.	Owner or Assignee.	Where Situated.	Kind of Power.	No. of Horse Power.	Commenced Operations	Description of Timber.	Logs Cut at	Logs on hand, Logs Manufactured and Sold, Logs on hand at date of last return.		Shingles Manufactured and sold.	Date of last return.	No. of Returns.	Remarks.
									Feet.				
10	J. Bailey Powell	High River...	Steam	. .	1903	Fir and Spruce	High River.....	On hand June 30, 1904..	Nil.	"	Mar. 31, 1905.	3	Timber berth 579.
								Manufactured	1,426,934				
								Sold.............	1,231,081				
									195,853				
								Transferred to timber berth 1124..	180,000				
								On hand March 31, 1905.	15,853				
11	Thos. Qingley..........	Cochrane	Steam	......	1904	....	....	On hand	Nil.	"	Mar. 31, 1905.	1	Timber berth 1159.
								Manufactured	514,256				
								Sold.	364,256				
								On hand March 31, 1905.	150,000				
12	Thos. Quigley..... ...	... .	Steam	.....	1904	... .	....	On hand	Nil.	Nil.	Mar. 31, 1905.	1	Timber berth 1165
								Manufactured.........	30,000				
								Sold..	Nil.				
								On hand March 31, 1905	30,000				
13	W. & J. Rutherford.....	Cypress Hills.	Steam	......	....	Spruce.. . ..	2 8-3-4.	On hand March 31, 1904	37,000	"	Mar. 31, 1905.	4	Timber berth 784
								Manufactured....	Nil.				
								Sold..................	37,000				
								On hand March 31, 1905	....				

14	W. & J. Rutherford.	10-8-3-4.	Steam	......	1903	....	10-8-3-4.	On hand March 31, 1904 Manufactured Sold	Nil. 70,000 45,000	"	Mar. 31, 1905.	4	Timber berth 1027
								On hand March 31, 1905	25,000				
15	J. H. Wray	Mount'n View	Steam	.....	1902	....	....	On hand March 31, 1904 Manufactured Sold	Nil. 75,000 38,000	"	Mar. 31, 1905.	3	Timber berth 583
								On hand March 31, 1905	37,000				
16	C. J. B. Anderson	2-13-30-4	Steam	.....	1904	....	....	On hand June 30, 1904 Manufactured Sold	Nil. 100,000 Nil.	"	Mar. 31, 1905.	2	Timber berth 1074
								On hand March 31, 1905	100,000				

Total quantity of lumber manufactured during the year .... 9,569,938 feet.
" " " sold " " .... 9,337,459 "

No. 23.

REPORT OF THE CROWN TIMBER AGENT AT PRINCE ALBERT.

DEPARTMENT OF THE INTERIOR,
CROWN TIMBER OFFICE,
PRINCE ALBERT, SASKATCHEWAN, July 8, 1905.

The Commissioner of Dominion Lands,
Ottawa, Ont.

SIR,—I have the honour to inclose herewith the following statements for the year ending June 30, 1905:—

Schedule 'A.'—Statement of receipts on account of Crown timber, grazing, mining and hay.

Schedule 'B.'—Statement showing saw-mills operating under government license.

Schedule 'C.'—Statement showing operations of permit berths.

Schedule 'D.'—Statement showing general work during the year.

Your obedient servant,
J. W. HANNON,
Crown Timber Agent.

SCHEDULE A.

STATEMENT of Receipts from Timber, Grazing and Hay Lands at the Crown Timber Office, Prince Albert, for the twelve months ending June 30, 1905.

Month.	Dominion Lands.	School Lands.	Total.
1904.	$ cts.	$ cts.	$ cts.
July	2,016 12	75 60	2,091 72
August	356 49	6 50	362 99
September	393 63	....	393 63
October	346 64	13 05	359 69
November	1,700 90	....	1,700 90
December	3,966 69	4 50	3,971 19
1905.			
January	3,008 25	0 50	3,008 75
February	748 75	....	748 75
March	802 46	3 60	806 06
April	3,173 09	72 50	3,245 59
May	1,471 77	25 50	1,497 27
June	374 29	17 10	391 39
Total	18,359 08	218 85	18,577 93
Collected at Head office	19,925 19	....	19,925 19
Grand total	38,284 27	218 85	38,503 12

CROWN TIMBER OFFICE,
PRINCE ALBERT, July 7, 1905.

J. W. HANNON,
Crown Timber Agent.

SCHEDULE B.

STATEMENT showing Saw-mills in the Prince Albert district operating under Government License, during the year ending June 30, 1905.

Name of Owner.	Horse-power and kind.	Capacity for 10 hours.	Commenced operations.	Description of timber.	Where cut.	Quantity of lumber manufactured during the year.	Quantity of lumber sold.	Number of shingles manufactured.	Number of shingles sold.	Number of lath manufactured.	Number of lath sold.	Date of last return and total of returns made.
						Feet.	Feet.					
James H. Sanderson........	225, Steam.	36,000	1888	Spruce and Tam'rac	Limits north of Sturgeon Lake.	2,605,366	2,210,103	283 M.	279 M.	152,900	71,750	June 30, 1905.
Wm. Cowan & Co..........	250, " ..	35,000	1890	" ..	Limits up Little Red River..	4,612,004	3,080,932	....	....	449,650	114,850	" 30, 1905.
The Sturgeon Lake Lumber Co., Lt'd................	225, " ..	35,000	1899	" ..	Limits north of Sturgeon Lake.	2,975,234	1,938,902	....	....	337,250	96,900	" 30, 1905.
*The Telford Lumber Co. ...	264, " ..	75,000	1902	" ..	Limits on Sturgeon Lake, Shell and Little Red Rivers.	5,399,136	4,641,157	....	....	182,100	129,640	" 30, 1905.
						15,591,740	11,871,094	283 M.	279 M.	1,121,900	413,140	16

J. W. HANNON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
PRINCE ALBERT, July 7, 1905.

*Mill destroyed by fire May, 1905. New mill in course of construction, capacity, 120,000 ft. per diem.

SCHEDULE C.

STATEMENT showing operations by Permit Berth Holders during the year ending June 30, 1905.

Name of Owner.	Horse-power and kind and where mill is situated.	Capacity per 10 hours.	Commenced operations.	Description of timber.	Where cut.	Quantity of lumber manufactured.	Number of railway ties cut.	Number of telegraph-poles cut.	Number of fence posts cut.
						Feet.			
James H. Sanderson	225, Steam at Prince Albert	36,000	1896	Spruce and tamarac	T. B. 765 on Shell River.	1,000,000			
Tait & Sutherland	50, Steam, South East of Melfort	15,000	1903	"	T. B. 853, T. B. 42, Rg. 16, W. 2 m.	296,975			
					On Indian reservation	221,578			
					Cut in trespass	332,451			
W. H. Hutchinson	45, Steam, Prince Albert	15,000	1904	"	T. B. 877, 859 and 875	338,756	65,000	300	20,000
W. C. McKay	No mill		...	"	T. B. 941		20,000	150	2,000
						2,189,760	85,000	450	22,000

J. W. HANNON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
PRINCE ALBERT, July 7, 1905.

SCHEDULE D.

General return of the Crown Timber Office, Prince Albert, for the year ending June 30, 1905.

—	1904-05.	Increase over previous year.
Timber permits issued	1,409	147
Hay permits issued	101	54
Timber seizures	69	19
Free miners' certificates	12	10
Mill returns received in connection with berths not operated	193	29
Mill returns, berths in operation	16	....

J. W. HANNON,
Crown Timber Agent.

Prince Albert, July 7, 1905.

No. 24.

REPORT OF THE ORDNANCE AND ADMIRALTY LANDS BRANCH.

Department of the Interior,
Ordnance and Admiralty Lands Branch,
Ottawa, July 15, 1905.

W. W. Cory, Esq.,
Deputy Minister of the Interior,
Ottawa.

Sir,—I have the honour to submit a report on the operations of this branch of the department, for the fiscal year ended June 30, 1905.

The subjoined statements are similar to those prepared in previous years. They include:—A. Statement of sales, amounting to $4,029, of which the sum of $2,888 was paid on account. The following properties were disposed of:—

1. At Edmonton, New Brunswick, 4 lots forming part of the ordnance reserve in that locality were sold at public auction for $535, or at the average price of $59.45 per acre. Of this amount $287.50 was paid on account.

2. At Grand Falls, N.B., 11 lots, comprising an area of 111½ acres, were sold at public competition for $672, on the usual terms governing ordnance lands sales, namely: One-fourth of the purchase money to be paid on the day of sale, and the balance in three equal annual instalments, with interest at the rate of 5 per cent per annum.

3. Ten acres of ordnance land in the township of Gloucester, which have been occupied by the Sabourin family for over 60 years, and have had considerable improvements made thereon by the present occupant and representative of that family, were

sold to him for $500, of which amount $100 has been received on account and the balance is divided into four annual payments of a like amount, with interest at the rate of 5 per cent per annum.

4. At Ottawa nine lots were redeemed by the payment of $1,637, and letters patent issued to the parties entitled to receive the same.

5. At Quebec a lot adjoining the Fortification wall on St. John street, and comprising an area of nearly three-fourths of an acre, was sold to the Quebec Auditorium Company for the sum of $500 cash, under the authority of an Order in Council approved by His Excellency the Governor General on December 28, 1904.

6. At Sorel a lot comprising an area of about ⅓ of an acre was sold for $165 cash, under the authority of an Order in Council dated September 28, 1904.

7. Two small islands, situated in the line of the Rideau navigation, between Pittsburg and Storrington townships, and comprising a total area of 2½ acres of rock formation, were sold for $20 cash. This is an advance on the value placed on similar islands in that vicinity by the Ontario government.

Two portions of the southerly ordnance reserve at Owen Sound, Ontario, containing 8,700 and 32,300 square feet, respectively, were leased for a term of 21 years, at a total rental of $22 per annum.

The balance of the reserve at Owen Sound was leased for oil exploiting purposes for a period of three years, at a nominal rental, on condition that if oil or gas were found $50 per annum should be paid for each gas well utilized, and the market value of every eighth barrel of oil produced should be paid to the department. The naval reserve at Point Pelee, Ontario, was leased for oil exploiting purposes for two years, on conditions similar to those last above mentioned. In case oil or gas is found both these leases are to be extended for the balance of a term of twenty-one years.

B. Statement showing the several localities in which are situated the ordnance land on account of which moneys have been received. Total amount $10,308.16.

C. Statement of amounts received monthly during the fiscal year divided into principal, rent or interest and fees.

D. Statement showing the amount due and remaining unpaid June 30, 1905, in the several localities where ordnance lands are situated, classified as rent or interest, and principal moneys. The total amount shown to be due is $61,628.48, a decrease when compared with last year, of $3,019.71. This amount includes $52,000 due by the city of Toronto for land purchased for the enlargement of the cattle market in that city.

The routine work of the office is about the same as that of the immediately preceding years.

Your obedient servant,

JAS. N. FERGUSON,

Clerk in Charge.

A.—STATEMENT of sales made during the year ended June 30, 1905.

Locality.	Number of Lots sold or redeemed.	Amount.	Amount received on Account.
		$ cts.	$ cts.
Edmundston	4	535 00	287 50
Grand Falls	11	672 00	178 50
Gloucester	1	500 00	100 00
Ottawa	9 lots redeemed	1,637 00	1,637 00
Quebec	1	500 00	500 00
Sorel	1	165 00	165 00
Storrington	Blake & Crow Islands	20 00	20 00
Total		4,029 00	2,888 00

JAS. N. FERGUSON,
Clerk in Charge.

DEPARTMENT OF THE INTERIOR,
ORDNANCE AND ADMIRALTY LANDS BRANCH,
OTTAWA, July 15, 1905.

B.—STATEMENT showing the several localities on account of which moneys have been received during the fiscal year ending June 30, 1905.

Locality.	Amount.	Locality.	Amount.
	$ cts.		$ cts.
Amherstburg	2 00	Brought forward	5,528 33
Beaver Harbour	2 00		
Burlington Beach	100 00	Prescott	1 00
Charlotteville	18 67	Quebec	3,258 15
Chambly	14 00	Queenston	2 00
Edmundston	299 16	Presqu'Isle	0 50
Fort Erie	339 25	St. Croix	1 00
Gloucester	101 00	Sorel	244 00
Grenville	2 20	Storrington	20 00
Grand Falls	597 21	Sarnia	40 00
Kingston	2 25	Shelburne	31 00
Longueuil	316 10	St. Joseph's Island	147 12
Montreal	2 00	Toronto	895 50
Nepean	142 94	Wolford	107 80
Niagara	20 00	Registration fees	68 00
Owen Sound	126 00		
Oxford	1 20	Total	10,344 40
Ottawa	3,440 35	Refund	35 74
Pt. Pelee	2 00		
		Net receipts	10,308 66
Carried forward	5,528 33		

JAS. N. FERGUSON,
Clerk in Charge.

DEPARTMENT OF THE INTERIOR,
ORDNANCE AND ADMIRALTY LANDS BRANCH,
OTTAWA, July 15, 1905.

C.—STATEMENT of receipts on account of Ordnance and Admiralty Lands for the Fiscal year ending June 30, 1905.

Date.	Fees.	Rent or Interest.	Principal.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.
July	....	323 08	324 00	647 08
August	2 00	1,021 00	32 50	1,055 50
September	...	101 20	52 00	153 20
October	6 00	124 76	185 40	316 16
November	6 00	120 66	104 60	231 26
December	4 00	365 66	224 50	594 16
1905.				
January	12 00	447 15	417 60	876 75
February	2 00	199 80	1,738 15	1,939 95
March	8 00	436 77	211 80	656 57
April	8 00	539 02	654 50	1,201 52
May	12 00	298 61	407 00	717 61
June	8 00	1,737 14	209 50	1,954 64
Total	68 00	5,714 85	4,561 55	10,344 40
Less refund	......	....	....	35 74
Net receipts		....	....	10,308 66

JAS. N. FERGUSON,
Clerk in Charge.

DEPARTMENT OF THE INTERIOR,
ORDNANCE AND ADMIRALTY LANDS BRANCH,
OTTAWA, July 15, 1905.

D.—STATEMENT showing amount due and unpaid on account of instalments of Purchase Money and Rent or Interest to June 30, 1905.

Locality.	Amount of instalments due and unpaid June 30, 1905.	Rent or Interest due and unpaid June 30, 1905.	Total.
	$ cts.	$ cts.	$ cts.
Burlington Beach		60 00	60 00
Beaver Harbour		2 00	2 00
Carillon		4 40	4 40
Chambly	152 00	217 88	369 88
Charlotteville		18 67	18 67
Dalhousie	23 00	5 52	28 52
Edmundston	88 18	28 50	116 68
Elmsley		9 70	9 70
Fort Cumberland		187 00	187 00
Grand Falls	1,497 34	295 74	1,793 08
Grenville		2 20	2 20
Kingston	50 96	246 90	297 86
Longueuil		155 00	155 00
Marlborough		56 00	56 00
Nepean	2,552 80	416 78	2,969 58
Oromocto		0 50	0 50
Ottawa		3,293 55	3,293 55
Owen Sound		50 00	50 00
Oxford		31 00	31 00
Point Pelee		1 00	1 00
Presqu'Isle		0 50	0 50
Pomroy Bridge		6 00	6 00
Quebec		30 00	30 00
Shelburne		1 00	1 00
St. Croix		1 00	1 00
Sorel		89 36	89 36
Toronto	52,000 00		52,000 00
Wolford		54 00	54 00
Total	56,364 28	5,264 20	61,628 48

JAS. N. FERGUSON,
Clerk in Charge.

DEPARTMENT OF THE INTERIOR,
ORDNANCE AND ADMIRALTY LANDS BRANCH,
OTTAWA, June 15, 1905.

No. 25.

REPORT OF THE ACCOUNTANT.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit statements of revenue collected from various sources during the fiscal year 1904-5, as follows:—

A. Dominion lands, including Yukon Territory.. ..	$1,339,382 35
B. Ordnance lands..	10,346 90
C. School lands..	332,914 48
D. Registration fees..	123,082 86
E. Fines and forfeitures, N.W.T..	10,018 49
F. Fines collected under Immigration Act..	60 00
G. Casual revenue..	4,198 14
H. Seed grain repayments..	16,471 34
	$1,836,474 56

A statement of the revenue on account of Dominion lands (marked I.) shows the receipts monthly, classified under sub-heads.

Statement (marked J.) shows a comparison between the receipts on account of Dominion lands for 1904-5, as compared with the revenue of the previous fiscal year.

Your obedient servant,

P. MARCHAND,

Acting Accountant.

A.—Dominion Lands Revenue (Cash and Scrip) for the fiscal year ended June 30, 1905.

Agencies, &c.	Cash.	Scrip.	Total.
Yukon Territory.	$ cts.	$ cts.	$ cts.
Sales of Land	7,637 04		
Rentals of Land	18,496 93		
Survey Fees	100 00		
Map sales, office fees, &c.	161 00		
Timber Dues	25,503 97		
Coal Lands	69 93		
Hay Lands	283 00		
Grazing Lands	9 92		
Mining Fees	92,854 00		
Export Tax on Gold	206,755 87		
Hydraulic Leases	6,957 05		
Dredging Leases	385 78		
Free Miners' Certificates	46,022 53		
Free Certificates for Export of gold	452 00		
Royalty on water sold	65 65		
Miscellaneous	953 50		
	406,708 17		406,708 17

SESSIONAL PAPER No. 25

A.—Dominion Lands Revenue (Cash and Scrip—*Continued.*

Agencies, &c.	Cash.	Scrip.	Total.
Dominion Lands Agencies.	$ cts.	$ cts.	$ cts.
Alameda	29,256 13	969 12	30,225 25
Battleford	38,337 56	60 00	38,397 56
Brandon	9,682 77	2,263 56	11,946 33
Calgary	42,415 00	1,170 27	43,585 27
Dauphin	6,822 57	263 50	7,086 07
Edmonton	35,378 23	755 33	36,133 56
Kamloops	11,898 62	1,196 74	13,095 36
Lethbridge	60,207 40	3,098 55	63,305 95
Minnedosa	4,626 59	960 00	5,586 59
New Westminster	4,431 85	....	4,431 85
Prince Albert	24,336 30	792 00	25,128 30
Red Deer	24,793 77	160 00	24,953 77
Regina	104,961 38	2,977 75	107,939 13
Winnipeg	22,859 09	4,065 91	26,925 00
Yorkton	54,414 70	911 86	55,326 56
Crown Timber Agencies.	474,421 96	19,644 59	494,066 55
Alameda	143 00	....	143 00
Battleford	561 80	....	561 80
Brandon	764 75	....	764 75
Calgary	16,443 09	....	16,443 09
Dauphin	9,398 26	....	9,398 26
Edmonton	37,255 14	....	37,255 14
Lethbridge	623 62	....	623 62
Minnedosa	890 60	....	890 60
New Westminster	70,979 27	....	70,979 27
Prince Albert	38,057 77	....	38,057 77
Red Deer	1,017 68	....	1,017 68
Regina	292 55	....	292 55
Winnipeg	64,689 16	....	64,689 16
Yorkton	330 80	....	330 80
	241,447 49	....	241,447 49
Rocky Mountains Park of Canada	14,044 55	15 00	14,059 55
Irrigation Fees	303 00	....	303 00
Map sales, office fees, &c.	3,908 48	....	3,908 48
Survey Fees	122,668 22	....	122,668 22
Patent Fees	560 00	....	560 00
Examination Fees, D.L.S.	906 50	....	906 50
Refunds of Refunds	285 50	....	285 50
Mining Fees	1,147 00	....	1,147 00
Hay Lands	2,152 99	....	2,152 99
Dredging Leases	6,730 12	....	6,730 12
Grazing Leases	36,135 40	5,237 36	41,372 76
Coal Lands	698 90	....	698 90
Rent of Water Power	49 77	....	49 77
Rental of Land	115 74	....	115 74
Assay Changes	1,480 67	....	1,480 67
Miscellaneous	720 94	....	720 94
	191,907 78	5,252 36	197,160 14
	1,314,485 40	24,896 95	1,339,382 35
Refunds	22,184 26	3,602 64	25,786 90
	1,292,301 14	21,294 31	1,313,595 45

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

B.—STATEMENT of Ordnance Lands Revenue for the fiscal year ended June 30, 1905.

Month.	Amount.	Month.	Amount.
1904.	$ cts.	1905.	$ cts.
July	647 08	January	876 75
August	1,055 50	February	1,939 95
September	155 70	March	656 57
October	316 16	April	1,201 52
November	231 26	May	717 61
December	594 16	June	1,954 64
		Total	10,346 90

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

C.—STATEMENT of Receipts on Account of School Lands for the fiscal year ended June 30, 1905.

Month.	Manitoba.	Assiniboia.	Alberta.	Saskatchewan.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	15,553 68	1,687 22	809 24	98 40	
August	6,453 55	174 75	390 42	6 50	
September	2,983 07	1,579 71	239 51	6 40	
October	23,202 02	11,048 03	493 94	51 45	
November	69,159 08	59,707 06	335 30	15,707 23	
December	22,865 84	14,173 68	417 64	59 38	
1905.					
January	13,294 87	3,441 77	774 20	36 08	
February	9,128 09	3,002 22	407 26	931 20	
March	13,487 31	5,694 38	441 79	3 60	
April	6,440 48	1,691 54	912 00	135 50	
May	10,027 72	3,340 59	1,102 66	156 40	
June	7,150 70	2,848 28	1,128 34	134 40	
	199,746 41	108,389 23	7,452 30	17,326 54	332,914 48

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

D.—Statement of Registration Fees for the fiscal year ended June 30, 1905.

District.	Registrar.	Total Registration Fees.
		$ cts.
Assiniboia	F. F. Forbes	63,645 40
North Alberta	Geo. Roy	23,836 55
South Alberta	W. R. Winter	22,673 38
East Saskatchewan	S. Brewster	10,389 35
West Saskatchewan	R. F. Chisholm	772 58
Yukon Territory	J. E. Girouard	1,765 60
		123,082 86

P. MARCHAND,
Assistant Accountant.

Department of the Interior,
Accounts Branch,
Ottawa, August 24, 1905.

E.—Statement of Fines and Forfeitures, North-west Territories, collected under Dominion Statutes (except 'The Indian Act' and 'The Fisheries Act') for the fiscal year ended June 30, 1905.

Date.	From whom Received.	Amount.	Total.
1904.		$ cts.	$ cts.
September	North-west Government	2,287 75	
December	" "	2,282 55	
1905.			
March	" "	2,808 65	
June	" "	2,639 54	
			10,018 49

P. MARCHAND,
Assistant Accountant.

Department of the Interior,
Accounts Branch,
Ottawa, August 24, 1905.

F.—STATEMENT of Fines collected under the Immigration Act, for the fiscal year ended June 30, 1905.

Date.	From whom Received.	Amount.
1904.		$ cts.
December	Collector of Customs, Victoria, B.C.	60 00

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

G.—STATEMENT of Casual Revenue for fiscal year ended June 30, 1905.

Name.	Particulars.		Amount.
			$ cts.
'Montreal Herald'	Refund of J. B. Walker's subscription		14 00
R. D. Foley	" account of expenses		13 40
J. A. Bannerman	" proceeds of sale of horse		40 00
C. A. Bigger	" account of travelling expenses		30 03
C. Beckwith	" account of expenses		12 00
S. Christopherson	" account of immigration expenses		716 05
F. H. Stephenson	" account of expenses		86 50
D. F. Reid	" account of expenses		129 75
Yukon Council	" freight charges on Yukon Ordinances		681 62
D. S. McCannel	" overpayment of Miss M. McDonald		16 66
Davidson, Paterson & Grant	" account of Wm. J. Whittington		275 83
B. C. Electric Railway	" being overpayment		10 40
W. G. Haultain	" account of travelling expenses		25 85
Allan Bros., Finance Dept	" account of bonuses, April, 1902		8 52
R. A. Daly	" boundary survey, 1904		270 36
Immigration Commis'ner, Winnipeg	" account of flour advanced to immigrants		17 30
" " "	" railway fares and lumber		16 10
Hon Clifford Sifton	" to recoup department for safe purchased from J. J. Taylor on Dec. 5, 1901		113 75
E. F. Stephenson	" proceeds of sale of Corp. Bingham's team		120 00
F. F. Forbes	" overpayment, 1902-1903		6 25
C. A. Jones	" account of expenses		42 32
J. A. Adams	" account of expenses		34 00
J. H. Doody	" account of expenses		109 68
Relief Advances	....		1,407 57
			4,198 14
Relief Mortgages	1876	938 30	
Seed Grain Advances	1894	2,909 47	
" "	1896	877 08	
" "	1900	569 15	
" "	1901	3,145 90	8,439 90
			12,638 94

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

H.—STATEMENT showing Seed Grain and Relief Mortgages for the fiscal year ended June 30, 1905.

—	Seed Grain Advances, 1901.	Seed Grain Advances, 1900.	Seed Grain Advances, 1896.	Seed Grain Advances, 1895.	Seed Grain Advances, 1894.	Seed Grain to Settlers' Account, 1890.	Territorial Account, 1886-87-88.	Relief Mortgages of 1876.	Total.
	$ cts	$ cts.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.	$ cts.	$ cts.
	3,200 55	576 25	921 93	3,289 64	2,999 86	2,057 90	2,486 01	939 20	16,471 34
Refunds....	54 65	7 10	44 85	27 34	90 39	72 97	8 10	0 90	306 30
	3,145 90	569 15	877 08	3,262 30	2,909 47	1,984 93	2,477 91	938 30	16.165 04

P. MARCHAND,
Assistant Accountant.

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

I.—Statement of Gross Receipts on account of Dominion Lands for the fiscal year ended June 30, 1905.

Year.	Homestead Fees.	Improvements.	General Sale of Lands.	Timber Dues.	Rents from Grazing Lands.	Export Tax, Mining Fees, Hay, Coal Lands, &c.	Rocky Mountains Park of Canada.	Map Sales, Office Fees, Sundry Fees.	Survey Fees.	Rentals and Miscellaneous.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July..............	29,850 00	1,572 54	15,303 21	16,043 75	1,293 90	52,429 24	1,906 10	383 74	100 00	914 81	119,797 59
August...........	23,285 00	1,520 55	5,729 08	11,510 12	1,536 88	57,472 42	1,287 31	382 60	12,411 93	1,616 06	116,751 95
September........	19,805 00	1,984 16	12,764 29	23,704 17	4,553 74	67,592 85	983 54	425 80	315 10	630 32	132,758 97
October..........	19,790 00	1,295 03	8,850 53	16,835 96	3,919 96	31,857 84	423 40	355 36	239 08	1,280 92	84,848 08
November........	26,195 00	1,541 20	10,164 45	18,825 05	1,836 74	11,794 01	969 50	334 69	17,255 07	367 67	89,283 38
December.......	18,550 00	2,124 65	14,523 00	24,443 93	2,212 39	12,657 16	1,773 35	624 00	357 46	596 87	77,862 81
1905.											
January.........	13,955 00	2,111 70	13,312 93	15,818 15	1,036 19	10,416 16	1,556 84	499 95	60,091 37	297 92	119,126 21
February.........	11,505 00	1,604 52	14,015 69	15,880 02	2,505 69	10,079 56	784 27	418 35	....	733 85	57,526 95
March............	24,101 00	1,935 40	14,031 58	21,595 13	6,680 51	9,916 81	998 00	568 69	927 99	254 94	81,010 05
April...........	37,840 00	1,486 85	14,156 86	36,530 46	3,509 41	11,110 37	763 75	539 15	32 00	4,653 40	110,622 25
May...........	38,180 00	2,170 95	14,580 23	36,487 16	2,722 89	23,741 39	1,541 94	392 35	6,962 46	10,335 79	137,115 16
June...........	41,750 25	2,223 70	16,666 19	29,277 56	4,337 02	65,855 78	1,056 25	1,159 45	24,075 76	1,380 04	187,782 00
	304,806 25	21,571 25	154,128 04	266,951 46	36,145 32	364,923 59	14,044 55	6,084 13	122,768 22	23,062 59	1,314,485 40
Scrip..........	....	....	19,644 59	....	5,237 36	....	15 00	....	....	....	24,896 95
	304,806 25	21,571 25	173,772 63	266,951 46	41,382 68	364,923 59	14,059 55	6,084 13	122,768 22	23,062 59	1,339,382 35

Department of the Interior,
Accounts Branch,
Ottawa, August 24, 1905.

P. MARCHAND,
Assistant Accountant.

DOMINION LANDS REVENUE.

J.—STATEMENT of Gross Receipts (Cash and Scrip) on account of Dominion Lands Revenue for the fiscal year 1904-1905, compared with the previous fiscal year.

Particulars.	Fiscal Year. 1904-1905.	Fiscal Year. 1903-1904.	Increase.	Decrease.	Net Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Dominion Lands Agencies.........	494,066 55	643,775 34	....	149,708 79	....
Crown Timber Agencies.	241,447 49	358,536 43	....	117,088 94	....
Rocky Mountains Park of Canada..	14,059 55	9,198 48	4,861 07	....	....
Hay, mining, coal, stone and grazing lands....................	52,151 54	38,402 29	13,749 25	....	....
Miscellaneous....................	130,949 05	66,975 42	63,973 63	....	....
	932,674 18	1,116,887 96	82,583 95	266,797 73	....
Yukon Territory..................	406,708 17	564,936 74	....	158,228 57	....
	1,339,382 35	1,681,824 70	82,583 95	425,026 30	342,442 35

DEPARTMENT OF THE INTERIOR,
ACCOUNTS BRANCH,
OTTAWA, August 24, 1905.

P. MARCHAND,
Assistant Accountant.

No. 26.

REPORT OF THE SCHOOL LANDS BRANCH.

DEPARTMENT OF THE INTERIOR,
SCHOOL LANDS BRANCH,
OTTAWA, September 6, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report in connection with the business of the School Lands Branch of the department for the fiscal year ending June 30, 1905.

No general auction sales of school lands were held during the year in either Manitoba or the North-west Territories, the series of sales which it had been intended to hold during the autumn of 1904, in the vicinity of the line of the Calgary and Edmonton Railway, and of the Crow's Nest Branch of the Canadian Pacific Railway, in Western Alberta, as well as those in Eastern Assiniboia, having been subsequently postponed.

Sections 11 and 29, in township 45, range 21, west of the 2nd principal meridian, in the district of Saskatchewan, were, however, after having been duly advertised, offered for sale at public auction at Melfort, Sask., on January 19 last. The east half, and the fractional south-west quarter of section 29, in this township, were sold at the rate of $15 per acre, and the fractional north-west quarter of section 11, at $10 per acre.

The demand for leases of school lands for grazing purposes, both in Manitoba and the North-west Territories, continues, and during the past year 206 leases were issued for the purpose of school lands within the Territories, and 50 leases of lands in the province of Manitoba, or 256 leases in all, representing a revenue of $11,761.04. Two leases were also issued for coal mining purposes.

Permits for the cultivation of portions of school sections, which in the past had been broken by squatters and others, were issued to the number of 43, representing a revenue of $710.70. While the revenue from this source is comparatively small, the issue of these permits serves the purpose of keeping these isolated patches of breaking on school lands from growing up in weeds, and so becoming an injury to the neighbouring farms.

As a number of purchasers of school lands in Manitoba are considerably in arrears in their payments, Mr. W. M. Ingram, the inspector of school lands, was furnished with a statement showing the lands on which the payments are in arrears, and was instructed to visit the lands in question and report to the department as to the nature and extent of the improvements thereon, and as to the prospect of an early payment of the arrears. A similar list was furnished to Mr. Potts, the inspector of school lands for the Territories. The work of inspection for the Territories has been completed, and that in Manitoba is still in progress, and from the reports so far received it is evident that the result of the inspections will be to materially reduce at an early date the indebtedness on these lands.

The total area of school lands sold in the province of Manitoba to July 1, 1905, is 271,384·45 acres, representing a principal sum of $2,181,066.91. The average price received for the land sold was $8.04 per acre.

The area sold in the North-west Territories to the same date was 147,245·32 acres, for the sum of $1,473,949.90, representing an average price of $10.01.

Appended herewith are five statements, namely, statement 'A,' showing revenue from Manitoba school lands for the fiscal year ended June 30, 1905; statement 'B,' revenue from Assiniboia school lands for the same period; statement 'C,' revenue from Alberta school lands for the same period; statement 'D,' revenue from Saskatchewan school lands for the same period; and statement 'E,' showing the balance to the credit of the several school lands funds on June 30, 1905.

From statement 'A' it will be seen that the net revenue from Manitoba school lands for the fiscal year was $199,334.86. Of this sum $135,586.72 represents the principal moneys of sales and the balance of $63,748.14, the revenue from all other sources. The expenditure for cost of management for same period was $3,973.20.

As you are aware, it is provided by the Order in Council of June 11, 1902, that the province of Manitoba shall be paid annually the revenue derived from the school lands within the province, with the exception of the principal moneys of sales, after first deducting the cost of the administration of these lands.

Under this arrangement the amount to be paid over to the province for the fiscal year ending June 30, 1905, is $59,774.94, that is to say, the revenue from all sources, except principal moneys of sales, $63,748.14, less the cost of management, $3,973.20.

From statements 'B,' 'C,' and 'D,' it will be seen that the total net revenue from the North-west Territories school lands for the same period was $132,662.27, of which $70,734.72 represents the principal moneys of sales and the balance, $61,927.55 revenue from all other sources. The total expenditure for the three provisional districts for the same period was $8,417.51, so that under the arrangement authorized by the Order in Council of November 18, 1902, similar to that made with the province of Manitoba by Order in Council of June 11, 1902, the government of the North-west Territories is entitled to be paid over the sum of $53,510.04, being the net revenue $61,927.55 (other than principal moneys of sales) less $8,417.51, the cost of management for the same period. The total net revenue from school lands in Manitoba and the Territories for the fiscal year was $331,997.13.

The following is a statement of the work done in this branch during the year:—

Letters and telegrams sent..	9,919
Cultivation permits..	43
Leases issued..	258
Receipts issued..	1,617
Number of accounts kept, posted, and statements furnished.	4,080
Copies of documents prepared..	185
Printed lists and notices sent..	16,842

There is in addition to the foregoing a large amount of work of which no record could be kept, but which involved considerable expenditure of time.

Your obedient servant,

FRANK S. CHECKLEY,

Clerk in Charge.

STATEMENT A.—MANITOBA.

Revenue from School Lands for the Fiscal Year ending June 30, 1905.

—	Sales.		Cultivation.	Grazing.	Timber.	Hay.	Coal.	Sundries.	Total.
	Principal.	Interest.							
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Head office	127,633 04	53,865 77	637 70	1,773 85	673 51	5 50	....	....	184,589 37
Agencies	8,298 69	3,075 25	38 00	421 91	1,575 39	2,188 85	....	....	15,598,09
Total gross revenue	135,931 73	56,941 02	675 70	2,195 76	2,248 90	2,194 35	....	....	200,187 46
Less refunds	345 01	....	....	12 80	19 40	34 34	....	....	411 55
Total	135,586 72	56,941 02	675 70	2,182 96	2,229 50	2,160 01	....	....	199,775 91
Less fees transferred to Dominion lands	....	....	....	....	27 05	414 00	....	....	441 05
Net total	135,586 72	56,941 02	675 70	2,182 96	2,202 45	1,746 01	....	....	199,334 86

STATEMENT B.—NORTHWEST TERRITORIES.

Revenue from Assiniboia School Lands for the Fiscal Year ending June 30, 1905.

—	Sales. Principal.	Sales. Interest.	Cultivation.	Grazing.	Timber.	Hay.	Coal.	Sundries.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Head office	55,250 32	48,771 42	33 00	2,371 76		0 50	302 85		106,729 85
Agencies	429 99	175 86		455 03	68 50	692 25			1,821 63
Total gross revenue	55,680 31	48,947 28	33 00	2,826 79	68 50	692 75	302 85		108,551 48
Less refunds	264 31	12 63		38 40		4 00			319 34
Total	55,416 00	48,934 65	33 00	2,788 39	68 50	688 75	302 85		108,232 14
Less fees transferred to Dominion lands					9 75	152 50			162 25
Net total	55,416 00	48,934 65	33 00	2,788 39	58 75	536 25	302 85		108,069 89

STATEMENT C.—NORTHWEST TERRITORIES.

Revenue from Alberta School Lands for the Fiscal Year ending June 30, 1905.

—	Sales.		Cultivation.	Grazing.	Timber.	Hay.	Coal.	Sundries.	Total.
	Principal.	Interest.							
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Head office			2 00	4,674 16	25 00	10 75	399 00		5,110 91
Agencies				1,604 13	84 21	534 15	220 15		2,442 64
Total gross revenue			2 00	6,278 29	109 21	544 90	619 15		7,553 55
Less refunds				65 71		10 75	15 00		91 46
Total			2 00	6,212 58	109 21	534 15	604 15		7,462 09
Less fees transferred to Dominion lands					2 25	99 00			101 25
Net total			2 00	6,212 58	106 96	435 15	604 15		7,360 84

STATEMENT D.—NORTHWEST TERRITORIES.

Revenue from Saskatchewan School Lands for the Fiscal Year ending June 30, 1905.

	Sales.		Cultivation.	Grazing.	Timber.	Hay.	Coal.	Sundries.	Total.
	Principal.	Interest.							
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Head office	15,413 72	1,176 56		398 75					16,989 03
Agencies				178 36	9 35	196 55			384 26
Total gross revenue	15,413 72	1,176 56		577 11	9 35	196 55			17,373 29
Less refunds	95 00								95 00
Total	15,318 72	1,176 56		577 11	9 35	196 55			17,278 29
Less fees transferred to Dominion lands					0 75	46 00			46 75
Net total	15,318 72	1,176 56		577 11	8 60	150 55			17,231 54

STATEMENT E.

STATEMENT of revenue and expenditure on account of school lands, for the fiscal year ending June 30, 1905.

MANITOBA SCHOOL LANDS.

Particulars.		Dr.	Cr.
		$ cts.	$ cts.
Balance, July 1, 1904			1,141,474 12
Sales	12 months to June 30, 1905		192,527 74
Rental for cultivation	″ ″ ″		675 70
Timber, hay and grazing	″ ″ ″		6,131 42
Interest	″ ″ ″		35,946 56
To cost of management at Ottawa	″ ″ ″	1,000 00	
Expenses being salaries, printing and advertising, &c	″ ″ ″	2,973 20	
Interest paid to Manitoba Government	″ ″ ″	35,946 56	
Interest and revenue paid Manitoba Government to June 30, 1905	″ ″ ″	133,709 20	
Balance, June 30, 1905		1,203,126 58	
		1,376,755 54	1,376,755 54

ASSINIBOIA SCHOOL LANDS.

Particulars.		Dr.	Cr.
Balance, July 1, 1904			167,317 93
Sales	12 months to June 30, 1905		104,350 65
Rental for cultivation	″ ″ ″		33 00
Timber, hay, grazing and coal	″ ″ ″		3,686 24
Interest	″ ″ ″		6,631 06
To cost of management at Ottawa	″ ″ ″	500 00	
Expenses being salaries, printing and advertising, &c	″ ″ ″	2,036 43	
Interest paid to North-west Government	″ ″ ″	6,631 06	
Interest and revenue paid to North-west Government to June 30, 1905	″ ″ ″	53,659 27	
Balance, June 30, 1905		219,192 12	
		282,018 88	282,018 88

ALBERTA SCHOOL LANDS.

Particulars.		Dr.	Cr.
Balance, July 1, 1904			50,276 21
Rental for cultivation	12 months to June 30, 1905		2 00
Timber, hay, grazing and coal	″ ″ ″		7,358 84
Interest	″ ″ ″		1,388 66
To cost of management at Ottawa	″ ″ ″	500 00	
Expenses being salaries, printing and advertising, &c	″ ″ ″	5,226 15	
Interest paid to North-west Government	″ ″ ″	1,388 66	
Interest and revenue paid North-west Government to June 30, 1905	″ ″ ″	7,212 54	
Balance, June 30, 1905		44,698 36	
		59,025 71	59,025 71

SASKATCHEWAN SCHOOL LANDS.

Particulars.		Dr.	Cr.
Balance, July 1, 1904			2,514 88
Sales	12 months to June 30, 1905		16,495 28
Timber, hay and grazing	″ ″ ″		736 26
Interest	″ ″ ″		356 97
Expenses being printing and advertising, &c	″ ″ ″	151 13	
Interest paid North west Government	″ ″ ″	356 97	
Interest and revenue paid North-west Government to June 30, 1905	″ ″ ″	2,047 69	
Balance, June 30, 1905		17,547 60	
		20,103 39	20,103 39

No. 27.

REPORT OF THE REGISTRAR.

Department of the Interior,
Correspondence Registration Branch,
Ottawa, August 30, 1905.

W. W. Cory, Esq.,
Deputy Minister of the Interior,
Ottawa.

Sir,—I have the honour to submit the usual annual statement showing in part the work of this branch for the fiscal year ended June 30, 1905.

In connection with the above, I desire to draw your attention to a paragraph in the last annual report of your predecessor, Mr. Smart, having reference to the number of official documents on record in this branch and to the fact that the million mark was then in sight. That number was reached on March 14 last, and on the same date we recommenced numbering the files, beginning at number one. To distinguish between previous similar numbers, and prevent any likelihood of confusion, I have had the letter 'A' printed on all the new file backs and written on all the outgoing letters.

We have reached since the date of change in numbers, a little over five months, 70,790 letters, or an average of about 14,000 letters per month. The last year, as you will observe, has been the heaviest on record, and from present appearances will continue to increase.

The need of better office accommodation is evident and makes it difficult to conduct the work in a satisfactory manner.

Your obedient servant,

K. J. HENRY,
Registrar.

STATEMENTS.

STATEMENT of work done in the Correspondence Registration Branch during the year ended June 30, 1905.

From July 1, 1904, to June 30, 1905.	Letters Received.	Letters Sent.	Registered Letters Received.	Registered Letters Sent.	Telegrams Sent.	Total.
July	11,680	15,242	382	1,515	33	28,852
August	10,801	14,535	494	1,876	56	27,762
September	9,553	11,435	434	1,502	35	22,959
October	10,740	14,028	493	2,029	47	27,337
November	9,870	13,096	510	2,292	38	25,806
December	10,660	14,772	517	2,671	62	28,682
Total for first half year	63,304	83,108	2,830	11,885	271	161,398
January	11,305	13,414	588	1,799	48	27,154
February	10,804	15,398	578	2,094	50	28,924
March	12,170	17,032	556	2,385	68	32,211
April	11,120	14,263	434	1,961	50	27,828
May	14,015	19,334	546	2,175	74	36,144
June	13,190	17,223	482	2,137	73	33,105
Total for second half year	72,604	96,664	3,184	12,551	363	185,366
Total for first half year	63,304	83,108	2,830	11,885	271	161,398
Total for second half year	72,604	96,664	3,184	12,551	363	185,366
Total for year ended June 30, '05.	135,908	179,772	6,014	24,436	634	346,764

The number of pages of documents, etc., compared during the year was 4,524.
The number of pages of Letter Book indexed was 93,835, each page was made in double entry.
Daily average, letters received, 450, or an increase over last year of 20%.
Daily average, letters sent, 580, or an increase over last year of 19%.
The Grand Total last year was 298,171, this year 346, 764, or an increase of 17%.

MONEYS RECEIVED.

—	July 1, 1904, to June 30, 1905.
	$ cts.
Cash	7,166 96
Cheques	434,286 48
Scrip	19,534 82
Money orders	67,231 50
Total	528,219 76

No. 28.

REPORT OF THE GEOGRAPHER.

Department of the Interior,
Office of the Geographer,
Ottawa, June 30, 1905.

W. W. Cory, Esq.,
Deputy Minister of the Interior,
Ottawa.

Sir,—I have the honour to report as follows on the work of my office for the past year.

The assignment of work was as follows:—

J. E. Chalifour compiled sheet 15, Nova Scotia—scale 3·95 miles to 1 inch—for the engraver, prepared the 'copy' for the geological map for the Economic Atlas, and is now in charge of the large 'Mineral' map of Canada.

H. E. Baine has completed the compilation of sheets 1 N.E. and 1 N.W., Ontario, and has compiled part of sheet 2, N.W.

H. Tache has completed for the lithographer, sheets 13, New Brunswick, 27, Ontario, the Quebec Mica District and Asbestos Region maps, and has compiled about two-thirds of sheet 11, Quebec.

M. W. Sharon added new surveys to bring the map of Manitoba and North-west Territories up to date, prior to publication of a new edition and has prepared the 'copy' for the Canals and the Lighthouse maps for the Economic Atlas.

G. E. Dumouchel has been employed on diagrams for the Economic Atlas, on the Ontario Mica Region map and on sundry plans to accompany Dr. Klotz's report on Trans-Pacific longitudes.

A. M. Darrach has been employed on diagrams for the Economic Atlas and has made tracings for the Ontario sheets, &c.

H. W. Wilson prepared the copy for the Telephone maps and for plans of cities for the Atlas, and has made reductions and tracings.

H. Blatchley was appointed March 22, 1905, and has made tracings for the engraver, of a portion of sheet 2, N.E. Ontario.

C. G. Wood has made sundry reductions and tracings.

J. P. McElligott has made tracings of railway plans and profiles.

S. Chandler was appointed June 21, and has made tracings of railways and other plans.

J. K. Bennie has compiled diagrams for the Economic Atlas.

R. W. Craig has compiled diagrams for the Atlas.

J. S. Gagnon has had charge of the distribution of maps.

Mrs. D. E. Waine has been employed as stenographer and typewriter, and has had charge of the distribution lists.

During the last two years the work of my office has been much hampered by the lack of room, the crowding on some draughting tables resulting in a serious interference with the work. New offices with ample space have, however, been secured in the Woods building, and the rooms vacated by my branch can be utilized by the portion of the Surveyor General's staff now housed in the building on Sparks street.

Pending the vacation of the whole of the Woods building by the Woods Company, an office has been secured on the second floor for the draughtsmen engaged on the

Mineral map. As this is the floor that I will occupy when in this building, it will not be necessary to move the furniture, plans, &c., now in use.

In September I attended the Eighth International Geographical Congress. Meetings were held at Washington, New York, Niagara Falls, Chicago and St. Louis, the itinerant nature of the congress permitting the combination of long excursions, conducted by able specialists, with meetings at these points.

It is not necessary to mention all or any of the numerous interesting and instructive papers that were read, but special mention may be made of the one by Professor Penck—the most noted of Austrian geographers—on the mapping of North America on the scale of $\frac{1}{1000000}$. At the International Congress at Berne, in 1891, he proposed that the congress should promote the construction of a map of the world on a scale of $\frac{1}{1000000}$. Since then, under his initiative, and with the support of each succeeding congress, it has made important progress. At the Washington meeting he appealed to the United States and Canada to undertake this work in so far as it affected their respective dominions. About the same time the Interstate Commerce Commission asked for a map of the United States on about this scale, and it was decided to combine the two and produce the Interstate Commerce Commission map on this scale.

When in St. Louis I found that the Exhibition Branch of the Department of Agriculture required, for exhibition purposes, a 'Mineral' map of Canada on about this scale, and shortly after the close of the exhibition, Mr. Hutchison, who is in charge of the branch, addressed a memo to you requesting that this department undertake the work. This memo. was sent to me for a report and, in my reply, I strongly recommended it, at the same time pointing out (1) its utility to the Railway Commission of Canada, which corresponds in this country to the Interstate Commerce Commission of the United States, and (2) that these sheets could be utilized to form maps of the various provinces, which would include the whole of each province, and at the same time would not be so large as to be unwieldy. You approved this memo. and, after considerable delay, owing to the necessity of getting another office, special draughting table, etc., work was commenced and is now being pushed forward.

Dr. H. R. Mill thus summarises the congress: 'The general impression left upon the mind by the whole visit to America is that it attracted less public notice and drew far smaller audiences than in London or Berlin, but that the people who did attend were keener in their interest and more whole-hearted in their devotion to the study of geography than corresponding audiences in the old world.'

During the past year 3,775 letters and circulars were sent out and 2,447 received, 10,550 maps and books were sent out and 44,978 received.

Below is a list of maps published, in press, and in progress:—

MAPS PUBLISHED.

Dominion of Canada and Newfoundland, eight sheets, each 25 inches by 26 inches; extends from the Atlantic to the Pacific, and from Maryland and Oregon on the south, to Cumberland sound and Herschell island on the north. Scale 35 miles to 1 inch.

Dominion of Canada and Newfoundland, 16 inches by 36 inches. Scale 100 miles to 1 inch.

Dominion of Canada (with map of world on reverse). Scale 58 miles to 1 inch.

Relief map of Canada. Scale 100 miles to 1 inch.

Resource map of Canada. Scale $\frac{1}{12500000}$ or 197·3 miles to 1 inch.

Water-power map, average rainfall at principal points in Canada. Scale 100 miles to 1 inch.

National Transcontinental Railway map, shows approximate route of the National Transcontinental Railway, Moncton to Pacific. Scale 100 miles to 1 inch.

Explorations in Northern Canada and adjacent portions of Greenland and Alaska. Scale 75 miles to 1 inch.

Rocky Mountains—Banff sheet—contoured map of mountains in the vicinity of Banff. Scale 2 miles to 1 inch.

Rocky Mountains—Lake Louise sheet—contoured map of mountains in the vicinity of Laggan and Field. Scale 2 miles to 1 inch.

Manitoba and North-west Territories—includes Manitoba, Assiniboia, Saskatchewan, Alberta and south-western portion of Keewatin; three sheets, each 25 inches by 36 inches. Scale 12½ miles to 1 inch.

Index map showing townships in Manitoba and North-west Territories, plans of which have been printed. Scale 35 miles to 1 inch.

General map of the north-western part of the Dominion of Canada. Edition of 1898. In 2 sheets. Scale 35 miles to 1 inch.

Map showing railways in Manitoba, Alberta, Assiniboia and Saskatchewan. Scale 35 miles to 1 inch.

Manitoba—Scale 12½ miles to 1 inch.
Assiniboia—Edition of 1904. Scale 12½ miles to 1 inch.
Saskatchewan—Edition of 1904. Scale 12½ miles to 1 inch.
Alberta—Edition of 1904. Scale 12½ miles to 1 inch.

Peace and Athabaska district—Alberta and Athabaska—includes the country between Wetaskiwin and Lake Athabaska and between Athabaska river and the eastern boundary of British Columbia. Scale 1/800000 or 12·63 miles to 1 inch.

Map showing new provinces of Alberta and Saskatchewan. Scale 100 miles to 1 inch.

Map showing electoral divisions (for provincial legislature) in Alberta and Saskatchewan. Scale 35 miles to 1 inch.

Map showing electoral divisions (for provincial legislature) in Southern Saskatchewan. Scale 12½ miles to 1 inch.

Map showing electoral divisions (for provincial legislature) in Southern Alberta. Scale 12½ miles to 1 inch.

Map showing all the even-numbered sections patented to January 1, 1905, and all even-numbered sections homesteaded and unpatented or finally allotted to railway companies to that date, in Manitoba, Saskatchewan and Alberta; 3 sheets. Scale 12½ miles to 1 inch.

British Columbia 'Railway Belt' map, showing the 'Railway Belt' in British Columbia. Scale 1/500000 or 7·89 miles to 1 inch.

Topographical map of British Columbia and Yukon—Alaska boundary. In 28 sheets. Scale 1/160000.

Southeastern Alaska and portion of British Columbia. Edition of 1897. Scale 1/960000.

Southeastern Alaska and portion of British Columbia, showing award of Alaska Boundary Tribunal, October 20, 1903. Scale 1/960000.

Yukon, extends from Lynn canal on the south, to Eagle on the north, and from the Pacific to the Frances river. Scale 1/750000 or 11·82 miles to 1 inch.

White, Alsek and Kluane rivers district, south-western Yukon. Scale 1/400000 or 6·31 miles to 1 inch.

Timiskaming sheet, Pontiac county, Quebec, and Nipissing district, Ontario. Scale 1/750000 or 11·83 miles to 1 inch.

Sheet 1, S.W. Ontario, Windsor sheet, Essex, Kent, and Lambton and portions of Elgin, Middlesex and Huron counties. Scale 1/250000 or 3·95 miles to 1 inch.

Sheet 1, S.E. Ontario, London sheet, Norfolk, Oxford, Brant and portions of Elgin, Middlesex, Huron, Perth, Waterloo and Wentworth counties. Scale 1/250000 or 3·95 miles to 1 inch.

Sheet 2, S.W. Ontario, Hamilton sheet, Lincoln, Welland, Haldimand, and portions of Wentworth and Halton counties. Scale 1/250000 or 3·95 miles to 1 inch.

Sheet 13 includes whole of New Brunswick, with exception of Madawaska and portions of Westmoreland and Albert counties. Scale 1/500000 or 7·89 miles to 1 inch.

REPORTS.

Altitudes in the Dominion of Canada. With a Relief map of North America. 8vo., p. 226.

Dictionary of Altitudes in the Dominion of Canada. With a Relief map of Canada. 8vo., p. 143.

MAPS IN PRESS.

Regina land district. Scale 12½ miles to 1 inch.
Red Deer land district. Scale 12½ miles to 1 inch.
Calgary land district. Scale 12½ miles to 1 inch.
Winnipeg land district. Scale 12½ miles to 1 inch.
Alameda land district. Scale 12½ miles to 1 inch.
Lethbridge land district. Scale 12½ miles to 1 inch.
Edmonton land district. Scale 12½ miles to 1 inch.
Dauphin land district. Scale 12½ miles to 1 inch.
Yorkton land district. Scale 12½ miles to 1 inch.
Prince Albert land district. Scale 12½ miles to 1 inch.
Battleford land district. Scale 12½ miles to 1 inch.
Brandon land district. Scale 12½ miles to 1 inch.
Minnedosa land district. Scale 12½ miles to 1 inch.

Sheets 1, N.W., and 1, N.E. Ontario, Guelph sheet, Wellington, Grey, Bruce and portions of Huron, Perth, Waterloo, Halton, Dufferin and Simcoe counties. Scale $1/250000$ or 3·95 miles to 1 inch.

Sheet 2, N.W. Ontario, Toronto sheet, Peel, York, Ontario, and Victoria and portions of Halton, Simcoe, Dufferin, Muskoka, Durham and Peterborough counties. Scale $1/250000$ or 3·95 miles to 1 inch.

Sheet 11, Montreal sheet, includes the country between Quebec and Vaudreuil and between the International boundary and lat. 48° N. Scale $1/500000$ or 7·89 miles to 1 inch.

Sheets 15, N.W., 15, S.W., and 15, S.E., Cape Breton island and portions of Antigonish and Guysboro counties. Scale $1/250000$ or 3·95 miles to 1 inch.

Sheet 27, Ontario, Lake of the Woods sheet, Rainy River district and portions of Thunder Bay district and Keewatin. Scale $1/500000$ or 7·89 miles to 1 inch.

ATLAS OF CANADA (in progress).—Contains the following maps and diagrams:—

1. Territorial divisions of Canada.
2. Relief map—western sheet.
3. Relief map—eastern sheet.
4. Geology—western sheet.
5. Geology—eastern sheet.
6. Minerals—western sheet.
7. Minerals—eastern sheet.
8. Forests.
9. Limits of trees.
10. Telegraphs—Maritime provinces and Quebec. Also Atlantic cables.
11. Telegraphs—Ontario and western Quebec.
12. Telegraphs—Manitoba and North-west Territories.
13. Telegraphs—British Columbia and Yukon. Also Pacific cable.
14. Telephones—Maritime provinces and Quebec.
15. Telephones—Ontario and Quebec.
16. Telephones—Manitoba, Saskatchewan, Alberta and British Columbia.
17. Railways—Maritime provinces and Quebec.
18. Railways—Ontario and Quebec.
19. Railways—Manitoba, Saskatchewan and Alberta.
20. Railways—British Columbia and Yukon.

21. Transcontinental Railways of Canada.
22. Canals.
23. Lighthouses, sailing distances and routes and depth of the sea—Pacific coast.
24. Lighthouses, sailing distances and routes and depth of the sea—Atlantic coast.
25. Isotherms, for months of the year.
26. Isotherms, for summer and year and Isobars for seasons and year.
27. Density of population in eastern Canada.
28. Density of population in western Canada.
29. Distribution of Indian tribes.
30. International and Interprovincial boundaries; New Brunswick-Maine, New Brunswick-Quebec and Quebec-Labrador.
31. International and interprovincial boundaries; Yukon-Alaska, and Ontario-Manitoba-Keewatin.
32. Routes of explorers.
33. Drainage basins.
34. Montreal.
35. Toronto.
36. Quebec and St. John.
37. Winnipeg.
38. Ottawa and Vancouver.
39. Hamilton, Halifax and London.

DIAGRAMS.

40-44. Trade and Commerce.
45. Education and immigration.
46-55. Population and areas.
56-61. Agriculture.
62-65. Manufactures.
66-70. Finance.
71-73. Banking.
74-77. Marine.
78. Fisheries.
79-82. Railways.
83-84. Vital statistics.
85-86. Minerals.

MAPS IN PROGRESS.

Sheet 2, N.E., Ontario, Belleville sheet, Northumberland and Prince Edward and portions of Durham, Peterborough, Hastings, Lennox and Addington counties. Scale 1/250000 or 3·95 miles to 1 inch.

Sheet 18, British Columbia, Kamloops sheet. Scale 1/500000 or 3·95 miles to 1 inch.

Sheet 19, British Columbia, West Kootenay sheet. Scale 1/500000 or 7·89 miles to 1 inch.

Sheet 37, Quebec, Gaspé sheet. Scale 1/500000 or 7·89 miles to 1 inch.

Rocky mountains between the Canadian Pacific Railway and the North Saskatchewan. Scale 4 miles to 1 inch.

Your obedient servant,

JAMES WHITE,

Geographer.

No. 29.

REPORT OF THE LAND PATENTS BRANCH.

DEPARTMENT OF THE INTERIOR,
OTTAWA, October 24, 1905.

W. W. CORY, Esq.,
Deputy of the Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit herewith the following seven statements for publication in connection with the annual report of this department, for the year ending June 30 last, viz.:—

A. Statement showing the number of homestead entries made during the fiscal year ended June 30, 1905, compared with the corresponding period of the previous year.

B. Abstract of letters patent covering Dominion lands situate in Manitoba, the North-west Territories, British Columbia and the Yukon Territory, issued from the Department of the Interior during the fiscal year ending June 30, 1905, as compared with the fiscal year ending June 30, 1904.

C. Statement showing the number of acres of swamp lands in Manitoba transferred by Order in Council to the province of Manitoba up to June 30, 1905.

D. Statement showing the number of patents forwarded to the several registrars of the land registration districts of the North-west Territories, and the number of notifications mailed to patentees, during the year ending June 30, 1905.

E. Statement showing the number of entries cancelled during the year ended June 30, 1905, showing also the years in which such entries were made.

F. Statement showing the number of deeds of transfer recorded at head office during the year ended June 30, 1905.

G. Statement of entries affecting Dominion lands which were made at head office during the fiscal year ending June 30, 1905.

Your obedient servant,
WM. M. GOODEVE,
Chief Clerk, Patents Branch.

A.—STATEMENT showing the number of Homestead Entries made during the Fiscal Year ended June 30, 1905, compared with the corresponding period of the previous year.

Agency.	Year		Increase.	Decrease.	Net Increase.
	Fiscal Year ended June 30, 1905.	Fiscal Year ended June 30, 1904.			
Alameda	1,627	1,665		38	
Battleford	3,610	1.772	1,838		
Brandon	306	489		183	
Calgary	2,155	2,664		509	
Dauphin	514	388	126		
Edmonton	2,899	2,581	318		
Kamloops	149	180		31	
Lethbridge	1,969	1,722	247		
Minnedosa	216	262		46	
New Westminster	38	28	10		
Prince Albert	2,136	1,634	502		
Regina	7,946	6,595	1,351		
Red Deer	2,115	1,234	881		
Winnipeg	671	866		195	
Yorkton	4,468	3,993	475		
	30,819	26,073	5,748	1,002	4,746

Representing in 1904 .... 68,381 Souls.
" 1905 .... 77,550 "

WM. M. GOODEVE,
Chief Clerk, Patents Branch.

DEPARTMENT OF THE INTERIOR,
OTTAWA, October 24, 1905.

B.—ABSTRACT of Letters Patent covering Dominion Lands situate in Manitoba, the North-west Territories, British Columbia and the Yukon Territory, issued from the Department of the Interior during the Fiscal Year ending June 30, 1905, as compared with the Fiscal Year ending June 30, 1904.

No.	Nature of Grant.	From July 1, 1904, to June 30, 1905. Patents.	From July 1, 1904, to June 30, 1905. Acres	From July 1, 1903, to June 30, 1904. Patents.	From July 1, 1903, to June 30, 1904. Acres.
1	British Columbia homesteads	61	9,225	58	8,094
2	British Columbia sales	43	4,740	37	4,484
3	Coal lands sales	6	1,087	3	368
4	Commutation grants	6	302	16	858
5	Homesteads	5,869	928,376	4,084	647,448
6	Hudson's Bay Co	6	14,352	....	....
7	Leases	1	230	1	153
8	License of occupation	....	....	1	....
9	Manitoba Act grants	4	236	10	420
10	Military Bounty grants	1	160	3	480
11	Military homesteads	8	2,572	8	2,369
12	Mineral rights	27	6,151	9	2,202
13	Mining lands sales	2	51	12	337
14	Northwest half-breed grants	265	55,329	435	85,410
15	Northwest Mounted Police grants	....	....	2	320
16	Parish sales	18	2,104	9	1,195
17	Quit claim special grants	28	....	26	....
	Railways :—				
18	Alberta Railway and Coal Co	7	5,601	8	44,983
19	Calgary and Edmonton Railway Co	188	194,343	2	323
20	Canadian Northern Railway Co	109	26,580	67	12,201
21	Canadian Pacific Railway grants	829	3,723,470	806	1,709,277
22	Canadian Pacific Railway grants (Souris Branch)	319	902,280	31	74,795
23	Canadian Pacific Railway Nominees	1	129	3	960
24	Canadian Pacific Railway roadbed and station grounds	15	296	34	689
25	Manitoba and North-western Railway Co	14	23,958	47	43,810
26	Manitoba South-western Colonization Railway Co	286	167,285	420	106,592
27	Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Co	121	71,685	55	23,599
28	Shuswap and Okanagan Railway Co	....	....	1	....
29	Sales	326	39,590	488	194,610
30	School lands sales	96	12,160	86	11,143
31	Special grants	107	4,008	54	2,418
32	Yukon Territory sales	34	1,054	66	2,602
33	Yukon Territory specials	1	....	8	439
	Totals	8,793	6,197,354	6,890	2,982,579

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October, 23, 1905.

C.—STATEMENT showing the number of acres of swamp lands in Manitoba transferred by Order in Council to the province of Manitoba up to June 30, 1905.

April 16, 1888	52,600·00
June 7, 1888	60,335·60
August 25, 1891	105,635·41
December 7, 1891	36,479·00
April 22, 1893	69,680·00
October 21, 1893	13,040·00
" 4, 1895	50,602·72
" 31, 1896	53,520·19
" 31, 1896	6,960·00
November 10, 1896	137,016·75
December 1, 1896	117,250·09
June 18, 1897	151,985·39
June 27, 1898	3,120·00
December 1, 1899	148,811·39
February 17, 1899 Angust 18, 1899 May 26, 1900	48,470·00
January 6, 1900	160·00
April 26, 1902	20,744·01
February 3, 1903	27,764·85
" 3, 1903	84,659·48
August 17, 1904	5,127·00
" 17, 1904	5,584·00
" 18, 1904	13,098·01
September 28, 1904	43,192·27
December 29, 1904	10,719·73
April 20, 1905	160·00
Total	1,266,715·89

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October 24, 1905.

D.—STATEMENT showing the number of patents forwarded to the several Registrars of the Land Registration Districts of the North-west Territories, and the number of notifications mailed to patentees during the year ending June 30, 1905.

Registration Districts.	Number of patents sent to registrars.	Number of notifications mailed to patentees.
Assiniboia	2,401	2,541
East Saskatchewan	627	684
West Saskatchewan	505	122
North Alberta	1,383	1,452
South Alberta	1,143	863
Yukon	40	63
Totals	6,099	5,725

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October 24, 1905.

E.—STATEMENT showing the number of entries cancelled during the year ending June 30, 1905, also the years in which such entries were made.

Years.	Homesteads	Preemptions	Preemption Sales.	Time Sales.	Sales.
1877		1			
1878		1			
1879	1	1			
1880	4				
1882	5	6			
1883	7	10			
1884	3	12			
1885	1	3			
1886	3	3			
1887	2				
1888	2	2		2	
1889	8	9		1	
1890	9		2		
1891	7		1	1	
1892	13			1	
1893	7				
1894	6				
1895	6				
1896	8				
1897	13				
1898	13				
1899	33			1	
1900	100				
1901	214				
1902	1,641				
1903	5,007				
1904	3,782				
1905	401				
	11,296	48	3	6	

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October 24, 1905.

F.—STATEMENT showing the number of deeds of transfer recorded at head office during the year ended June 30, 1905.

Number of deeds registered	789
Fees received in connection therewith	$1,653.54

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October 24, 1905.

G.—STATEMENT of Entries affecting Dominion Lands which were made at Head Office during fiscal year ending June 30, 1905.

Name of Grant.	No. of Grant.	Acres.	Mines and Minerals only.
			Acres.
Special grants	191	5,538 00	
Alberta Railway and Coal Co	7	5,601 07	
Calgary and Edmonton Railway Company	200	199,104 53	
" Mines and minerals	583	...	896,152 66
Canadian Northern Railway Company	105	37,489 24	
Canadian Pacific Railway Company (main line)	940	4,075,335 13	
" " " (Souris branch)	339	966,713 15	
" Mines and minerals	2	...	2,240 00
Manitoba and Northwestern Railway Company	9	134,202 25	
Manitoba and Southwestern Colonization Railway Company	297	170,008 19	
Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Company	122	71,845 14	
Railway right of way	39	1,288 00	
Totals	2,834	5,667,124 70	898,392 66

WM. M. GOODEVE,
Chief Clerk.

DEPARTMENT OF THE INTERIOR,
LAND PATENTS BRANCH,
OTTAWA, October 24, 1905.

PART II

IMMIGRATION

IMMIGRATION

REPORT OF THE SUPERINTENDENT OF IMMIGRATION.

DEPARTMENT OF THE INTERIOR,
OTTAWA, July 5, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I herewith lay before you the customary annual reports of those engaged in the immigration service of Canada.

At headquarters we have had a heavy correspondence to deal with, 77,610 attachments having been made to our files and duly attended to. We have responded to 227,443 individual requests for information, direct and indirect, and have sent out during the year 3,257,403 pamphlets, maps, &c.

On the recommendation of our agents in the United States, we procured transportation during the year for five delegates from Ohio, one from Illinois, nineteen from Michigan, two from Indiana, one from Iowa; from Pennsylvania five, South Dakota four, Missouri two and Wisconsin two; besides arranging similarly for three delegates from Germany and one from Austria. The reports of the delegates have been without exception favourable, and their influence will not be without its good effect on our work.

The following is a statement showing the orders for immigration literature during the year:—

Geography of the Dominion of Canada (English)....	355,000
" " " (Flemish)....	40,000
Atlas " " (Swedish)....	15,000
" " " (Norwegian)..	10,000
The Evolution of the Prairie by the Plow..........	30,000
Lacombe Board of Trade Pamphlet..............	2,000
Asked and Answered (New Ontario)...........	25,000
Prosperity follows Settlement................	100,000
One thousand facts about Canada.............	5,000
French Pamphlet 'Manitoba'..................	5,000
Letter Story of a Manitoba Farmer (Cotton)........	5,000
Canadian Year Book.......................	3,675
Letters from Scandinavian Settlers in Manitoba......	5,000
Farms and Farmers (English).................	104,000
Farms and Farmers (Foreign).................	104,000
Posters..............................	10,000

Folder Maps.

L'Ouest Canadian (French).................	200,000
British Colony (English)..................	10,000
Where and How (English) Coloured Map........	100,000
" " "	50,000
" " (German)...............	50,000

Maps.

Maps of the Dominion of Canada 11½ x 16½	100,000
Small map of the Dominion of Canada	50,000
Small map of the Dominion of Canada	8,000

Newspaper Special Editions.

Der Nordwesten	20,000
Toronto Globe, Christmas Number	200
Canadian American	200,000
Manitoba Free Press Crop Edition	250,000
Western British American	1,000,000
Alberta German Herald	5,000
Manitoba Free Press	1,000,000
The Inland Sentinal, Kamloops	5,000
Victoria Times	15,000
Resources of B.N. America	6,000

I submit the following statistical matter compiled in my office:—

PORT OF QUEBEC.

For the fiscal year ending June 30, 1905, there arrived at the port of Quebec 77,443 passengers, of whom 4,269 travelled saloon, and 73,174 steerage. Of the saloon passengers 4,129 were destined to Canada and 140 to the United States. Of the steerage passengers 64,001 were for Canada and 9,173 for the United States. Included in the steerage passengers for Canada were 2,518 returned Canadians and 640 tourists, leaving the immigration proper at 60,843 souls, an increase at this port over the previous fiscal year of 14,856 persons.

Table I. deals with the total arrivals of saloon passengers, Table II. with the total arrivals of steerage passengers, and Tables III., IV. and V. give a summary of the information obtained from immigrants for Canada upon arrival.

Table I.

Nationality and sex of Saloon Passengers arriving at Quebec for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
Australian	1			1	2	1		3	3	1		4
Belgian	8	6	2	16					8	6	2	16
Chinese	2			2					2			2
Dutch	1	2		3					1	2		3
French	31	24	9	64					31	24	9	64
German	9	5		14					9	5		14
English	1,468	1,089	148	2,705	16	12	2	30	1,484	1,101	150	2,735
Welsh	4	4		8					4	4		8
Scotch	182	168	25	375	6	6	2	14	188	174	27	389
Irish	25	17	1	43					25	17	1	43
West Indian	2	1		3					2	1		3
Hebrew, Russian	3			3					3			3
Italian	1			1					1			1
Japanese	1			1					1			1
New Zealand	2			2					2			2
Poles, N.E.S.					1			1	1			1
Icelandic	1			1					1			1
Swedish		2		2						2		2
Syrian	2	2		4					2	2		4
U. S. Citizens	11	8		19	37	45	10	92	48	53	10	111
Returned Canadians	402	388	69	859					402	388	69	859
Tourists	2	1		3					2	1		3
Totals	2,158	1,717	254	4,129	62	64	14	140	2,220	1,781	268	4,269

TABLE II.

NATIONALITY and sex of Steerage Passengers arriving at Quebec for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
African, South	18	5	1	24	3	1	2	6	21	6	3	30
Australian	47	15	7	69	3			3	50	15	7	72
Austrian, N.E.S.	169	29	25	223	82	55	25	162	251	84	50	385
Bohemian	24	24	26	74					24	24	26	74
Buckowinian	460	57	68	585					460	57	68	585
Croatian	27			27					27			27
Dalmatian	4			4					4			4
Galician	1,635	460	543	2,638	21	12	10	43	1,656	472	553	2,681
Hungarian, N.E.S.	181	70	74	325	47	38	20	105	228	108	94	430
Ruthenian	3			3					3			3
Slovak	2	1	3	6		1		1	2	2	3	7
Belgian	254	85	77	416	80	21	29	130	334	106	106	546
Bulgarian	2			2					2			2
Dutch	98	15	25	138	22	21	27	70	120	36	52	208
French	632	291	193	1,116	10	9	2	21	642	300	195	1,137
German, N.E.S.	499	251	299	1,049	191	142	162	495	690	393	461	1,544
Alsace-Lorraine	2	2	1	5					2	2	1	5
Bavarian	2			2					2			2
Prussian	5			5	6	3	3	12	11	3	3	17
Saxon	1			1					1			1
English	17,112	7,182	6,617	30,911	390	282	179	851	17,502	7,464	6,796	31,762
Welsh	355	102	84	541	13	9	6	28	368	111	90	569
Scotch	4,395	2,105	1,646	8,146	98	78	57	233	4,493	2,183	1,703	8,379
Irish	1,668	755	330	2,753	86	77	10	173	1,754	832	340	2,926
West Indian	2			2					2			2
Greek	47	2	1	50	15			15	62	2	1	65
Hebrew, N.E.S.	191	159	133	483		4	12	16	191	163	145	499
" Russian	2,460	608	784	3,852	260	160	201	621	2,720	768	985	4,473
" Polish	47	15	26	88					47	15	26	88
" Austrian	77	44	62	183	8	10	1	19	85	54	63	202
" German	49	22	31	102	9	2	4	15	58	24	35	117
Italian	1,602	38	30	1,670	136	6	2	144	1,738	44	32	1,814
New Zealand	9	2	2	13	1			1	10	2	2	14
Portuguese	1			1					1			1
Poles, N.E.S.	56	12	17	85	27	11	6	44	83	23	23	129

" Austrian	29	8	17	54					29	8	17	54
" German	5			5	1			1	6			6
" Russian	190	48	41	279	18	6	3	27	208	54	44	306
Persian	5	1		6					5	1		6
Roumanian, N.E.S	30	12	20	62	4	1	5	10	34	13	25	72
Russian, N.E.S	438	147	210	795	479	275	256	1,010	917	422	466	1,805
Finns	412	121	77	610	736	292	188	1,216	1,148	413	265	1,826
Doukhobors	2	2		4					2	2		4
Spanish	5	2	1	8					5	2	1	8
Swiss	64	16	16	96	4			4	68	16	16	100
Servian	4	1	2	7					4	1	2	7
Danish	139	43	34	216	146	66	64	276	285	109	98	492
Icelandic	121	142	137	400					121	142	137	400
Swedish	578	307	359	1,244	533	356	178	1,067	1,111	663	537	2,311
Norwegian	453	227	181	861	916	495	300	1,711	1,369	722	481	2,572
Turks	12			12	6			6	18			18
Armenian	37	8	7	52	33	12	11	56	70	20	18	108
Egyptian	2			2					2			2
Syrians	246	114	87	447	3	4	2	9	249	118	89	456
Arabians	9	4	3	16	1		1	2	10	4	4	18
U. S. A. Citizens	51	12	7	70	259	225	81	565	310	237	88	635
Negroes	4		1	5					4		1	5
Total Immigration	34,972	13,566	12,305	60,843	4,647	2,674	1,847	9,168	39,619	16,240	14,152	70,011
Returned Canadians	1,480	750	288	2,518					1,480	750	2	2,518
Tourists	421	182	37	640	3	2		5	424	184		645
Totals	36,873	14,498	12,630	64,001	4,650	2,676	1,847	9,173	41,523	17,174	14,477	73,174

TABLE III.

MONTHLY Arrivals of Immigrants for Canada by Nationalities at the Port of Quebec for the Fiscal Year ended June 30, 1905.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Totals.
African, South	2	6	3	4	......	......	......	......	......	......	5	4	24
Australian	9	8	20	10	1	......	......	......	......	......	8	13	69
Austrian, N.E.S	17	16	7	2	16	......	......	......	......	......	136	29	223
Bohemian	10	2	1	14	2	......	......	......	......	......	30	15	74
Buckowinian	7	50	19	4	47	......	......	......	......	......	366	92	585
Croatian	......	......	......	......	......	......	......	......	......	......	14	13	27
Dalmatian	......	......	......	......	......	......	......	......	......	......	......	4	4
Galician	116	157	71	54	62	......	......	......	......	......	1,762	416	2,638
Hungarian, N.E.S	7	14	13	6	15	......	......	......	......	......	190	80	325
Ruthenian	......	......	......	......	......	......	......	......	......	......	3	......	3
Slovak	......	......	......	......	......	......	......	......	......	......	6	......	6
Belgian	35	44	41	39	25	......	......	......	......	......	194	38	416
Bulgarian	......	......	......	2	......	......	......	......	......	......	......	......	2
Dutch	15	3	12	5	......	......	......	......	......	......	65	38	138
French	115	304	173	112	56	......	......	......	......	......	231	125	1,116
German, N.E.S	195	156	161	90	105	......	......	......	......	......	156	186	1,049
Alsace-Lorraine	......	......	......	......	......	......	......	......	......	......	3	2	5
Bavarian	......	......	......	......	......	......	......	......	......	......	2	......	2
Prussian	......	......	......	......	......	......	......	......	......	......	2	3	5
Saxon	......	......	......	......	......	......	......	......	......	......	......	1	1
English	4,448	3,704	3,735	2,921	1,277	......	......	......	......	......	9,872	4,954	30,911
Welsh	77	68	36	47	16	......	......	......	......	......	207	90	541
Scotch	967	969	863	703	362	......	......	......	......	......	2,216	2,066	8,146
Irish	339	403	377	333	84	......	......	......	......	......	816	401	2,753
West Indian	......	......	......	......	......	......	......	......	......	......	......	2	2
Greek	4	6	17	9	1	......	......	......	......	......	2	11	50
Hebrew, N.E.S.	47	91	134	11	73	......	......	......	......	......	63	64	483
" Russian	570	613	700	509	523	......	......	......	......	......	513	424	3,852
" Polish	13	30	18	11	10	......	......	......	......	......	1	5	88
" Austrian	19	67	33	7	16	......	......	......	......	......	19	22	183
" German	34	33	12	5	10	......	......	......	......	......	3	5	102
Italian	19	33	24	21	19	......	......	......	......	......	1,266	288	1,670
New Zealand	2	2	5	......	......	......	......	......	......	......	3	1	13
Portuguese	......	......	......	......	......	......	......	......	......	......	1	......	1
Poles, N.E.S	58	1	......	......	......	......	......	......	......	......	21	5	85
" Austrian	......	9	17	4	14	......	......	......	......	......	9	1	54
" German	......	......	......	......	......	......	......	......	......	......	3	2	5
" Russian	25	31	36	25	30	......	......	......	......	......	73	59	279
Persian	1	......	5	......	......	......	......	......	......	......	......	......	6
Roumanian, N.E.S	......	1	23	8	1	......	......	......	......	......	11	18	62
Russian, N.E.S	34	46	26	5	23	......	......	......	......	......	321	340	795

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Totals.
Finns	68	78	78	67	44						158	117	610
Doukhobors			3		1								4
Spanish	1		5	1								1	8
Swiss	8	8	15	9	3						34	19	96
Servian											3	4	7
Danish	22	28	34	19	10						66	37	216
Icelandic	150	6	27		1						1	215	400
Swedish	274	158	174	77	37						284	240	1,244
Norwegian	144	123	109	67	37						232	149	861
Turks	2	1	6								1	2	12
Armenian	10	5	3	10	6						15	3	52
Egyptian		1		1									2
Syrian	234	168	9	16	2						5	13	447
Arabian	8	1	6									1	16
U.S.A. Citizens	10	15	20	7	3						10	5	70
Negroes											1	4	5
Totals	8,116	7,459	7,071	5,235	2,932						19,403	10,627	60,843

TABLE IV.

MONTHLY Arrivals of Immigrants for Canada by Occupations and Destination at the Port of Quebec for the Fiscal Year ended June 30, 1905.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Totals.
Agriculturists	2,059	1,819	1,213	1,086	526						7,728	4,148	18,579
General labourers	2,093	1,718	1,556	1,086	726						4,000	1,778	12,957
Mechanics	1,678	1,759	1,724	1,237	882						4,808	2,788	14,876
Clerks	441	523	637	384	152						831	518	3,486
Miners	190	130	259	201	87						274	151	1,292
Female servants	422	434	535	401	254						955	737	3,738
Not classed	1,233	1,076	1,147	840	305						807	507	5,915
Totals	8,116	7,459	7,071	5,235	2,932						19,403	10,627	60,843
Maritime provinces	170	167	207	127	61						147	136	1,015
Quebec	2,369	2,264	2,400	1,673	1,057						4,417	2,297	16,477
Ontario	3,065	2,718	2,453	2,121	1,003						6,965	3,752	22,077
Manitoba	1,703	1,516	1,242	792	507						5,408	2,880	14,048
N.W.T	616	563	467	330	200						2,079	1,222	5,477
British Columbia	193	231	302	192	104						387	340	1,749
Totals	8,116	7,459	7,071	5,235	2,932						19,403	10,627	60,843

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant arrivals

Nationality.	Sex.				Trade or								
					Farmers, or Farm Labourers class.			General Labourers.			Mechanics.		
	M.	F.	C.	Total.	M.	F	C.	M.	F.	C.	M.	F.	C.
African, South	18	5	1	24	5			1	1	1	6		
Australian	47	15	7	69	21	6	2	9			8		
Austrian, N.E.S	169	29	25	223	50	10	10	72	4	9	20	4	3
Bohemian	24	24	26	74	6	8	14	4			6	4	2
Buckowinian	460	57	68	585	226	33	41	218	8	15	16	5	7
Croatian	27			27	1			26					
Dalmatian	4			4	3			1					
Galician	1,635	460	543	2,638	997	299	455	505	37	54	125	15	16
Hungarian, N.E.S.	181	70	74	325	119	47	56	46	8	8	14	1	
Ruthenian	3			3				3					
Slovak	2	1	3	6	1	1	3	1					
Belgian	254	85	77	416	127	42	46	45	10	13	56	9	11
Bulgarian	2			2									
Dutch	98	15	25	138	51	6	18	17	1	2	24	1	
French	632	291	193	1,116	311	86	117	82	14	20	88	27	22
German, N.E.S.	499	251	299	1,049	193	110	191	117	24	40	143	40	30
Alsace-Lorraine	2	2	1	5	1	1	1				1	1	
Bavarian	2			2	2								
Prussian	5			5	4								
Saxon	1			1	1								
English	17,112	7,182	6,617	30,911	6,568	1,345	1,475	3,227	703	1,005	5,201	1,541	1,572
Welsh	355	102	84	541	165	21	30	48	12	14	83	16	21
Scotch	4,395	2,105	1,646	8,146	1,612	330	417	522	96	137	1,594	482	474
Irish	1,668	755	330	2,753	734	82	93	373	76	88	325	102	51
West Indian	2			2	1						1		
Greek	47	2	1	50	3	1		25			14	1	1
Hebrew, N.E.S	191	159	133	483	8	2	1	64	29	44	104	59	54
" Russian	2,460	608	784	3,852	117	26	56	1,076	142	183	1,175	241	296
" Polish	47	15	26	88				18	2	4	25	7	3
" Austrian	77	44	62	183	3	1	3	34	13	30	34	9	7
" German	49	22	31	102				21	1	4	27	5	4
Italian	1,602	38	30	1,670	51	1		1,489	24	30	32	3	
New Zealand	9	2	2	13	4			1			3		
Portuguese	1			1									
Poles, N.E.S	56	12	17	85	9	2	4	26	2	2	13	2	6
" Austrian	29	8	17	54	5			10	1	1	13	6	16
" German	5			5	5								
" Russian	190	48	41	279	39	2	2	90	19	24	46	7	11
Persian	5	1		6				5	1				
Roumanian, N.E.S	30	12	20	62	16	3	11	9	1	1	2	1	3
Russian, N.E.S	438	147	210	795	146	68	121	208	23	42	70	20	22
Finns	412	121	77	610	77	7	10	274	17	31	23	2	
Doukhobors	2	2		4	2	2							
Spanish	5	2	1	8				2				1	
Swiss	64	16	16	96	24	9	14	18	1		13		1
Servian	4	1	2	7	3						1	1	2
Danish	139	43	34	216	46	5	9	55	6	11	27	4	7
Icelandic	121	142	137	400	105	69	118	10	4	5	5	4	8
Swedish	578	307	359	1,244	225	93	186	261	42	62	71	20	35
Norwegian	453	227	181	861	152	32	70	220	20	27	65	17	25
Turks	12			12				10					
Armenian	37	8	7	52				21	2	3	8	2	
Egyptian	2			2				1					
Syrian	246	114	87	447	3			215	107	83	11	1	
Arabian	9	4	3	16				6	3	2	3		
U. S. A. Citizens	51	12	7	70	12	1		18	1	3	7	2	
Negroes	4		1	5									
Totals	34,972	13,566	12,305	60,843	12,254	2,751	3,574	9,504	1,455	1,998	9.503	2,663	2,710

for Canada, at the Port of Quebec for the Fiscal Year ending June 30, 1905.

Occupation. Clerks, traders, &c.			Miners.			Female Servants.	Not Classified.			Destination. Lower Provinces.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.	Yukon.
M.	F.	C.	M.	F.	C.		M.	F.	C.							
5	1					1	1	2		4	6	7	6		1	
7	2	2	2			3		4	3		19	20	16	7	7	
3			22	2		7	2	2	3	7	63	44	65	21	23	
1			7	4	6	4		4	4	4	3	3	28	13	23	
						9		2	5		100	56	358	67	4	
												26	1			
														4		
1	2	2	7	1	2	100		6	14	8	207	137	1,913	367	6	
			1			9	1	5	10	11	49	18	81	166		
											2		1			
												1		5		
11	4	4	11	2		13	4	5	3	11	108	31	200	62	4	
2											2					
6						3		4	5		11	13	87	27		
55	15	10	4	12	6	40	92	97	18	11	576	97	309	113	10	
30	7	6	10	5	11	34	6	31	21	21	284	135	427	175	7	
											2		3			
												1	1			
1													5			
														1		
1,407	440	302	375	93	142	1,952	334	1,108	2,121	469	6,783	14,429	5,536	2,694	1,000	
26	6	8	27	5	9	27	6	15	2	5	83	157	143	101	52	
395	141	87	169	49	110	703	103	304	421	217	1,395	3,354	2,037	812	331	
173	55	12	29	5	6	303	34	132	80	54	663	1,249	554	174	59	
											1		1			
1							4				31	11	2	2	1	
12	7	3				30	3	32	31		337	73	59	12	2	
78	18	33	6	1		50	8	130	216	57	2,658	684	412	36	5	
1			3			1		5	19	1	59	24	4			
5	1					8	1	12	22		110	54	12	7		
1	1					6		9	23		65	21	14	2		
6			24			8		2		17	1,328	211	76	14	24	
							1	2	2		7	3	1		2	
1												1				
			8	3	3	2		1	2	10	61	7	7			
			1			1				1	15	11	26	1		
											4		1			
1			14	3	2	12		5	2	23	198	20	35	3		
											5	1				
1	1		1			6	1		5		27	4	29	2		
10	3	5	2			22	2	11	20	9	286	98	281	115	6	
3			35	5	5	68		22	31	1	100	407	40	30	32	
													4			
3						1			1		7	1				
9	1					5			1	2	32	16	16	29	1	
													3	4		
8	2		3			21		5	7	5	67	43	74	24	3	
			1			63		2	6		2		397	1		
6	2	1	11	2	4	101	4	47	71	31	135	277	495	217	89	
9	1		6	3	3	119	1	35	56	11	135	235	258	166	56	
2											8	3	1			
5						1	3	3	4		29	22	1			
			1								2					
3	1	1	6			1	8	4	3	23	367	40	17			
						1			1	1	14	1				
9	1	1	2			3	3	4	3	1	27	27	11	3	1	
							4		1		1	4				
2,297	712	477	788	195	309	3,738	626	2,052	3,237	1,015	16,477	22,077	14,048	5,477	1,749	....

PORT OF ST. JOHN.

For the fiscal year ending June 30, 1905, there arrived at the port of St. John 16,521 passengers, of whom 632 travelled saloon and 15,889 steerage. Of the saloon passengers 631 were destined to Canada and 1 to the United States. Of the steerage passengers 14,297 were for Canada and 1,592 for the United States. Included in the steerage passengers for Canada were 557 returned Canadians and 144 tourists, leaving the immigration proper at 13,596 souls, an increase at this port over the previous fiscal year of 5,337 persons.

Table I. deals with the total arrivals of saloon passengers, Table II. with the total arrivals of steerage passengers, and Tables III., IV. and V. give a summary of the information obtained from immigrants for Canada upon arrival.

TABLE I.—Nationality and sex of Saloon passengers arriving at St. John for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
French		1		1						1		1
German	1			1					1			1
English	162	57	8	227					162	57	8	227
Scotch	24	6		30	1			1	25	6		31
Irish	3	1		4					3	1		4
West Indian	3	2		5					3	2		5
Bermudian	5	8	3	16					5	8	3	16
Danish	1			1					1			1
Armenian	3			3					3			3
Arabian		3		3						3		3
Returned Canadians	119	68	15	202					119	68	15	202
Tourists	88	38	12	138					88	38	12	138
Totals	409	184	38	631	1			1	410	184	38	632

TABLE II.—Nationality and sex of Steerage passengers arriving at St. John for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
Australian	9	2		11					9	2		11
Austrian, N.E.S	249	51	75	375	47	18	9	74	296	69	84	449
Bohemian	6			6	3	3	6	12	9	3	6	18
Buckowinian	56	3	6	65					56	3	6	65
Galician	1,280	182	210	1,672	18	10	5	33	1,298	192	215	1,705
Hungarian, N.E.S	124	31	45	200	11	8	6	25	135	39	51	225
Belgian	146	34	23	203	47	14	19	80	193	48	42	283
Dutch	25	6	8	39					25	6	8	39
French	36	17	8	61		1	3	4	36	18	11	65
German, N.E.S	55	25	25	105	41	34	49	124	96	59	74	229
Prussian	3			3					3			3
Saxon	1	1		2					1	1		2
Wurtemburg	1	1		2					1	1		2
English	4,907	1,122	982	7,011	38	15	14	67	4,945	1,137	996	7,078
Welsh	64	12	7	83	1			1	65	12	7	84
Scotch	582	96	50	728	6			6	588	96	50	734
Irish	294	65	26	385	10	3	3	16	304	68	29	401
West Indian	6			6					6			6
Greek	4	1		5					4	1		5
Hebrew, Russian	488	17	10	515					488	17	10	515
" Austrian	6	3		9					6	3		9
" German	1	1	4	6					1	1	4	6
Italian	328	3	1	332	38		1	39	366	3	2	371
Newfoundland	1			1					1			1
New Zealand	4			4					4			4
Poles, N.E.S	9	4	4	17	2	6	1	9	11	10	5	26
" Austrian	4			4					4			4
" German	3	4	2	9					3	4	2	9
" Russian	31	13	9	53	1			1	32	13	9	54
Roumanian, N.E.S	67	59	50	176	5			5	72	59	50	181
Russian, N.E.S	779	91	78	948	298	76	52	426	1,077	167	130	1,374
Finns	130	7	3	140	81	9	4	94	211	16	7	234
Swiss	18	2	7	27	2	2	5	9	20	4	12	36
Danish	63	10	9	82	75	16	3	94	138	26	12	176
Swedish	86	16	22	124	107	31	47	185	193	47	69	309
Norwegian	102	26	31	159	185	48	22	255	287	74	53	414
Armenian					8	2		10	8	2		10

Syrian	9	4	7	20					9	4	7	20
Arabian	1		1	2					1		1	2
U. S. A. Citizens	6			6	17	5	1	23	23	5	1	29
Total Immigration	9,984	1,909	1,703	13,596	1,041	301	250	1,592	11,025	2,210	1,953	15,188
Returned Canadians	435	75	47	557					435	75	47	557
Tourists	84	29	31	144					84	29	31	144
Totals	10,503	2,013	1,781	14,297	1,041	301	250	1,592	11,544	2,314	2,031	15,889

TABLE III.—Monthly arrivals of immigrants for Canada, by nationalities at Port of St. John, for the Fiscal Year ending June 30, 1905.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Totals.
Australian					1	3	1	4	1	1			11
Austrian, N.E.S.						5	6	14	50	300			375
Bohemian							1		1	4			6
Buckowinian					4	2	4	9	40	6			65
Galician					26	72	97	93	452	932			1,672
Hungarian, N.E.S.					2	21	17	11	77	72			200
Belgian					2	4	16	20	103	58			203
Dutch					1	9	2		21	6			39
French					3	13	10	3	20	12			61
German, N.E.S.					8	7	13	4	45	28			105
Prussian									3				3
Saxon										2			2
Wurtemburg									2				2
English					183	310	247	717	1,586	3,968			7,011
Welsh					3	2	2	13	21	42			83
Scotch					10	60	47	97	156	357	1		728
Irish					16	22	20	39	86	202			385
West Indian									1		5		6
Greek						4	1						5
Hebrew, Russian								475	40				515
" Austrian								1	8				9
" German								6					6
Italian					5	18	7	20	69	213			332
Newfoundland												1	1
New Zealand					1			1	1	1			4
Poles, N.E.S						6	6	4		1			17
" Austrian								4					4
" German									9				9
" Russian					6	2	18	17	9	1			53
Roumanian, N.E.S					58	31	60	24	2	1			176
Russian, N.E.S.					199	235	367	11	28	108			948
Finns					2	6	2	53	22	55			140
Swiss					3	6	1	3	1	13			27
Danish					4	8	9	12	15	34			82
Swedish					9	19	7	3	5	81			124
Norwegian					7	10	5	19	19	99			159
Syrian						19	1						20
Arabian						2							2
U.S.A. Citizens					1	1			2	2			6
Totals					554	897	967	1,677	2,895	6,599	6	1	13,596

TABLE IV.—Monthly arrivals of immigrants for Canada, by occupations and destination at the Port of St. John, for the Fiscal Year ending June 30, 1905.

—	July.	Aug.	Sept.	Oct.	Nov.	Dec	Jan.	Feb.	Mar.	Apr.	May.	June.	Totals.
Agriculturists					81	140	242	350	901	1,401	1		3,116
General labourers					57	185	70	274	916	2,643	4		4,149
Mechanics					215	252	382	668	587	1,426			3,530
Clerks					34	33	21	76	86	269	1		520
Miners					29	22	12	18	16	43			140
Female servants					12	34	16	29	62	111			264
Not classed					126	231	224	262	327	706		1	1,877
Totals					554	897	967	1,677	2,895	6,599	6	1	13,596
Maritime provinces					100	199	90	97	159	516		1	1,162
Quebec					138	246	376	643	263	385			2,051
Ontario					124	216	196	495	789	1,872	2		3,694
Manitoba					145	152	224	323	1,208	2,748	4		4,804
North-west Territories					35	67	59	78	419	990			1,648
British Columbia					12	17	22	41	57	88			237
Totals					554	897	967	1,677	2,895	6,599	6	1	13,596

TABLE V.—Nationality, Sex, Occupation and Destination of Immigrant Arrivals for

Nationality.	Sex.				Trade or								
					Farmers, or Farm Labourers Class.			General Labourers.			Mechanics.		
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Male.	Female.	Children.	Male.	Female.	Children.
Australian	9	2	....	11	3	..	....	1	....	....	2	1	..
Austrian, N.E.S	249	51	75	375	14	2	4	225	33	49	6	1	2
Bohemian	6	.....	...	6	....	.....	.....	4	....	.	2	....	..
Buckowinian	56	3	6	65	9	1	1	42	....	....	5	....	....
Galician	1,280	182	210	1,672	135	19	24	1,056	73	111	70	10	14
Hungarian, N.E.S	124	31	45	200	13	6	6	90	12	28	14	4	..
Belgian	146	34	23	203	55	12	8	47	3	4	23	2	1
Dutch	25	6	8	39	13	2	1	6	1	1	6	....	....
French	36	17	8	61	14	3	4	13	2	....	5	...	...
German, N.E.S	55	25	25	105	21	10	10	8	2	6	20	6	5
Prussian	3	...	......	3	2	.....	.....	1	....	....	....	....	....
Saxon	1	1	.....	2	..	.....	.....	1	....	....	....	....	....
Wurtemburg	1	1	.....	2	..	....	.....	1	....	....	....	....	....
English	4,907	1,122	982	7,011	1,584	210	221	1,021	112	147	1555	222	251
Welsh	64	12	7	83	30	1	5	13	2	2	13	2	....
Scotch	582	96	50	728	221	11	6	104	5	2	172	13	5
Irish	294	65	26	385	105	10	3	65	6	4	68	8	5
West Indian	6	.....	....	6	1	.....	.....	4	....	....	....	....	....
Greek	4	1	.....	5	....	.....	.....	....	....	....	4	1	....
Hebrew, Russian	488	17	10	515	37	....	....	38	....	....	373	6	3
" Austrian	6	3	...	9	....	.....	.....	1	..	....	5	1	....
" German	1	1	4	6	.....	.....	.....	....	...	....	....	....	....
Italian	328	3	1	332	1	.....	.....	316	....	1	6	....	....
Newfoundland	1	......	.....	1	.....	.....	.....	....	....	....	....	....	....
New Zealand	4	.....	...	4	1	....	..	....	...	...	1	..	...
Poles, N.E.S.	9	4	4	17	.....	.....	.....	2	....	....	7	..	....
" Austrian	4	.....	....	4	3	.....	.. ..	...	....	....	1	....	....
" German	3	4	2	9	3	3	1	...	....	....	....	....	....
" Russian	31	13	9	53	11	...	....	5	2	3	14	2	3
Roumanian, N.E.S.	67	59	50	176	17	6	3	4	1	..	36	8	2
Russian, N.E.S	779	91	78	948	99	18	5	159	6	14	435	24	19
Finns	130	7	3	140	4	.....	.....	125	2	1	1	....	....
Swiss	18	2	7	27	3	1	7	6	....	....	3	...	....
Danish	63	10	9	82	19	3	6	16	....	....	22	...	....
Swedish	86	16	22	124	19	2	5	47	2	....	16	2	3
Norwegian	102	26	31	159	26	3	8	62	10	14	7	1	4
Syrian	9	4	7	20	1	.....	.....	4	...	..	3	1	....
Arabian	1	.....	1	2	.....	.....	....	1	....	....	....	...	....
U. S. A. Citizens	6	....	......	6	1	.....	.....	.....	....	..	3	....	....
Totals	9,984	1,909	1,703	13,596	2,465	323	328	3,488	274	387	2898	315	317

Canada at the Port of St. John, N.B., for the Fiscal Year ending June 30, 1905.

Occupation. Clerks, Traders, &c.			Miners.			Female Servants.	Not Classified.			Destination. Lower Provinces.	Quebec.	Ontario.	Manitoba.	N. W. Territories.	B. Columbia.	Yukon.
Male.	Female.	Children.	Male.	Female.	Children.		Male.	Female.	Children.							
1							2	1			2	2	4	2	1	
			2			4	2	11	20	19	22	23	259	39	13	
										1		1	2	2		
								2	5	9	16	7	27	6		
			1			33	18	47	61	29	196	84	1,186	177		
2			1			2	4	7	11	15	18	14	33	114	6	
3			9	1	1	1	9	15	9	10	29		96	68		
						1		2	6			1	37	1		
			1			1	3	11	4	10	6	3	29	13		
2	1	2				2	4	4	2	11	1	18	48	26	1	
											1		1	1		
								1		1			1			
								1					2			
312	47	48	53	11	14	138	382	382	301	552	392	2,684	2,280	953	150	
2			1			2	5	5		8	8	22	39	4	2	
31	5	4	15	4	3	24	39	34	30	50	34	319	196	99	30	
28			4			30	24	11	14	40	25	131	141	43	5	
1												2	4			
											1	4				
7							33	11	7	7	486	8	11	3		
						2					4	2	3			
							1	1	4			6				
			5					3		155	108	55	7		7	
							1			1						
2										1	1	1	1			
						3		1	4	1	5	6	5			
											2		2			
								1	1					9		
			1			3		6	3	10	24	7	5	7		
2						1	8	43	45	1	93	29	49	4		
15			7	1		5	64	37	40	164	500	81	164	34	5	
						3		2	2	8	37	73	6	9	7	
1			4				1	1		5	5	4	13			
2							4	7	3	22	14	20	20	5	1	
1						3	3	7	14	17	5	25	58	14	5	
1						6	6	6	5	9	7	51	73	15	4	
							1	3	7	6	7	7				
									1			2				
			1				1				2	2	2			
413	53	54	105	17	18	264	615	663	599	1,162	2,051	3,694	4,804	1,648	237	....

PORT OF HALIFAX.

For the fiscal year ending June 30, 1905, there arrived at the port of Halifax 28,676 passengers, of whom 4,441 travelled saloon and 24,235 steerage. Of the saloon passengers 4,439 were destined to Canada and 2 to the United States. Of the steerage passengers 21,729 were for Canada and 2,506 for the United States. Included in the steerage passengers for Canada were 1,614 returned Canadians and 72 tourists, leaving the immigration proper at 20,043 souls, a decrease at this port from the previous fiscal year of 5,555 persons.

Table I. deals with the total arrivals of saloon passengers, Table II. with the total arrivals of steerage passengers, and Tables III., IV. and V. give a summary of the information obtained from immigrants for Canada upon arrival.

TABLE I.

NATIONALITY and Sex of Saloon Passengers arriving at Halifax for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
French	7	3	5	15					7	3	5	15
German	4			4					4			4
English	366	158	37	561	1			1	367	158	37	562
Scotch	36	12	1	49					36	12	1	49
Irish	10	3		13					10	3		13
West Indian	1			1					1			1
Bermudian	9			9					9			9
Newfoundland	14	15	3	32	1			1	15	15	3	33
Russian	1	1		2					1	1		2
U. S. A. Citizens	4	1		5					4	1		5
Returned Canadians	870	680	63	1,613					870	680	63	1,613
Tourists	1,010	1,014	111	2,135					1,010	1,014	111	2,135
Totals	2,232	1,887	220	4,439	2			2	2,334	1,887	220	4,441

TABLE II.

NATIONALITY and sex of steerage passengers arriving at Halifax for the Fiscal Year ending June 30, 1905.

Nationality.	Canada. Male.	Canada. Female.	Canada. Children.	Canada. Total.	United States. Male.	United States. Female.	United States. Children.	United States. Total.	Canada and United States. Male.	Canada and United States. Female.	Canada and United States. Children.	Canada and United States. Total.
African, South	10	1		11					10	1		11
Australian	13		4	17	1	1	1	3	14	1	5	20
Austrian, N.E.S	22	14	17	53	14	11	16	41	36	25	33	94
Bohemian	20			20					20			20
Buckowinian	151	13	25	189	1			1	152	13	25	190
Galician	1,275	355	436	2,066	1			1	1,276	355	436	2,067
Hungarian, N.E.S	41	16	22	79	5	2	2	9	46	18	24	88
Magyar	5			5					5			5
Slovak	21	4	5	30					21	4	5	30
Belgian	80	31	20	131	14	4	11	29	94	35	31	160
Brazilian	1			1					1			1
Dutch	36	8	5	49	3			3	39	8	5	52
French	212	63	58	333	3	3		6	215	66	58	339
German, N.E.S.	230	164	194	588	53	21	27	101	283	185	221	689
Bavarian	4			4					4			4
Prussian	12	2	6	20					12	2	6	20
Saxon	5	2		7					5	2		7
Wurtemburg	3	1		4					3	1		4
English	6,251	1,610	1,338	9,199	81	39	15	135	6,332	1,649	1,353	9,334
Welsh	104	31	5	140	1	1	2	4	105	32	7	144
Scotch	2,007	481	334	2,822	12	10	6	28	2,019	491	340	2,850
Irish	568	167	75	810	11	5	4	20	579	172	79	830
West Indian	20	10	4	34					20	10	4	34
Bermudian	2	6		8					2	6		8
Jamaican	17	9		26					17	9		26
Greek	5			5	5	4		9	10	4		14
Hebrew, N.E.S.	61	28	32	121	1			1	62	28	32	122
" Russian	935	217	206	1,358	65	22	29	116	1,000	239	235	1,474
" Polish	29	16	18	63	4	4	2	10	33	20	20	73
" Austrian	29	9	10	48	4			4	33	9	10	52
" German	3	4	3	10					3	4	3	10
Italian	158	3	5	166	24	1		25	182	4	5	191
Newfoundland	67	108	14	189		2		2	67	110	14	191
New Zealand	4			4					4			4
Poles, N.E.S	15			15	6	11	13	30	21	11	13	45
" Austrian	4	2	6	12					4	2	6	12
" German	6	2	7	15					6	2	7	15
" Russian	47	6	14	67	17	1		18	64	7	14	85
Roumanian, N.E.S	7	2		9	3	1	6	10	10	3	6	19
Russian, N.E.S	68	17	22	107	200	100	152	452	268	117	174	559
Finns	384	60	18	462	561	106	65	732	945	166	83	1,194
Doukhobors	1	1	1	3					1	1	1	3
Spanish	1			1	13			13	14			14
Swiss	13	2	4	19		1		1	13	3	4	20
Danish	121	16	3	140	47	10	3	60	168	26	6	200
Icelandic	3	1		4					3	1		4
Swedish	156	55	36	247	72	33	23	128	228	88	59	375
Norwegian	135	51	46	232	300	113	53	466	435	164	99	698
Turks	15			15					15			15
Armenians	20	5	1	26	3	1		4	23	6	1	30
Syrian	21	10	7	38	1			1	22	10	7	39
Arabian	3	1		4					3	1		4
U.S.A. Citizens	14	2	1	17	32	6	5	43	46	8	6	60
Total Immigration	13,435	3,606	3,002	20,043	1,558	513	435	2,506	14,993	4,119	3,437	22,549
Returned Canadians	1,267	217	130	1,614					1,267	217	130	1,614
Tourists	57	14	1	72					57	14	1	72
Totals	14,759	3,837	3,133	21,729	1,558	513	435	2,506	16,317	4,350	3,568	24,235

TABLE III.

MONTHLY ARRIVALS of Immigrants for Canada by nationalities at the Port of Halifax for the Fiscal Year ended June 30, 1905.

—	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Totals.
African, South			1		1			4	2	3			11
Australian						2	1	1	2	10	1		17
Austrian, N.E.S		1			5	5	3	6	2	10	14	7	53
Bohemian								1	19				20
Buckowinian										86	43	60	189
Galician							1	4	129	766	516	650	2,066
Hungarian, N.E.S							6		3	36	34		79
Magyar									5				5
Slovak									14	7	3	6	30
Belgian	5	1			13	3	8	9	21	58	13		131
Brazilian								1					1
Dutch						1			21	21	6		49
French	3		3	3	3	24	10	7	63	155	62		333
German, N.E.S	1				11	36	8	8	67	255	148	54	588
Bavarian							1		3				4
Prussian									3	14	3		20
Saxon							1	5	1				7
Wurtemburg									3	1			4
English	118	59	109	54	309	517	592	695	2,507	3,988	177	74	9,199
Welsh		2	1		4	9	15	4	31	70	4		140
Scotch	40	23	22	10	48	74	87	81	677	1,127	597	36	2,822
Irish	3		7	4	39	56	34	53	208	371	33	2	810
West Indian	12		4			2	5			1	1	9	34
Bermudian	3										4	1	8
Jamaican	9		2		1	3			3		3	5	26
Greek						2			1	2			5
Hebrew, N.E.S				1	2	17	13	40	12	36			121
" Russian	7			1	97	555	172	127	203	157	13	26	1,358
" Polish	2				8	29	8	4	6	5		1	63
" Austrian	1				2	17	4	4		19	1		48
" German						8	2						10
Italian	2	1	6		1	7	2	4	50	75	17	1	166
Newfoundland	14	18	28	24	29	7		7	5	26	17	14	189
New Zealand							1		2	1			4
Poles, N.E.S						2	7	5				1	15
" Austrian						9					3		12
" German					1	3			2			9	15
" Russian					6	13	12	7	4	18	7		67
Roumanian, N.E.S	1				3				3	1	1		9
Russian, N.E.S					7	6	5	37	13	20	10	9	107
Finns					6	78	111	54	91	85	37		462
Doukhobors							2			1			3
Spanish					1								1
Swiss					1		1	1		16			19
Danish	1				2	8	31	21	38	38	1		140
Icelandic								1		3			4
Swedish		5			24	37	17	12	52	99	1		247
Norwegian		1			12	11	9	10	79	110			232
Turks	1							3	1	10			15
Armenian					3	3	2	3	8	7			26
Syrian	4		8		5	11				2	5	3	38
Arabian											2	2	4
U.S.A. citizens		2		2	1	2	2		1	5	2		17
Totals	227	113	191	99	645	1,557	1,173	1,219	4,355	7,715	1779	970	20,043

TABLE IV.

MONTHLY ARRIVALS of Immigrants for Canada by occupations and destination at the Port of Halifax for the Fiscal Year ended June 30, 1905.

—	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Totals.
Agriculturists	9	2	11	5	89	292	215	360	2,182	4,199	1,024	736	9.124
General labourers	14	17	32	24	136	245	265	233	372	683	144	38	2,203
Mechanics	42	12	29	13	207	669	415	381	1,233	2,011	372	86	5,470
Clerks	11	4	10	3	40	91	108	79	214	287	62	9	918
Miners	116	53	76	31	76	65	35	53	64	160	50	37	816
Female servants	6	6	4	6	68	152	71	51	211	321	105	50	1,051
Not classed	29	19	29	17	29	43	64	62	79	54	22	14	461
Totals	227	113	191	99	645	1,557	1,173	1,219	4,355	7,715	1,779	970	20,043
Maritime provinces	195	110	189	93	169	141	123	97	171	348	160	145	1,941
Quebec	14	....	1	.	150	523	281	249	569	607	134	62	2,590
Ontario	6	2	1	6	237	599	533	553	1,686	2,806	350	49	6,828
Manitoba	7	....	....	....	43	173	156	207	1,421	2,814	815	490	6,126
Northwest territories	1	...	..	....	33	75	62	89	421	975	282	222	2,160
British Columbia	4	1	..	....	13	46	18	24	84	165	38	2	395
Yukon	....	....	....	....	..	......	......	......	3	......	......	....	3
Totals	227	113	191	99	645	1,557	1,173	1,219	4,355	7,715	1,779	970	20,043

TABLE V.—NATIONALITY, Sex, Occupation and Destination of Immigrant arrivals

Nationality.	Sex.				Trade or								
					Farmers, or Farm Labourers class.			General Labourers.			Mechanics.		
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Male.	Female.	Children.	Male.	Female.	Children.
African, South	10	1		11	4			3	1		1		
Australian	13		4	17	6		4				5		
Austrian, N.E.S	22	14	17	53	10	7	8	4	2	5	7	1	1
Bohemian	20			20	19						1		
Buckowinian	151	13	25	189	143	12	25	3			5		
Galician	1,275	355	436	2,066	1,202	268	430	59	6	3	13	1	
Hungarian, N.E.S	41	16	22	79	26	9	19	13	3	3	2		
Magyar	5			5	3			2					
Slovak	21	4	5	30	9	1	2	9	1	2	2	1	1
Belgian	80	31	20	131	65	15	7	2	1		8	3	3
Brazilian	1			1	1								
Dutch	36	8	5	49	23	4	3	4	1	2	7		
French	212	63	58	333	142	30	44	31	3	4	19	5	2
German, N.E.S	230	164	194	588	179	116	170	17	3	11	28	11	11
Bavarian	4			4	1						3		
Prussian	12	2	6	20	2	1	3				2		
Saxon	5	2		7	2			1			2	1	
Wurtemburg	3	1		4	2						1	1	
English	6,251	1,610	1,338	9,199	2,889	387	549	602	101	148	2,123	386	377
Welsh	104	31	5	140	61	9	4	9			21	3	1
Scotch	2,007	481	334	2,822	844	89	114	109	16	15	805	117	92
Irish	568	167	75	810	313	33	44	68	6	6	124	27	18
West Indian	20	10	4	34	1			4			7	1	1
Bermudian	2	6		8				1			1		
Jamaican	17	9		26	4			4			4		
Greek	5			5	1			4					
Hebrew, N.E.S	61	28	32	121	8	4	12	5			42	11	8
" Russian	935	217	206	1,358	137	27	36	97	14	31	666	105	100
" Polish	29	16	18	63				3			24	12	16
" Austrian	29	9	10	48	7	2	6	7	1	2	14	5	2
" German	3	4	3	10							3	2	2
Italian	158	3	5	166	13	2	3	126			13		2
Newfoundland	67	108	14	189	2	1		37	1	2	18	1	1
New Zealand	4			4	2						2		
Poles, N.E.S.	15			15	7			6			2		
" Austrian	4	2	6	12	3						1	1	2
" German	6	2	7	15	3	1	7	2			1		
" Russian	47	6	14	67	17			19	5	12	10	1	2
Roumanian, N.E.S	7	2		9	2			2			3	2	
Russian, N.E.S	68	17	22	107	34	12	18	20			11	2	4
Finns	384	60	18	462	47	7	6	310	11	10	12	1	
Doukhobors	1	1	1	3	1	1	1						
Spanish	1			1							1		
Swiss	13	2	4	19	8	1	4	1			4		
Danish	121	16	3	140	50	6	2	36			30		
Icelandic	3	1		4				2			1		
Swedish	156	55	36	247	90	14	30	49	1	1	16	4	2
Norwegian	135	51	46	232	65	19	35	40	4	6	24	2	5
Turks	15			15	4			11					
Armenian	20	5	1	26	1			6			11	2	
Syrian	21	10	7	38	1			15	5	6	3		1
Arabian	3	1		4				2	1		1		
U.S.A. citizens	14	2	1	17	6			1	1		3		
Totals	13,435	3,606	3,002	20,043	6,460	1,078	1,586	1,746	188	269	4,107	709	651

for Canada at the Port of Halifax for the Fiscal Year ending June 30, 1905.

Occupation.										Destination.						
Clerks, Traders, &c.			Miners.			Female Servants.	Not classified.									
Male.	Female.	Children.	Male.	Female.	Children.		Male.	Female.	Children.	Lower Provinces.	Quebec.	Ontario.	Manitoba.	N. W. T.	B. C.	Yukon.
1			1							3	1	5	1		1	
			2								2	4	1	1	9	
1				1	3	2		1		14	7	4	7	21		
											3		17			
						1				1	6	25	102	55		
1						77		3	3	14	181	56	1,477	332	6	
						4				9	5	3	21	33	8	
										1			1			
			1			1					2	15	1	3	9	
			5	10	10	2				22	15	6	73	12	3	
												1				
1						3	1			1	3	3	37	5		
8	2	2	3	2	3	11	9	10	3	15	64	27	166	58	3	
4	2	2	1			30	1	2		6	37	13	342	189	1	
											4					
3			5	1	3					1	4		1	14		
	1										1	5	1			
											2		2			
376	81	41	241	88	145	440	20	127	78	970	795	4,166	2,201	861	204	2
7	2		6	1		12		4		12	13	38	48	22	7	
130	25	17	114	45	77	156	5	33	19	353	204	1,014	873	297	80	1
56	6	2	4			79	3	16	5	69	68	422	170	77	4	
8	1					6		2	3	26	1	3	4			
						2		4		8						
5						8		1		13	1	6			6	
											4	1				
6	4	8				5		4	4	3	60	17	41			
35	11	31				48		12	8	78	689	367	205	19		
2	1	2				3					44	18	1			
1						1					22	11	5	10		
	1	1				1					1	5	4			
1			5					1		21	98	26	15	6		
9			1			50		55	11	183		3	1		2	
											2		1	1		
										2	12	1				
				1	4					5	4		3			
						1				1	1	1	11	1		
			1							2	41	20	4			
										1	5	2		1		
1	1		2			1		1		4	28	13	23	39		
2			13	3	1	37		1	1	14	34	352	23	20	19	
														3		
											1					
						1				1	4	3	4		7	
3	1		1			8	1	1	1	9	50	21	47	12	1	
						1						2	2			
			1	3	2	31		2	1	24	20	68	94	36	5	
2	1		4	1		24				21	10	66	88	29	18	
										1	13		1			
2	1	1				2				1	17	8				
2						3		2		19	11	5	2		1	
										2			1	1		
3			1					1	1	8		2	4	2	1	
670	141	107	412	156	248	1,051	40	283	138	1,941	2,590	6,828	6,126	2,160	395	3

PORT OF MONTREAL.

For the fiscal year ending June 30, 1905, there arrived at the port of Montreal via ports in the United States, 7,566 passengers. All travelled steerage, and the entire number is reckoned as immigration, an increase at this port over the previous fiscal year of 2,250 persons.

Table I. deals with the total arrivals of steerage passengers, and Tables II., III. and IV. give a summary of the information obtained from immigrants upon arrival.

TABLE I.—Nationality and sex of Steerage passengers for Canada via Ports in the United States arriving at Montreal for the Fiscal Year ending June 30, 1905.

Nationality.	Canada. Male.	Female.	Children.	Total.
Austrian, N.E.S	155	18	13	186
Bohemian	1	1	5	7
Buckowinian	250	21	13	284
Galician	326	104	120	550
Hungarian, N.E.S.	242	67	67	376
Slovak	10	1	....	11
Belgian	32	9	5	46
Dutch	44	5	4	53
French	168	44	21	233
German, N.E.S	356	246	346	948
English	761	269	633	1,663
Welsh	5	1	....	6
Scotch	28	4	4	36
Irish	22	12	7	41
West Indian	1	....	....	1
Greek	31	4	3	38
Hebrew, N.E.S	314	38	44	396
Hebrew, Russian	429	30	22	481
Italian	1,173	72	60	1,305
Poles, N.E.S	81	23	25	129
Persian	2	....	....	2
Roumanian, N.E.S	12	6	5	23
Russian, N.E.S	24	20	22	66
Finns	81	18	12	111
Doukhobors	10	2	5	17
Spanish	1	....	....	1
Swiss	4	2	....	6
Danish	8	10	3	21
Icelandic	4	2	3	9
Swedish	107	61	62	230
Norwegian	64	28	48	140
Syrian	81	29	14	124
Arabian	18	4	4	26
Totals	4,845	1,151	1,570	7,566

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TABLE II.

MONTHLY arrivals of Immigrants for Canada via Ports in the United States, by nationalities, at the Port of Montreal, for the Fiscal Year ending June 30, 1905.

Nationality.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Austrian, N.E.S.	3		1	21	4	34	11	3	39	36	19	15	186
Bohemian						7							7
Buckowinian										40	192	52	284
Galician	47	16		77	5		3	14	33	69	148	138	550
Hungarian, N.E.S	21	14	54	15	26	68	4	12	15	85	38	24	376
Slovak										6		5	11
Belgian	8	4			1	2	3	4	14	4	2	4	46
Dutch		2						1	41	5	4		53
French	20	72	17	44	1	4	3	11	8	10	28	15	233
German, N.E.S	150	37	83	85	60	84	54	24	65	94	138	74	948
English	65	22	10	3	3	7	7	41	299	1,203	3	2	1,663
Welsh									4	2			6
Scotch	1	2			1			11	6	6	2	7	36
Irish	2	2	5	2			1	7	3	7		12	41
West Indian								1					1
Greek				1		2				6	21	8	38
Hebrew, N.E.S	62	34	21	30	49	40		160					396
Hebrew, Russian							294		11	160	9	7	481
Italian	12	20	5	40	37	18	21	20	110	285	487	250	1,305
Poles, N.E.S.	22	10	19	1	2	19	5	2	9	15	7	18	129
Persian			2										2
Roumanian, N.E.S.								9	3	10	1		23
Russian, N.E.S	21	4	3			7	3		12	2	11	3	66
Finns	12	6	8	12	17	5	19	18	4	3	7		111
Doukhobors											17		17
Spanish										1			1
Swiss						2				1		3	6
Danish	1	3	6		3	2		4		1	1		21
Icelandic		9											9
Swedish	30	30	12	16	12	17	2	4	9	57	24	17	230
Norwegian	29	14		14	6	1	2	6	5	33	12	18	140
Syrian	5	9	2	13		20	2	5	2	5	60	1	124
Arabian		2			6						7	11	26
Totals	509	312	248	374	233	339	434	357	692	2,146	1,238	684	7,566

TABLE IV.—NATIONALITY, Sex, Occupation and Destination of Immigrant for the Fiscal Year

Nationality.	Sex.				Trade or								
					Farmers or Farm Labourers Class.			General Labourers.			Mechanics.		
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Males.	Females.	Children.	Males.	Females.	Children.
Austrian, N.E.S	155	18	13	186	30	6	7	95	6	5	8	1	1
Bohemian	1	1	5	7									
Buckowinian	250	21	13	284	68	14	13	181	1		1		
Galician	326	104	120	550	244	78	116	82	4	4			
Hungarian, N.E.S	242	67	67	376	134	43	59	50	4	5	3		
Slovak	10	1		11				9	1				
Belgian	32	9	5	46	10	4	4	9			13	3	1
Dutch	44	5	4	53	12			3	2	3	25	2	1
French	168	44	21	233	41	14	15	15	3		9	7	4
German, N.E.S	356	246	346	948	305	215	328	24	1	3	27	6	15
English	761	269	633	1,663	172	42	39	187	90	168	198	110	187
Welsh	5	1		6	1						2		
Scotch	28	4	4	36	14	1		5	3	4	6		
Irish	22	12	7	41	15	4	5	4	2		2	1	2
West Indian	1			1									
Greek	31	4	3	38				31	3	3			
Hebrew, N.E.S	314	38	44	396	11	4	8	222	17	31	80	9	5
" Russian	429	30	22	481	7			250	9	16	169	11	4
Italian	1,173	72	60	1,305	3	1	4	1,117	45	44	4	4	5
Poles, N.E.S	81	23	25	129	26	7	10	42	9	7	3	4	8
Persian	2			2				2					
Roumanian, N.E.S	12	6	5	23	2	1	1	6			4	5	4
Russian, N.E.S	24	20	22	66	21	17	20	3	1	2			
Finns	81	18	12	111				79	6	12	2	1	
Doukhobors	10	2	5	17	10	2	5						
Spanish	1			1							1		
Swiss	4	2		6	3						1		
Danish	8	10	3	21	4	6	3	2			2		
Icelandic	4	2	3	9	4	2	3						
Swedish	107	61	62	230	62	31	50	27	3	10	12	2	2
Norwegian	64	28	48	140	41	11	42	11	2		7	3	6
Syrian	81	29	14	124				78	21	14			
Arabian	18	4	4	26				18	2	4			
Totals	4,845	1,151	1.570	7.566	1,240	503	732	2,552	235	335	579	169	245

Arrivals for Canada via Ports in the United States at the Port of Montreal, ending June 30, 1905.

Occupation.										Destination.						
Clerks, Traders, &c.			Miners.			Female Servants.	Not Classified.									
Males.	Females.	Children.	Males.	Females.	Children.		Males.	Females.	Children.	Lower Provinces.	Quebec.	Ontario.	Manitoba.	North West Territories.	British Columbia.	Yukon.
...	...	...	22	2	...	3	...	...	...	...	49	31	36	37	33	...
...	...	...	1	1	5	...	...	...	...	...	...	...	...	...	7	...
...	...	...	...	...	...	6	...	...	...	...	187	...	76	21	...	...
...	...	...	...	...	...	22	...	...	...	...	91	23	373	63	...	...
...	...	...	55	5	3	15	...	...	...	...	19	29	167	107	54	...
...	...	...	1	...	...	...	...	...	...	...	...	7	...	...	4	...
...	...	...	...	...	...	2	...	...	...	...	2	7	28	9	...	...
4	...	...	...	...	...	1	...	...	...	...	...	...	51	2	...	...
100	...	...	3	2	2	7	...	11	...	...	127	8	57	37	4	...
...	...	...	...	...	...	24	...	...	...	...	20	32	602	292	2	...
36	10	6	3	...	...	14	165	3	233	...	127	1,139	295	65	37	...
...	...	...	2	...	...	1	...	...	...	...	...	...	2	2	2	...
3	...	...	...	...	...	...	...	...	...	...	16	2	15	2	1	...
1	...	...	...	...	...	5	...	...	...	...	3	11	25	2	...	...
1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
...	...	...	...	...	...	1	...	...	...	...	21	17	...	...	...	...
1	...	...	...	...	...	8	...	...	...	...	199	7	172	12	6	...
3	6	2	...	...	...	4	...	...	...	...	264	82	121	14	...	...
...	...	...	49	7	7	15	...	...	...	...	712	267	149	90	87	...
...	1	...	10	...	...	2	...	...	...	3	37	26	40	8	15	...
...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	20	...	...	3	...	...
...	...	...	...	...	...	2	...	...	...	...	5	...	35	24	2	...
...	...	...	...	...	...	11	...	...	...	...	4	85	2	7	13	...
...	...	...	...	...	...	...	...	...	...	...	...	...	17	...	...	...
...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...
...	...	...	...	...	...	2	...	...	...	...	1	3	2	...	...	...
...	...	...	...	...	...	4	...	...	...	...	1	2	11	7	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...
...	...	...	6	...	...	25	...	...	...	...	4	39	104	55	28	...
...	...	...	5	...	...	12	...	...	...	...	6	16	97	14	7	...
3	1	...	...	...	...	7	...	...	...	...	80	24	12	8	...	...
...	...	...	...	...	...	2	...	...	...	...	15	9	2	...	...	...
152	18	8	157	17	17	195	165	14	233	3	2,011	1,868	2,501	881	302	...

TABLE III.

MONTHLY arrivals of Immigrants for Canada, via ports in the United States, by occupations and destination, at the Port of Montreal, for the fiscal year ending June 30, 1905.

Occupation.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Agriculturists	340	120	141	181	90	165	75	86	198	421	406	252	2,475
General labourers	121	87	50	112	105	117	248	156	274	764	739	349	3,122
Mechanics	17	11	12	14	23	12	90	96	183	469	42	24	993
Clerks	4	64	....	34	....	....	6	11	12	41	4	2	178
Miners	5	13	24	16	11	26	10	5	12	16	13	40	191
Female servants	22	17	10	17	4	19	5	3	13	34	34	17	195
Not classed	...	....	11	....	....	....	....	....	....	401	.....	..	412
Totals	509	312	248	374	233	339	434	357	692	2,146	1,238	684	7,566
Destination.													
Maritime Provinces	....	....	....	....	....	....	....	....	....	3	.....	....	3
Quebec	52	114	23	60	35	49	196	139	156	368	556	263	2,011
Ontario	30	14	25	47	59	51	40	45	221	1,138	118	80	1,868
Manitoba	285	141	108	157	75	164	150	126	232	464	370	229	2,501
North-west Territories	109	25	72	89	57	44	41	31	63	120	159	71	881
British Columbia	33	18	20	21	7	31	7	16	20	53	35	41	302
Totals	509	312	248	374	233	339	434	357	692	2,146	1,238	684	7,566

PORTS OF VANCOUVER AND VICTORIA.

The collection of immigration statistics at these ports is new and as yet imperfect. Steps are being taken to perfect the system. According to the probably incomplete returns received by the department for the last seven months of the fiscal year, there arrived at the ports of Vancouver and Victoria 3,501 passengers, of whom 498 travelled saloon and 3,003 steerage. Of the saloon passengers 353 were destined to Canada and 145 to the United States. Of the steerage passengers 2,485 were for Canada and 518 for the United States. Included in the steerage passengers for Canada were 665 returned Canadians and 1,145 tourists, leaving the immigration proper at 675 souls.

Table I. following deals with the total arrivals of saloon passengers, Table II. with the total arrivals of steerage passengers and Tables III., IV. and V. give a summary of the information obtained from immigrants for Canada upon arrival.

TABLE I.

Nationality and sex of saloon passengers arriving at Vancouver and Victoria for last 7 months of the Fiscal Year ending June 30, 1905.

Nationality	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
Australian	7	4		11					7	4		11
Austrian	1			1					1			1
French	2			2					2			2
German	5	3		8	1			1	6	3		9
English	71	26	13	110					71	26	13	110
Japanese	11	1		12	4			4	15	1		16
U. S. A. Citizens	1	1		2	61	42	7	110	62	43	7	112
Returned Canadians	28	5	4	37					28	5	4	37
Tourists	117	51	2	170	23	7		30	140	58	2	200
Totals	243	91	19	353	89	49	7	145	332	140	26	498

TABLE II.

NATIONALITY and sex of steerage passengers arriving at Vancouver and Victoria for last 7 months of the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
African, South	....	....	....	......	1	......	......	1	1	......	......	1
Australian	47	27	33	107	34	39	29	102	81	66	62	209
Austrian, N.E.S.	......	..	..	....	....	1	......	1	......	1	......	1
Hungarian, N.E.S.	1	....	....	1	.....	......	......	......	1	....	......	1
Dutch	2	......	......	2	....	......	......	......	2	....	......	2
French	....	..	..	....	2	3	....	5	2	3	......	5
German, N.E.S.	10	4	......	14	10	1	....	11	20	5	.....	25
English	46	15	2	63	23	8	2	33	69	23	4	96
Welsh	......	......	......	......	......	1	....	1	....	1	......	1
Scotch	11	1	....	12	3	......	......	3	14	1	.....	15
Irish	6	3	.....	9	4	1	....	5	10	4	.....	14
Japanese	281	62	11	354	145	27	....	172	426	89	11	526
New Zealand	22	4	10	36	7	1	......	8	29	5	10	44
Poles, N.E.S.	......	1	......	1	......	......	......	......	......	1	......	1
Russian, N.E.S.	......	......	......	......	5	......	......	5	5	......	......	5
Swiss	2	......	......	2	......	......	......	......	2	......	......	2
Danish	2	......	......	2	1	1	......	2	3	1	......	4
Swedish	2	......	......	2	....	.....	....	....	2	.....	......	2
Norwegian	5	......	......	5	1	......	......	1	6	......	......	6
Turks	3	......	......	3	......	......	......	......	3	......	......	3
Syrian	1	......	......	1	..	..	......	......	1	....	......	1
U. S. A. Citizens	10	3	3	16	117	27	3	147	127	30	6	163
India	36	4	5	45	13	......	1	14	49	4	6	59
Total immigration	487	124	64	675	366	110	35	511	853	234	99	1,186
Returned Canadians	628	19	18	665	......	......	....	....	628	19	18	665
Tourists	901	192	52	1,145	7	......	......	7	908	192	52	1,152
Totals	2,016	335	134	2,485	373	110	35	518	2,389	445	169	3,003

TABLE III.

MONTHLY ARRIVALS of Immigrants for Canada by Nationalities at the Ports of Vancouver and Victoria for the last seven months of Fiscal Year ending June 30, 1905.

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Totals.
Australian						6	2	14	16	27	23	19	107
Hungarian, N.E.S.											1		1
Dutch							1				1		2
German, N.E.S							2		3	3		6	14
English						1	12	5	14	9	17	5	63
Scotch								4	1		5	2	12
Irish							1	1		2	1	4	9
Japanese							23	13	53	70	50	145	354
New Zealand								7	5	4	10	10	36
Poles, N.E.S.								1					1
Swiss										2			2
Danish										2			2
Swedish									2				2
Norwegian										5			5
Turks										1		2	3
Syrian								1					1
U.S.A. Citizens							6				8	2	16
India							8	4	6	3	15	9	45
Totals						7	55	50	100	128	131	204	675

TABLE IV.

MONTHLY ARRIVALS of Immigrants for Canada by Occupation and Destination at the Ports of Vancouver and Victoria for the last seven months of Fiscal Year ending June 30, 1905.

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Totals.
Agriculturists						2	17	15	17	14	22	35	122
General labourers						1	9	6	31	22	21	53	143
Mechanics							3	11	12	17	21	9	73
Clerks						1	7	9	26	35	33	70	181
Miners							2	2	2			2	8
Female servants						1			1	3	4	2	11
Not classed						2	17	7	11	37	30	33	137
Totals						7	55	50	100	128	131	204	675
Maritime Provinces												3	3
Quebec							1					4	5
Ontario								2	1	6	5		14
Manitoba							1	1	2	3	3	1	11
North-west Territories						1		2		2	1	10	16
British Columbia						6	53	45	97	117	122	186	626
Totals						7	55	50	100	128	131	204	675

TABLE

NATIONALITY, Sex, Occupation and Destination of Immigrant Arrivals for Canada, at ending June

Nationality	Sex				Trade or								
					Farmers, or Farm Labourers Class.			General Labourers.			Mechanics.		
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Male.	Female.	Children.	Male.	Female.	Children.
Australian	47	27	33	107	8	2	3	8	2	7	14	4	5
Hungarian, N.E.S	1	...	......	1		......	......	......	....	...	....	....	....
Dutch	2	...	.....	2	......	......	...	......	....	...	...	....	....
German, N.E.S	10	4	....	14	3	1	......	5	......	....	1	1	....
English	46	15	2	63	13	2	...	7	1	....	9	2	..
Scotch	11	1	....	12	1	...	......	2	......	....	6	1	....
Irish	6	3	.....	9	2	......	......	...	....	....	....	....	...
Japanese	281	62	11	354	63	13	1	54	9	4	9	....	....
New Zealand	22	4	10	36	6	.....	3	3	...	3	8	2	3
Poles, N.E.S	......	1	.....	1	.....	.....	...	.....	....	....	....	....	..
Swiss	3	.....	.....	2	1	....	.....	1	....	....	....	....	..
Danish	2	..	.....	2	....	......	.....	2	....	....	....	....	....
Swedish	2	......	.....	2	......	......	......	....	....	....	2	...	....
Norwegian	5	....	....	5	.....	......	....	5	....	...	....	....	....
Turks	3	......	....	3	......	......	......	1	....	....	....	....	....
Syrian	1	..	...	1	..	......	......	......	....	....	....	....	....
U.S.A. Citizens	10	3	3	16	....	......	.....	1	..	..	3	....	...
India	36	4	5	45	......	......	.....	28	....	....	3	....	....
Totals	487	124	64	675	97	18	7	117	12	14	55	10	8

V.

the Ports of Vancouver and Victoria, for the last Seven Months of the Fiscal Year 30, 1905.

Occupation.										Destination.						
Clerks, Traders, &c.			Miners.			Female Servants.	Not Classified.									
Male.	Female.	Children.	Male.	Female.	Children.		Male.	Female.	Children.	Lower Provinces	Quebec.	Ontario.	Manitoba.	North-West Territories	British Columbia	Yukon.
8	1	1	1			3	8	15	17		4	9	5	1	88	
							1								1	
2															2	
	1					1	1			1					13	
4			4			3	9	7	2		1	1	4	1	56	
1			1									1			11	
1			2				1	3						2	7	
121	23	1				4	34	13	5			3		1	350	
1							4	2	1				1	2	33	
								1							1	
															2	
															2	
															2	
															5	
							2								3	
1													1			
2		2					4	3	1	2					14	
2	4	5					3							9	36	
143	29	9	8			11	67	44	26	3	5	14	11	16	626	

OCEAN PORT ARRIVALS.

For the fiscal year ending June 30, 1905, there arrived via Canadian ocean ports, and at Montreal via United States ocean ports, 133,707 passengers, of whom 9,840 travelled saloon and 123,867 steerage. Of the saloon passengers 9,552 were destined to Canada and 288 to the United States. Of the steerage passengers 110,078 were for Canada and 13,789 for the United States. Included in the steerage passengers for Canada were 5,354 returned Canadians and 2,001 tourists, leaving the immigration proper via ocean ports at 102,723 souls, which together with the 43,543 settlers from the United States, brings the total immigration to 146,266, an increase over the previous fiscal year of 15,935 persons.

The following further statistical information will be of interest: Table I. deals with the total arrivals of saloon passengers, Table II. with the total arrivals of steerage passengers, and Tables III., IV. and V. give a summary of the information obtained from immigrants for Canada upon arrival.

TABLE I.

Nationality and Sex of Saloon Passengers arriving at Ocean Ports for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.
Australian	8	4	...	12	2	1	...	3	10	5	...	15
Austrian, N.E.S	1	...	...	1	...	...	...	...	1	...	...	1
Belgian	8	6	2	16	...	...	...	...	8	6	2	16
Chinese	2	...	...	2	...	...	...	...	2	...	...	2
Dutch	1	2	...	3	...	...	...	...	1	2	...	3
French	40	28	14	82	...	...	...	...	40	28	14	82
German	19	8	...	27	1	...	...	1	20	8	...	28
English	2,067	1,330	206	3,603	17	12	2	31	2,084	1,342	208	3,634
Welsh	4	4	...	8	...	...	...	...	4	4	...	8
Scotch	242	186	26	454	7	6	2	15	249	192	28	469
Irish	38	21	1	60	...	...	...	...	38	21	1	60
West Indian	6	3	...	9	...	...	...	...	6	3	...	9
Bermudian	14	8	3	25	...	...	...	...	14	8	3	25
Hebrew, Russian	3	...	...	3	...	...	...	...	3	...	...	3
Italian	1	...	...	1	...	...	...	...	1	...	...	1
Japanese	12	1	...	13	4	...	...	4	16	1	...	17
Newfoundland	14	15	3	32	1	...	...	1	15	15	3	33
New Zealand	2	...	...	2	...	...	...	...	2	...	...	2
Poles, N.E.S	...	...	...	...	1	...	...	1	1	...	...	1
Russian	1	1	...	2	...	...	...	...	1	1	...	2
Danish	1	...	...	1	...	...	...	...	1	...	...	1
Icelandic	1	...	...	1	...	...	...	...	1	...	...	1
Sweden	...	2	...	2	...	...	...	...	...	2	...	2
Armenian	3	...	...	3	...	...	...	...	3	...	...	3
Syrian	2	2	...	4	...	...	...	...	2	2	...	4
Arabian	...	3	...	3	...	...	...	...	...	3	...	3
U.S.A. Citizens	16	10	...	26	98	87	17	202	114	97	17	228
Returned Canadians	1,419	1,141	151	2,711	...	...	...	...	1,419	1,141	151	2,711
Tourists	1,217	1,104	125	2,446	23	7	...	30	1,240	1,111	125	2,476
Totals	5,142	3,879	531	9,552	154	113	21	288	5,296	3,992	552	9,840

TABLE IV.

Monthly Arrivals of Immigrants for Canada by Occupations and Destination at Ocean Ports for the Fiscal Year ending June 30, 1905.

—	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Totals.
Agriculturists	2,406	1,941	1,365	1,272	786	599	549	811	3,298	6,037	9,181	5,171	33,416
General labourers	2,227	1,822	1,638	1,222	1,024	548	592	669	1,593	4,113	4,908	2,218	22,574
Mechanics	1,736	1,782	1,765	1,264	1,327	933	890	1,156	2,016	3,923	5,243	2,907	24,942
Clerks	456	591	647	421	226	125	142	175	338	632	931	599	5,283
Miners	311	196	359	248	202	113	59	78	94	219	337	230	2,447
Female servants	450	457	549	424	338	206	92	83	287	469	1,098	806	5,259
Not classed	1,266	1,095	1,187	857	460	276	305	331	416	1,195	859	555	8,802
Totals	8,852	7,884	7,510	5,708	4,364	2,800	2,629	3,303	8,042	16,588	22,557	12,486	102,723
Maritime Provinces	365	277	396	220	330	340	213	194	330	867	307	285	4,124
Quebec	2,435	2,378	2,424	1,733	1,380	818	854	1,031	988	1,360	5,107	2,626	23,134
Ontario	3,101	2,734	2,479	2,174	1,423	866	769	1,095	2,697	5,822	7,440	3,881	34,481
Manitoba	1,995	1,657	1,350	949	770	489	531	657	2,863	6,029	6,600	3,600	27,490
North-west Territories	726	583	539	419	325	187	162	200	903	2,087	2,521	1,525	10,182
British Columbia	230	250	322	213	136	100	100	126	258	423	582	569	3,309
Yukon	....	....	....	....	....	....	....	....	3	....	....	....	3
Totals	8,852	7,884	7,510	5,708	4,364	2,800	2,629	3,303	8,042	16,588	22,557	12,486	102,723

TABLE II.

Nationality and Sex of Steerage Passengers arriving at Ocean Ports for the Fiscal Year ending June 30, 1905.

Nationality.	Canada.				United States.				Canada and United States.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Total.
African, South	28	6	1	35	4	1	2	7	32	7	3	42
Australian	116	44	44	204	38	40	30	108	154	84	74	312
Austrian, N.E.S.	595	112	130	837	143	85	50	278	738	197	180	1,115
Bohemian	51	25	31	107	3	3	6	12	54	28	37	119
Buckowinian	917	94	112	1,123	1	....	....	1	918	94	112	1,124
Croatian	27	....	....	27	....	....	....	....	27	....	....	27
Dalmatian	4	....	....	4	....	....	....	....	4	....	....	4
Galician	4,516	1,101	1,309	6,926	40	22	15	77	4,556	1,123	1,324	7,003
Hungarian, N.E.S.	539	184	208	981	63	48	28	139	652	232	236	1,120
Magyar	5	....	....	5	....	....	....	....	5	....	....	5
Ruthenian	3	....	....	3	....	....	....	....	3	....	....	3
Slovak	33	6	8	47	....	1	....	1	33	7	8	48
Belgian	512	159	125	796	141	39	59	239	653	198	184	1,035
Bulgarian	2	....	....	2	....	....	....	....	2	....	....	2
Brazilian	1	....	....	1	....	....	....	....	1	....	....	1
Dutch	205	34	42	281	25	21	27	73	230	55	69	354
French	1,048	415	280	1,743	15	16	5	36	1,063	431	285	1,779
German, N.E.S.	1,150	690	864	2,704	295	198	238	731	1,445	888	1,102	3,435
Alsace-Lorraine	2	2	1	5	....	....	....	....	2	2	1	5
Bavarian	6	....	....	6	....	....	....	....	6	....	....	6
Prussian	20	2	6	28	6	3	3	12	26	5	9	40
Saxon	7	3	....	10	....	....	....	....	7	3	....	10
Wurtemburg	4	2	....	6	....	....	....	....	4	2	....	6
English	29,077	10,198	9,572	48,847	532	344	210	1,086	29,609	10,542	9,782	49,933
Welsh	528	146	96	770	15	11	8	34	543	157	104	804
Scotch	7,023	2,687	2,034	11,744	119	88	63	270	7,142	2,775	2,097	12,014
Irish	2,558	1,002	438	3,998	111	86	17	214	2,669	1,088	455	4,212
West Indian	29	10	4	43	....	....	....	....	29	10	4	43
Bermudian	2	6	....	8	....	....	....	....	2	6	....	8
Jamaican	17	9	....	26	....	....	....	....	17	9	....	26
Greek	87	7	4	98	20	4	....	24	107	11	4	122
Hebrew, N.E.S.	566	225	209	1,000	1	4	12	17	567	229	221	1,017
" Russian	1,312	872	1,022	6,206	325	182	230	737	1,637	1,054	1,252	6,943
" Polish	76	31	44	151	4	4	2	10	80	35	46	161
" Austrian	112	56	72	240	12	10	1	23	124	66	73	263

" German	53	27	38	118	9	2	4	15	62	29	42	133
Italian	3,261	116	96	3,473	198	7	3	208	3,459	123	99	3,681
Japanese	281	62	11	354	145	27	.....	172	426	89	11	526
Newfoundland	68	108	14	190	.....	2	.....	2	68	110	14	192
New Zealand	39	6	12	57	8	1	.....	9	47	7	12	66
Portuguese	1	.....	.....	1	.....	.....	.....	.....	1	.....	.....	1
Poles, N.E.S.	161	40	46	247	35	28	20	83	196	68	66	330
" Austrian	37	10	23	70	.....	.....	.....	.....	37	10	23	70
" German	14	6	9	29	1	.....	.....	1	15	6	9	30
" Russian	268	67	64	399	36	7	3	46	304	74	67	445
Persian	7	1	.....	8	.....	.....	.....	.....	7	1	.....	8
Roumanian, N.E.S.	116	79	75	270	12	2	11	25	128	81	86	295
Russian, N.E.S.	1,309	275	332	1,916	982	451	460	1,893	2,291	726	792	3,809
Finns	1,007	206	110	1,323	1,378	407	257	2,042	2,385	613	367	3,365
Doukhobors	13	5	6	24	.....	.....	.....	.....	13	5	6	24
Spanish	7	2	1	10	13	.....	.....	13	20	2	1	23
Swiss	101	22	27	150	6	3	5	14	107	25	32	164
Servian	4	1	2	7	.....	.....	.....	.....	4	1	2	7
Danish	333	79	49	461	269	93	70	432	602	172	119	893
Icelandic	128	145	140	413	.....	.....	.....	.....	128	145	140	413
Swedish	929	439	479	1,847	712	420	248	1,380	1,641	859	727	3,227
Norwegian	759	332	306	1,397	1,402	656	375	2,433	2,161	988	681	3,830
Turks	30	.....	.....	30	6	.....	.....	6	36	.....	.....	36
Armenian	57	13	8	78	44	15	11	70	101	28	19	148
Egyptian	2	.....	.....	2	.....	.....	.....	.....	2	.....	.....	2
Syrian	358	157	115	630	4	4	2	10	362	161	117	640
Arabian	31	9	8	48	1	.....	1	2	32	9	9	50
U.S.A. Citizens	81	17	11	109	425	263	90	778	506	280	101	887
Negroes	4	.....	1	5	.....	.....	.....	.....	4	.....	1	5
India	36	4	5	45	13	.....	1	14	49	4	6	59
Total Immigration	63,723	20,356	18,644	102,723	7,612	3,598	2,567	13,777	71,335	23,954	21,211	116,500
Returned Canadians	3,810	1,061	483	5,354	.....	.....	.....	.....	3,810	1,061	483	5,354
Tourists	1,463	417	121	2,001	10	2	.....	12	1,473	419	121	2,013
Totals	68,996	21,834	19,248	110,078	7,622	3,600	2,567	13,789	76,618	25,434	21,815	123,867

TABLE III.

MONTHLY arrivals of Immigrants for Canada by Nationalities at Ocean Ports for the Fiscal Year ending June 30, 1905.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Totals.
African, South	2	6	4	4	1			4	2	3	5	4	35
Australian	9	8	20	10	2	11	4	19	19	38	32	32	204
Austrian, N.E.S.	20	17	8	23	25	44	20	23	91	346	169	51	837
Bohemian	10	2	1	14	2	7	1	1	20	4	30	15	107
Buckowinian	7	50	19	4	51	2	4	9	40	132	601	204	1,123
Croatian											14	13	27
Dalmatian												4	4
Galician	163	173	71	131	93	72	101	111	614	1,767	2,426	1,204	6,926
Hungarian, N.E.S.	28	28	67	21	43	89	27	23	95	193	263	104	981
Magyar									5				5
Ruthenian											3		3
Slovak									14	13	9	11	47
Belgian	48	49	41	39	41	9	27	33	138	120	209	42	796
Bulgarian				2									2
Brazilian								1					1
Dutch	15	5	12	5	1	16	3	1	83	32	76	38	281
French	138	376	193	159	63	41	23	21	91	177	321	140	1,743
German, N.E.S.	346	193	244	175	184	127	77	36	180	380	142	320	2,704
Alsace-Lorraine											3	2	5
Bavarian							1		3		2		6
Prussian									6	14	5	3	28
Saxon							1	5	1	2		1	10
Wurtemburg									5	1			6
English	4,629	3,785	3,854	2,978	1,772	835	858	1,458	4,406	9,168	10,069	5,035	18,847
Welsh	77	70	37	47	23	11	17	17	56	114	211	90	770
Scotch	1,098	994	885	713	421	134	134	193	840	1,490	2,821	2,111	11,744
Irish	344	405	389	339	139	78	56	100	297	582	850	419	3,998
West Indian	12		4			2	5	1	1	1	6	11	43
Bermudian	3										4	1	8
Jamaican	9		2		1	3			3		3	5	26
Greek	4	6	17	10	1	8	1		1	8	23	19	98
Hebrew, N.E.S.	109	125	155	42	124	57	13	200	12	36	63	64	1,000
" Russian	577	613	700	510	620	555	466	602	254	317	535	157	6,206
" Polish	15	30	18	11	18	29	8	4	6	5	1	6	151
" Austrian	20	67	33	7	18	17	4	5	8	19	20	22	240
" German	34	33	12	5	10	8	2	6			3	5	118
Italian	33	54	35	61	62	43	30	44	229	573	1,770	539	3,473
Japanese							23	13	53	70	50	145	351

Newfoundland	14	18	28	24	29	7	.....	7	5	26	17	15	190
New Zealand	2	2	5	.....	1	.....	1	8	8	6	13	11	57
Portuguese	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Poles, N.E.S.	80	11	19	1	2	27	18	12	9	16	28	24	217
" Austrian	.....	9	17	4	14	9	.....	4	.....	.....	12	1	70
" German	.....	.....	.....	.....	1	3	.....	.....	11	.....	3	11	29
" Russian	25	31	36	25	42	15	30	24	13	19	80	59	399
Persian	1	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
Roumanian, N.E.S.	1	1	23	8	62	31	60	33	8	12	13	18	270
Russian, N.E.S.	55	50	29	5	229	248	375	48	53	130	342	352	1,916
Finns	80	84	86	79	69	89	132	125	117	143	202	117	1,323
Doukhobors	.....	.....	3	.....	1	.....	2	.....	.....	1	17	.....	24
Spanish	1	.....	5	1	1	.....	.....	.....	.....	1	.....	1	10
Swiss	8	8	15	9	7	8	2	4	1	32	34	22	150
Servian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	4	7
Danish	24	31	40	19	19	18	40	37	53	75	68	37	461
Icelandic	150	15	27	.....	1	.....	.....	1	.....	3	1	215	413
Swedish	304	193	186	93	82	73	26	19	68	237	309	257	1,847
Norwegian	173	138	109	81	62	22	16	35	103	247	244	167	1,397
Turks	3	1	6	.....	.....	.....	.....	3	1	11	1	4	30
Armenian	10	5	3	10	9	3	2	3	8	7	15	3	78
Egyptian	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2
Syrian	243	177	19	29	7	50	3	6	2	7	70	17	630
Arabian	8	3	6	.....	6	2	.....	.....	.....	.....	9	14	48
U.S.A. citizens	10	17	20	9	5	3	8	.....	3	7	20	7	109
Negroes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	4	5
India	.....	.....	.....	.....	.....	.....	8	4	6	3	15	9	45
Totals	8,852	7,884	7,510	5,708	4,364	2,800	2,629	3,303	8,042	16,588	22,557	12,486	102,723

TABLE

Nationality, Sex, Occupations and Destination of Immigrant Arrivals

Nationality.	Sex.				Trade or									
					Farmers, or Farm Labourers Class.			General Labourers.			Mechanics.			
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Male.	Female.	Children.	Male.	Female.	Children.
African, South	28	6	1	35	9	...	...	4	2	1	7	...	...
Australian	116	44	44	204	38	8	9	18	2	7	29	5	5
Austrian, N.E.S.	595	112	130	837	104	25	29	396	45	68	41	7	7
Bohemian	51	25	31	107	25	8	14	8	...	...	9	4	2
Buckowinian	917	94	112	1123	446	60	80	444	9	15	27	5	7
Croatian	27	...	...	27	1	...	...	26	...	...	...	...	...
Dalmatian	4	...	...	4	3	...	...	1	...	...	...	...	...
Galician	4516	1101	1309	6926	2578	664	1025	1702	120	172	208	26	30
Hungarian, N.E.S.	589	184	208	981	292	105	140	199	27	44	33	5	...
Magyar	5	...	...	5	3	...	...	2	...	...	...	...	...
Ruthenian	3	...	...	3	...	...	...	3	...	...	...	...	...
Slovak	33	6	8	47	10	2	5	19	2	2	2	1	1
Belgian	512	159	125	796	257	73	65	103	14	17	100	17	16
Bulgarian	2	...	...	2	...	...	...	...	...	...	...	...	...
Brazilian	1	...	...	1	1	...	...	...	...	...	...	...	...
Dutch	205	34	42	281	99	12	22	30	5	8	62	3	1
French	1048	415	280	1743	508	133	180	141	22	24	121	39	28
German, N.E.S.	1150	690	864	2704	701	452	699	171	30	60	219	64	61
Alsace Lorraine	2	2	1	5	1	1	1	...	...	...	1	1	...
Bavarian	6	...	...	6	3	...	...	...	...	...	3	...	...
Prussian	20	2	6	28	8	1	3	1	...	...	2	...	...
Saxon	7	3	...	10	3	...	...	2	...	...	2	1	...
Wurtemburg	4	2	...	6	2	...	...	1	...	...	1	1	...
English	29077	10198	9572	48847	11226	1986	2284	5044	1007	1468	9086	2261	2387
Welsh	528	146	96	770	257	31	39	70	14	16	119	21	22
Scotch	7023	2687	2034	11744	2692	431	537	742	120	158	2583	613	571
Irish	2558	1002	438	3998	1169	129	145	510	90	98	519	138	76
West Indian	29	10	4	43	3	...	...	8	...	...	8	1	1
Bermudian	2	6	...	8	...	...	...	1	...	...	1	...	...
Jamaican	17	9	...	26	4	...	...	4	...	...	4	...	...
Greek	87	7	4	98	4	1	...	60	3	3	18	2	1
Hebrew, N.E.S.	566	225	209	1000	27	10	21	291	46	75	226	79	67
" Russian	4312	872	1022	6206	298	53	92	1461	165	230	2383	363	403
" Polish	76	31	44	151	...	...	...	21	2	4	49	19	19
" Austrian	112	56	72	240	10	3	9	2	14	32	53	15	9
" German	53	27	38	118	...	...	...	21	1	4	30	7	6
Italian	3261	116	96	3473	68	4	7	3048	69	75	55	7	7
Japanese	281	62	11	354	63	13	1	54	9	4	9	...	...
Newfoundland	68	108	14	190	2	1	...	37	1	2	18	1	1
New Zealand	39	6	12	57	13	...	3	4	...	3	14	2	3
Portuguese	1	...	...	1	...	...	...	...	...	...	...	...	...
Poles, N.E.S.	161	40	46	247	42	9	14	76	11	9	25	6	14
" Austrian	37	10	23	70	11	...	...	10	1	1	15	7	18
" German	14	6	9	29	11	4	8	2	...	...	1	...	...
" Russian	268	67	64	399	67	2	2	114	26	39	70	10	16
Persian	7	1	...	8	...	...	...	7	1	...	...	...	...
Roumanian, N.E.S.	116	79	75	270	37	10	15	21	2	1	45	16	9
Russian, N.E.S.	1309	275	332	1916	300	115	164	390	30	58	516	46	45
Finns	1007	206	110	1323	128	14	16	788	36	54	38	4	...
Doukhobors	13	5	6	24	13	5	6	...	...	...	...	...	...
Spanish	7	2	1	10	...	...	...	2	...	...	2	1	...
Swiss	101	22	27	150	39	11	25	26	1	...	21	...	1
Servian	4	1	2	7	3	...	...	...	...	...	1	1	2
Danish	333	79	49	461	119	20	20	111	6	11	81	4	7
Icelandic	128	145	140	413	109	71	121	12	4	5	6	4	8
Swedish	929	439	479	1847	396	140	271	384	48	73	117	28	42
Norwegian	759	332	306	1397	284	65	155	338	36	47	103	23	40

V.

for Canada at Ocean Ports, for the Fiscal Year ending June 30, 1905.

Occupation. Clerks, Traders, &c.			Miners.			Female Servants.	Not Classified.			Destination.						
Male.	Female.	Children.	Male.	Female.	Children.		Male.	Female.	Children.	Lower Provinces.	Quebec.	Ontario.	Manitoba.	North-West Territories.	British Columbia.	Yukon.
6	1		1			1	1	2		7	7	12	7		2	
16	3	3	5			6	10	20	20		27	35	26	11	105	
4			46	5	3	16	4	14	23	40	141	102	367	118	69	
1			8	5	11	4		4	4	5	6	4	47	15	30	
						16		4	10	10	309	88	563	149	4	
												26	1			
														4		
2	2	2	8	1	2	232	18	56	78	51	675	300	4949	939	12	
2			57	5	3	30	6	12	21	35	91	64	302	420	69	
										4			1			
											2		1			
			2			1					2	23	1	8	13	
14	4	4	25	13	11	18	13	20	12	43	154	44	397	151	7	
2											2					
												1				
13						8	1	6	11	1	14	17	212	35	2	
163	17	12	11	16	11	59	104	129	25	36	773	135	561	221	17	
36	11	10	11	5	11	91	12	37	23	39	342	198	1419	682	24	
											2		3			
											4	1	1			
4			5	1	3					1	5		7	15		
	1							1		1	1	5	2	1		
								1			2		4			
2135	578	397	676	192	301	2547	910	1627	2735	1991	8098	22419	10316	4574	1447	2
35	8	8	36	6	9	42	11	24	2	25	104	217	232	129	63	
560	171	108	299	98	190	883	147	371	470	620	1649	4690	3121	1210	453	1
259	61	14	39	5	6	417	62	162	99	163	759	1813	890	298	75	
10	1					6		2	3	26	2	5	10			
						2		4		8						
5						8		1		13	1	6			6	
1						1	4				60	33	2	2	1	
19	11	11				43	3	36	35	3	596	97	272	24	8	
123	35	66	6	1		102	41	153	231	142	4097	1141	749	72	5	
3	1	2	3			4		5	19	1	103	42	5			
6	1					11	1	12	22		136	67	20	17		
1	2	1				7	1	10	27		66	32	18	2		
7			83	7	7	23		6		193	2246	559	247	110	118	
121	23	1				4	34	13	5			3		1	350	
9			1			50	1	55	11	184		3	1		2	
3							5	4	3	1	10	4	4	3	35	
1												1				
	1		18	3	3	7		3	6	16	115	40	52	8	16	
			1	1	4	1				6	21	11	31	1		
						1		1	1	1	5	1	12	10		
1			16	3	2	15		11	5	35	263	47	44	10		
											5	3				
3	1		1			7	9	43	50	2	145	35	78	10		
26	4	5	11	1		30	66	49	60	177	819	192	503	212	13	
5			48	8	6	119		25	34	23	175	917	71	66	71	
													21	3		
3						1			1		9	1				
10	1		4			8	1	1	1	8	42	26	35	29	10	
													3	4		
13	3		4			33	5	13	11	36	132	86	152	48	7	
			1			64		2	6		2	2	408	1		
7	2	1	18	5	6	160	7	56	86	72	164	409	751	322	129	
12	2		15	4	3	161	7	41	61	41	158	368	516	224	90	

TABLE

Nationality, Sex, Occupations and Destination of Immigrant Arrivals

Nationality.	Sex.				Trade or								
					Farmers, or Farm Labourers Class.			General Labourers.			Mechanics.		
	Male.	Female.	Children.	Total.	Male.	Female.	Children.	Male.	Female.	Children.	Male.	Female.	Children.
Turks..	30	....	....	30	4	....	....	22	....	....	....	....	....
Armenians.	57	13	8	78	1	....	....	27	2	3	19	4	....
Egyptians..	2	....	....	2	....	....	....	1	....	....	....	....	....
Syrians	358	157	115	630	5	....	....	312	133	103	17	2	1
Arabians	31	9	8	48	....	....	....	27	6	6	4	....	....
U. S. A. citizens	81	17	11	109	19	1	....	20	2	3	16	2	....
Negro	4	....	1	5	....	....	....	....	....	....	....	....	....
India	36	4	5	45	....	....	....	28	....	....	3	....	....
Totals	63723	20356	18644	102723	22516	4673	6227	17407	2164	3003	17142	3866	3934

V.—*Continued.*

for Canada, at Ocean Ports, for the Fiscal Year ending June 30, 1905—*Continued.*

Occupation.										Destination.						
Clerks, Traders, &c.			Miners.			Female Servants.	Not Classified.									
Male.	Female.	Children.	Male.	Female.	Children.		Male.	Female.	Children.	Lower Provinces.	Quebec.	Ontario.	Manitoba.	North-West Territories.	British Columbia.	Yukon.
2							2			1	21	3	2		3	
7	1	1				3	3	3	4	1	46	30	1			
			1								2					
9	2	1	6			11	9	9	10	48	465	76	32	8	1	
						3			2	3	29	12	3	1		
14	1	3	4			3	8	8	5	11	29	31	17	5	16	
							4		1		1	4				
2	4	5					3							9	36	
3675	953	655	1470	385	592	5259	1513	3056	4233	4124	23134	34481	27490	10182	3309	3

COMPARATIVE STATEMENT.

IMMIGRANTS arriving for Canada, by Ports, during the Fiscal Years of 1903-4 and 1904-5.

	Fiscal year 1903-4.				Fiscal year 1904-5.			
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.
Halifax	16,209	4,575	4,814	25,598	13,435	3,606	3,002	20,043
St. John	5,925	1,218	1,116	8,259	9,984	1,909	1,703	13,596
Quebec	26,455	10,260	9,272	45,987	34,972	13,566	12,305	60,843
Montreal, by ocean travel via ports in United States	3,794	743	779	5,316	4,845	1,151	1,570	7,566
Montreal, from United States	1,635	363	498	2,496	1,187	277	358	1,822
Winnipeg and outports from United States	21,515	5,306	6,445	33,266	17,951	5,983	8,122	32,056
Vancouver	......	......	......	......	478	120	63	661
Victoria	......	......	......	......	9	4	1	14
Total for principal ports	75,533	22,465	22,924	120,922	82,861	26,616	27,124	136,601
Customs entries	......	......	......	7,479	......	......	......	7,781
Repatriation societies	......	......	......	1,930	......	......	......	1,884
Grand total	75,533	22,465	22,924	130,331	82,861	26,616	27,124	146,266

SUMMARY FOR THE FISCAL YEAR 1904-5.

Per ocean travel—		
Halifax	20,043	
St. John	13,596	
Quebec	60,843	
Montreal	7,566	
Vancouver	661	
Victoria	14	
		102,723
From United States, not including 109 United States citizens by ocean ports—		
Montreal	1,822	
Winnipeg, &c	32,056	
Lake St. John	1,076	
Rainy River	381	
Montreal Colonization Society	275	
Timiskaming District	152	
Customs entries	7,781	
		43,543
		146,266

IMMIGRANTS arriving for Canada, by months, during the Fiscal Years of 1903-4 and 1904-5.

Month.	Fiscal year 1903-4.				Fiscal year 1904-5.			
	Males.	Females.	Children.	Total.	Males.	Females.	Children.	Total.
July	6,678	2,151	2,475	11,304	6,570	2,329	2,688	11,587
August	5,877	1,993	1,679	9,549	5,913	2,450	2,234	10,597
September	4,786	1,873	1,624	8,283	4,947	2,500	2,308	9,755
October	4,449	1,753	1,975	8,177	4,124	1,893	1,981	7,998
November	3,343	1,341	1,373	6,057	3,929	1,535	1,593	7,057
December	2,020	774	772	3,566	2,514	878	811	4,203
January	1,420	422	381	2,223	2,360	607	575	3,542
February	2,299	550	519	3,368	2,862	642	581	4,085
March	8,147	1,586	1,640	11,373	8,240	1,991	2,200	12,431
April	13,450	2,706	2,971	19,127	15,380	3,441	3,909	22,730
May	13,864	4,218	4,490	22,572	17,032	4,721	4,608	26,361
June	9,200	3,098	3,025	15,323	8,990	3,629	3,636	16,255
Total	75,533	22,465	22,924	120,922	82,861	26,616	27,124	136,601
Customs entries				7,479				7,781
Repatriation societies				1,930				1,884
Grand totals	75,533	22,465	22,924	130,331	82,861	26,616	27,124	146,266

COMPARATIVE STATEMENT showing the number of Immigrants arriving in Canada, by countries, during the Fiscal Years ending June 30, 1904, and 1905, showing increase and decrease for each country.

Country.	Fiscal Year 1903-1904	Fiscal Year 1904-1905.	Increase.	Decrease.
English and Welsh	36,694	49,617	12,923	
Scotch	10,552	11,744	1,192	
Irish	3,128	3,998	870	
Total British	50,374	65,359	14,985	
African, South	21	35	14	
Australian	58	204	146	
Austrian	516	837	321	
Bohemian	91	107	16	
Buckowinian	1,578	1,123		455
Croatian	16	27	11	
Dalmatian		4	4	
Galician	7,729	6,926		803
Hungarian	1,091	981		110
Magyar		5	5	
Ruthenian		3	3	
Slovak	116	47		69
Belgian	858	796		62
Brazilian	2	1		1
Bulgarian	14	2		12
Dutch	169	281	112	
French	1,534	1,743	209	
German	2,966	2,704		262
Alsace		5	5	
Bavarian		6	6	
Prussian	11	28	17	
Saxon	8	10	2	
Wurtemburg		6	6	
West Indian	52	43		9
Bermuda	3	8	5	
Jamaican		26	26	
Greek	191	98		93
Hebrew	3,727	7,715	3,988	
Italian	4,445	3,473		972
Japanese		354	354	
Newfoundland	519	190		329
New Zealand	23	57	34	
Polish	669	745	76	
Persian	5	8	3	
Portuguese		1	1	
Roumanian	619	270		349
Russian	1,955	1,916		39
Finns	845	1,323	478	
Mennonites	11			11
Doukhobors		24	24	
Spanish	5	10	5	
Swiss	128	150	22	
Servian	10	7		3
Danish	417	461	44	
Icelandic	396	413	17	
Swedish	2,151	1,847		304
Norwegian	1,239	1,397	158	
Turks	29	30	1	
Armenians	81	78		3
Egyptians	3	2		1
Syrians	369	630	261	
Arabians	58	48		10
Negro, Mulatto, &c		5	5	
India		45	45	
Total Continental, &c	34,728	37,255	2,527	
United States	45,229	43,652		1,577
Total Immigration	130,331	146,266	15,935	

The following diagram shows the distribution of our agents in the United States:

The dots indicate the location of our salaried or 'State' agents. Working under them we have altogether seventy-seven sub-agents or local men who work on commission, and whose influence is often of much importance to the success of our operations. The efforts of our state and sub-agents, combined with the extensive advertising, account in no small degree for the heavy correspondence at headquarters, and for the creation and maintenance of a widespread interest in western Canada. The results of this will be shown, I think, for many years to come, in a steady stream of immigration of a highly desirable kind, such as we are receiving at present from the United States.

Your obedient servant,

W. D. SCOTT,

Superintendent of Immigration.

No. 1.

REPORT OF THE CANADIAN COMMISSIONER OF EMIGRATION IN GREAT BRITAIN AND EUROPE.

July 4, 1905.

The Right Honourable
Lord Strathcona and Mount Royal,
17 Victoria St., S.W.

My Lord,—The returns during the present fiscal year, as a direct result of the active emigration propaganda carried on by the Department of the Interior upon this side of the Atlantic during the last few years, give evidence of a marked increase in the numbers directing their footsteps towards Canada.

During the last four or five years the efforts of Canada to secure population from Great Britain have been more marked than those of all the other colonies combined. But it is quite evident from the present outlook that the Dominion will have, in the near future, several competitors from the Australian colonies. with a view of securing for their respective countries a larger proportion of the British emigrating population.

A few years ago Canada was contented in securing about 10 per cent of the annual emigration from the British Isles, but this, your Lordship will be pleased to know, has given place at the present time to nearly 50 per cent of the Britishers leaving the United Kingdom and seeking homes elsewhere. That this marked increase has been brought about by the active propaganda carried on under the authority of the government of Canada there can be no doubt whatever.

With a view of preventing, if possible, the publication of complaints from disappointed emigrants, such as characterised the preceding year, I thought it well in the early part of the season to issue the following warning in the public press in the United Kingdom:—

CANADIAN EMIGRATION.

'Sir,—A few words of advice to intending emigrants may not be inopportune. In the first place, inquirers interested should read the official pamphlets issued by the Canadian government. These may be procured from the Canadian Emigration Offices, Charing Cross, and from the agencies of the several steamship companies.

'It must be remembered that the government is not carrying on a propaganda for indiscriminate emigration to the Dominion. No inducements are held out in any way of promises to emigrants of an easy time and a speedy accumulation of wealth. Prospective emigrants looking forward to a life of luxury, with little or nothing to do, are advised not to go to Canada. The Dominion only desires an addition to its population of those who are willing to work, and who are not averse to tackling the new conditions of life with energy and determination.

'In very many respects, emigrants on arrival in the Dominion will be surrounded with somewhat different conditions from those to which they have been accustomed. In so far as they prove themselves worthy of confidence, however, they will be given cheerful encouragement and a hearty welcome, and government officers will assist in finding employment for the right class.

'In carrying on an emigration propaganda, the Canadian government not only advise, but warn. There is no desire to present unduly advantages of emigration to the Dominion without, at the same time, directing attention to the probable experiences of each emigrant. Therefore, it is all the more necessary, before finally deciding this momentous question, for all contemplating emigration to read with care and thoughtfulness the Canadian government publications.

'Yours very truly,

'W. T. R. PRESTON,

'*Commissioner of Emigration.*'

This letter was given a very wide circulation by the press, without cost to the department, and, I think, had a somewhat steadying influence on the movement to the Dominion. But, notwithstanding the efforts that have been put forth by the department from time to time, a considerable number emigrate without any clear conception whatever as to the conditions that they are likely to meet in Canada; in fact I have come in contact with a small number, who returned from Canada after an experience of a few days in the early spring, who had emigrated, in the first place, without having read any of the publications issued by the department. Upon returning home, as might be expected, men of this stamp have proceeded to justify their disappointment by communicating with the press. Letters of complaint are almost invariably transmitted to the department for investigation, and in every such case the reports of the departmental officers proved that the failure to find satisfactory employment was due, not to the fact that employment was not available, but to the disinclination of the parties in question to remain, mostly for personal reasons, in the Dominion. Emigrants returning to Great Britain under these circumstances are never satisfied by giving a truthful account of their experiences. The blame is always laid upon the alleged false information said to have been given to them, either in the government offices, or by some of the more active booking agencies or bureaus.

The attention of the authorities has been called from time to time to booking offices or employment bureaus of a somewhat questionable character, and even careful inquiries among these sources have failed to justify the conviction that organizations of that character have succeeded in securing public confidence, and it may be truthfully stated that their business has had practically no important bearing, whatever, upon the emigration returns. Quite a number of booking offices, agencies and bureaus have apparently placed themselves in communication with employers of labour in Canada, and in answer to inquiries in this office as to the bona fides of institutions of this kind, and as to promises being made them with a view of inducing labour of one kind and another to go to Canada, I have personally interviewed the managers of some of these organizations, pointing out that the departmental policy is limited to agriculturists, or those who intend to engage in agriculture, and domestics, and have asked for an explanation as to why they are apparently carrying on a propaganda, or offering inducements for other classes to emigrate to the Dominion. In every case that I have inquired into the managers of these organizations have produced letters from employers of labour of respectability and financial standing in Canada, asking for the particular labour to which they were offering inducements in their advertisements. Under such circumstances I could not take the responsibility of saying that the employers of labour, whose names were frequently mentioned to the inquirers, were not men of standing in the Dominion. I have failed to find a single case of a returning emigrant doing business with those who have attached themselves to responsible employers of labour in Canada, where the emigrant has returned dissatisfied, or expressing his disappointment with the promises which were made to him by the managers of the organizations in question.

In regard to the advertising, it was thought well to ask for tenders upon a basis that was prepared with considerable care, containing specifications as to the newspapers in which it was desirable the advertisements should appear, the space to be occupied in each paper, and the period for which the advertisements should run. The tenders were asked from the advertising firms which had hitherto, through the departmental agents, been doing this work. In addition, I asked for tenders upon the same basis from a well known and highly responsible London firm, namely Street & Company. When the tenders were received I found that by giving the work to Street & Company a saving would be effected of from 33 to 100 per cent.

I arranged with the Street Advertising Company that the only circumstances under which the departmental advertisement should be given to a newspaper at a higher rate than the lowest commercial price were in the particular cases where official sanction was secured before an order should issue for the insertion of the advertisement.

I am satisfied that upon no other system could the advertising of the department be conducted with any degree of satisfaction, either as to services rendered, the checking of accounts or the proper return for money expended.

By having the orders for our advertising attended to through the agency of an extensive and reputable firm, having an intimate acquaintance with the lowest rates available in all the newspapers in the United Kingdom for commercial purposes, the department is enabled to secure advantages which would hardly be possible under any other circumstances.

As to the future, it is quite evident, as I have said, that from this time Canada is not going to be allowed sole possession in the emigrating field. Some of the Australian colonies and New Zealand are now preparing to spend large sums of money, with a view of securing for their colonies a larger percentage than heretofore of the emigrating British population. It will, therefore, be necessary in considering the character of the propaganda in the future, to see that nothing is left undone so that the Dominion shall continue to maintain the premier position it now occupies among the inquiring or prospective emigrants. This cannot be maintained unless equal energy is continually shown. Any relaxation of effort in the line of directing attention to Canada is certain to be very speedily followed by a decline in the general interest in Canada.

The experience of another year at the emigration offices at Charing Cross justified to a greater extent than ever the location as well as the expense which the department has gone to in this particular. Not only in the emigrating season, but in fact during the whole year the personal inquiries at the office continue to tax to the fullest extent the resources of the staff. It might also be expected, in view of the large number of personal inquiries that the general correspondence of the office would show some falling off, more especially as such a large proportion of it formerly came from districts and counties immediately contiguous to London. But the experience of the last financial year plainly shows instead of diminution in the general interest a very considerable increase.

Encouraged by the success which has attended the opening up of offices on the ground floor at a busy centre in London, the department also decided to adopt a similar policy in regard to the offices at Glasgow and Belfast; the result being that at these two places commodious premises have been secured at very reasonable rentals, both offices having large windows for display purposes, and both being a continual source of attraction.

Your obedient servant,

W. T. R. PRESTON,

Commissioner of Emigration.

No. 2.

REPORT OF MR. G. H. MITCHELL, CANADIAN GOVERNMENT AGENT AT BIRMINGHAM.

43 Cannon Street,
Birmingham, July 7, 1905.

The Commissioner of Emigration,
London.

Sir,—I beg to submit my report for the twelve months ending June 30.

The immigration figures are of course not yet available, but the statements respecting bookings made to me by the principal steamship agents in this district indicate an increase in the numbers. So far as my ow observation goes, judging from my correspondence, the callers, and from the people I have interviewed in different parts of the country, the great majority of those who have gone have been of an excellent class, and well qualified to succeed in the Dominion, altogether apart from the money they have taken out. The cash which is transferred to Canada with these emigrants in twelve months must be enormous, and it was brought forcibly to my notice only a few weeks ago by my ascertaining that the capital possessed by the callers I had during one morning aggregated between £5,000 and £6,000. As this is going on more or less every day of the year, the influence of this money on Canadian trade, both internal and external, is hardly calculable.

A considerable portion of my time has been occupied in visiting steamship agents in various parts of the district, with a view to supplying them with information and stimulating their efforts; in many cases my attendance was previously advertised so that intending emigrants who could not get to Birmingham had the opportunity of having the personal interview which is recognized as being so much more satisfactory than correspondence. This plan has answered admirably, and almost without exception good numbers of inquirers availed themselves of the facilities afforded.

In addition to visiting agents, I send to them regularly all the newspapers that reach me from Canada, but as the number of these is limited, I extract items which have any bearing on the work, and have a weekly news sheet manifolded and sent to a larger number of addresses. I have found the steamship agents using these in giving information to intending emigrants, and some of them exhibit the sheets in their windows. It has been suggested that in particular cases a number of copies should be supplied to be sent out with the agents' correspondence. By these means I have endeavoured with some success to keep them informed as to current events in the Dominion, and sustain their interest.

Arrangement were made throughout the year to have a supply of literature distributed, not only at the different agricultural shows, but at some other large gatherings, and in this way many thousands of pamphlets have been circulated. Some special work in this way was done over a large part of Lincolnshire, one of the most important agricultural counties in England; large quantities of printed matter have been dispatched also to steamship agents for use on their own account. A good variety of pamphlets has been supplied, and what may be termed their specialisation, devoting one leaflet to each special subject, has been an excellent feature, and one much appreciated.

During the winter season, many lecturers took Canada as their subject, and my lantern slides were in much request. There have been several delegates from western

Canada who have taken part in this work, and their presence in any particular locality has always stimulated inquiry.

Australian competition is becoming keener, and it is quite certain that their work will be rewarded at our expense should our efforts be in any way relaxed. The experience with our newspaper advertising is full of significance in this respect: suspend it, and inquiries immediately fall off; it should be remembered that the future emigrant is always growing up, and what was done for one generation is of little value in regard to the next.

The routine work of the office has been carried on without interruption, and I may be allowed to hope that the result of my year's work has been satisfactory to the department.

Your obedient servant,

G. H. MITCHELL.

No. 3.

REPORT OF H. M. MURRAY, CANADIAN GOVERNMENT AGENT AT CARDIFF.

WESTERN MAIL BUILDINGS,
CARDIFF, WALES, June 30, 1905.

The Commissioner of Emigration,
London.

SIR,—I have the honour to present my annual report, 1904-5, of work done in North and South Wales and the counties in England which comprise my district.

Although having no actual or reliable data to go upon, I am convinced from the introductory cards granted, and from returns from the various booking agents, that the number of emigrants who have gone out from this part of the country is much in excess of last season. The quality has also much improved, more of the genuine farming class having been prevailed upon to enter on a new and in every sense better life in Canadian agricultural work. I had the gratification last winter of seeing quite a number of former emigrants who had come home for the purpose of spending a holiday with friends and relations, all of whom expressed themselves as being more than satisfied with their new life and surroundings. Naturally, as was to be expected, difficulties and in some cases hardships met them at the outset, but stability and a determination to go through with it met with success. In so far as my knowledge goes a very small proportion of dissatisfied and disgruntled people have returned, this may in part be accounted for by the emigrants being men and women of good stamina, who had gone out with the determination to succeed, and who bore in mind my warning that under newer conditions of life they would have hard up-hill work before them, but that with minds firmly made up to work faithfully and diligently they need have no doubt of a prosperous and successful future.

As stated in past reports, owing to the normal condition of employment in South Wales, where 90 per cent of the workers are either connected with the mining and shipment of coal, manufacturing of tin plates, or kindred industries, it is absolutely impossible to direct a large emigration from this portion of my district. Then again the agricultural classes in Mid-Wales are more interested in pastoral work than ordinary corn growing or mixed farming. Still a fair amount of success has resulted from my work in Wales.

So far as I have been able to gather the best results have been obtained in the counties of Gloucester, Hereford and Somerset—in Bristol alone nearly a thousand persons having booked their passages since the opening of the present emigration season. In these counties we have a splendid class of agriculturists, who should not fail to do well in Canada.

As in past years quite a number of inexperienced young men from the cities have gone out for the purpose of learning the rudiments of farming, with the intention of eventually taking up land for themselves. The majority of these were lads of good physique, well educated and of respectable parentage, with a determination to get along, and who, I have no doubt, have acted up to their principles. I have directed inexperienced men (unless they had their minds centered upon any special spot) to settle first in Ontario. Quite a number of experienced men have also gone to Ontario, as also a few to the maritime provinces, but the great majority have gone to the North-west.

During last winter our lantern slides were much requisitioned for lectures by schoolmasters, clergymen, &c., and to all of these meetings a supply of our literature was sent, and I am sure much good resulted therefrom.

Under Messrs. Thos. Cook & Son's auspices the Reverend Mr. Vining, of Winnipeg, delivered a series of lectures in Bristol, Cheltenham and Gloucester, all of which were crowded by interested audiences. I had the pleasure of arranging one in Cardiff, when Mr. Vining was eagerly listened to by an audience of over 3,000 persons. I think I may safely say that it was the event of the lecture season. Mr. Vining's powers of oratory, combined with the vivid telling description of Canadian life and work, impressed his listeners to a most remarkable degree, the result being that large numbers of our local young men have since gone out to Canada.

During the spring months I attended at the offices of the principal booking agents in my district, where I had many inquirers visiting me, the great bulk of them being of a most desirable class.

So far this season agricultural shows have been attended at Bath (three days), Cheltenham (three days), Exeter (three days), New Quay, Cornwall (two days), and Great Malvern (three days). These meetings were fortunately conducted under good weather conditions, and I was, therefore, enabled to get in touch with the class of people most wanted in Canada, viz.: agriculturists. The demand for our literature was most gratifying, and many expressed their intention of going out next spring. I will hope to attend other meetings during the course of the present summer and autumn.

In conclusion I need hardly say that no efforts of mine will be wanting to do everything possible in the promotion of Canadian emigration.

Your obedient servant,

H. M. MURRAY,

Agent for Wales and West of England.

No. 4.

REPORT OF ALFRED F. JURY, CANADIAN GOVERNMENT AGENT AT LIVERPOOL.

OLD CASTLE BUILDINGS, PREESON'S ROW,
LIVERPOOL, June 30, 1905.

The Commissioner of Emigration,
London.

SIR,—In presenting my seventh annual report, I am pleased to be able to say that the stream of British emigration continues to flow with ever increasing volume. The numbers carried from Liverpool for the first six months of this year, and the corresponding period of last year, are as follows:—

ALLAN LINE.

January to June, 1904.		January to June, 1905.	
Cabin	1,501	Cabin	1,437
2nd class	6,102	2nd class	7,106
3rd class	15,589	3rd class	20,991
Total	23,201	Total	29,534

CANADIAN PACIFIC LINE.

January to June, 1904.		January to June, 1905.	
1st and 2nd class	1,630	1st and 2nd	1,580
3rd class	11,300	3rd class	10,350
Total	12,930	Total	11,930

DOMINION LINE.

January to June, 1904	18 sailings.	3,750 adults.
January to June, 1905	16 sailings.	7,341 adults.

Of the 11,300 passengers carried by the Canadian Pacific Line in 1904, 4,000 were continental emigrants. In 1905 the 10,350 were all British passengers. This has been due to many causes, but mainly to the deplorable condition of the labour market in this country, the unemployed during the last winter being in excess of any year during this decade. This fact has compelled thousands to look in Canada for opportunities to labour which they were unable to find here. The Salvation Army, the London Daily *Telegraph*, and the various emigration societies have been very helpful in producing the above results.

I have been struck with the number of inquiries received at this office during the past season, from South Africa, for information about Canada.

I paid a visit to Canada, with the permission of the department, for the purpose of renewing my acquaintance with the west, and of visiting the extreme eastern parts of the maritime provinces, where I had been given to understand there were openings for a certain class of small truck farmers to supply the local demand of the coal mining and steel manufacturing districts of Nova Scotia. I found that part of Canada very much as it had been represented to me, and I have since been able to send a few of the kind of settlers they require. In regard to the west, I found a development in places like Winnipeg, Brandon, Regina, Calgary, Edmonton and Saskatoon, that surprised my most sanguine expectations. Some of these places have doubled their population since my previous visit in 1902. I found, to all outward appearances, not only prosperity from one end of the country to the other, and of reasonable contentment with the present, but every one seemed to be inspired with the most optimistic view for the future. On my return from Canada I at once commenced to arrange for the ensuing lecture season, and the fall and winter shows, three of which I attended before the end of last year. As I have pointed out in most of my reports, I regard these agricultural and fat stock shows as of great importance, as they are really the only places where we are brought into close touch with the agricultural portion of the population. I feel sure that if I am kept well supplied with good specimens of Canadian products, more money can be spent on these shows to great advantage, and these shows come at a time of the year when it is impossible to meet large numbers of the agricultural class in any other way. The farmer, pure and simple, can be met in the cities and towns on market days, but at these shows one has an opportunity of meeting the farmers, labourers and rural domestic servants, the people most wanted in, and suitable for Canada.

During the lecture season, I delivered between fifty and sixty lectures; in nearly every case they were well attended, and we know that there have been good results, by the correspondence we have received at this office. It seems to me that Canada occupies an exceptionally good position in the English-speaking world in regard to immigration in the future; it is the only white man's country offering the land-hungry of the world free land in a constitutionally governed country. The United States of America has disposed of nearly all its free land, and desirable farm lands have reached a price which has put it beyond the reach of the poor emigrant. Australia is too far away for the same class to go to, and good land where the climate is reliable for farming, is held at a price that offers little inducement to the settler with small capital. South Africa even, with its variable climate, and subject as it is to cattle disease, and insect pest, does not offer a very cordial invitation to the poor white settler. All these circumstances point to the advantages possessed by Canada over her competitors for the surplus population of the old world, and these should be used to the utmost at the present moment.

I have received about 4,000 letters in reference to emigration, and about 2,000 concerning general subjects and trade matters.

I have issued about 1,500 letters of introduction between July 1, 1904, and June 30, 1905.

The sets of lantern slides have been in good demand and are much appreciated by school masters and others.

During the past year 2,499 children, in 50 parties, were sent to Canada by the various philanthropic societies. These children were inspected and the usual certificates given.

The emigration correspondence of the Reverend J. Bridger, has been dealt with as usual; about 1,000 letters having been handled.

Your obedient servant,

ALFRED F. JURY.

No. 5.

REPORT OF JOHN WEBSTER, CANADIAN GOVERNMENT AGENT AT DUBLIN.

CANADIAN GOVERNMENT OFFICES,
14 WESTMORELAND STREET,
DUBLIN, July 11, 1905.

W. T. R. PRESTON, Esq.,
Commissioner of Emigration, London.

SIR,—I beg to submit a report of my work in Ireland for the year ending June 30, 1905.

In accordance with instructions received from the Deputy Minister I last year visited Canada, and took an extended trip through Ontario, Manitoba and the Northwest Territories. From Prince Albert I drove to Battleford and Lloydminster, so that I had an opportunity of viewing the district which at present is receiving so much attention, and to which so many of our old country emigrants are directing their attention. I travelled from Calgary to Edmonton, visiting the various important towns en route. In the course of my journeying I met many well-contented Irish settlers whom I had advised to go to the country. This, I need not say, was a satisfaction to me. My visit to Canada has been of great value to me during the past season here, as, of course, it makes me up-to-date in the information which I give to the many callers and correspondents who apply to this office. I took numerous photos of farm scenes, &c., when in Canada, and have made many of them into slides for lecturing purposes. It is, in my opinion, in the interests of the work here that the government agents should visit Canada at intervals, and thus keep in touch with the developments there. This morning I have received a letter from a Mr. Glendinning, of county Tipperary, who with his wife and twelve children have this year settled in the west. As the letter is a most interesting one, I append the following extracts from it:

'I like Canada well. It is a splendid country—filling up with settlers of the most respectable class. Many are comparatively wealthy. Railways are being pushed forward vigorously. Wheat and all crops look well. We have had plenty of rain, more than I wanted when driving.

'My sons who went out last year, and one who came out with me this year, have $26 and $25 per month. Daughters are with farmers' wives learning Canadian methods, and have $15 per month. We intend to move to our homestead just before the fall. I will go up before that to see about the house, and to get hay put up for horses. I thought the country strange at first, but one becomes westernized in a short time, and does not feel any desire to go back to the old country. There is such a spirit of ardent hopefulness pervading everything that one gets carried along and surmounts difficulties which in the old country would seen impossible.

'I have now seen something of Canada, and I must say it is a great country. Coal has been found near Goose lake, and also gold. This is where I have located. I was surprised to see several steam ploughs at work, not on old settled places, but right on the primeval prairie, doing splendid work.

'I will conclude by saying that I have made no mistake coming out here.'

As in previous years, when absent from office I have been busy visiting fairs and markets, where the farmers congregate in large numbers. At these places I display posters and distribute literature; I also visit the steamship agents and stir them up to fresh activity in the interests of the Dominion. It is certainly most advisable that the steamship agents should be visited whenever the opportunity offers. I am sorry to say that I have sometimes experienced difficulty in securing space at agricultural shows, as owing to a declining population, every effort is being made here to keep the Irish people in their own country, so the agricultural societies are not anxious for the Canadian tent and the government agent, doing his best to demonstrate the great opportunities which the Dominion offers. Notwithstanding this I have been successful in securing space at shows in the south of Ireland, with satisfactory results. During the winter season I secure as many lecturing engagements as possible, and, for the illustrating of these, I largely use slides made from pictures taken on the occasion of my visits to Canada in 1902 and 1904, these slides, coupled with my long experience as a western farmer, tending to make my lecture an interesting and practical one. I have great faith in lecturing and am always pleased to lend sets of slides to parties requiring them for a lecture. I have had a large number of callers at the office, and a considerable correspondence to handle, this being especially so while the advertisements were running in the papers.

Your obedient servant,

JOHN WEBSTER.

No. 6.

REPORT OF EDWARD O'KELLY, CANADIAN GOVERNMENT AGENT AT BELFAST.

CANADIAN GOVERNMENT OFFICES,
17 & 19 VICTORIA ST.,
BELFAST, July 14, 1905.

The Commissioner of Emigration,
London.

SIR,—In making my annual report, I beg to say that I consider the year ending June 30, the most successful I have yet experienced, both in numbers and in the amount of capital represented by those who emigrated through this office. The number of personal inquiries made exceeded those of last year by 1,091, the total being 2,559, and my correspondents numbered 1,726, showing an increase of 292 for the same period. I am confident the number of emigrants will show a proportionate increase. I moved into the much-needed new offices in the last week of January. These are situated in the most suitable part of the city for such premises. Occupying, as they do, the ground floor, and having large plate glass windows, I am in a position to present to a large section of the public an ever varying exhibition of Canadian fruits, grains, and grasses, backed by suitable views of Canadian life on the farm, and in the orchard. In the past year I had my tent and stand of specimens at fifteen show fairs in my district. The stand was visited by thousands, a large number of whom expressed great interest in my exhibits, particularly the fruits. and all were supplied with literature before leaving. There is no doubt in my mind that these exhibitions of Canadian farming products and fruits have done more than all that has ever been said or written about Canada to satisfy the farmers of Ireland that the great Dominion is not the icebound and snow-covered country for most of the year that it is often represented to be. I have also attended many of the stock fairs, when I considered a day spent amongst the people of a district, supplied with our pamphlets, would produce good results. I may here mention that in these conversations I have with farmers, I find every year an increasing number telling me of the success of their friends in Canada, so much so that in a few years I expect the bulk of the farming class leaving Ireland will seek new homes in that country. In order, if possible, to secure all those leaving this country, I have for some time carefully scanned the local papers for advertisements of sales of farms, and have sent a selection of our literature to the vendors. In this connection, as of course, in all others, I have had willing assistance from the London office by their sending me notices of auctions that would otherwise likely have escaped me. I have attended those auction sales when possible, and found the gatherings at them most anxious to hear all I could tell them of the country that their neighbour was going to. In the past year the most serious drawback to my work was the number of local show fairs at which I was refused space for my stand, on the plea that the best of the people were induced to leave the country by such exhibitions. In conclusion, I would add, from my knowledge of the people in this district, I have every reason to believe, as already stated, that in a very few years at most, the great bulk of the emigrants who leave this country for the North American continent, will select Canada for their future home.

I have received a number of trade inquiries, and have attended to them.

Your obedient servant,
EDWARD O'KELLY.

No. 7.

REPORT OF D. TREAU DE CŒLI, AGENT IN BELGIUM.

ANTWERP, BELGIUM, July 3, 1905.

The Commissioner of Emigration,
London.

SIR,—I have the honour to submit my report for the year ending June, 1905. I am pleased to state that the emigration movement in Belgium is improving continually, and that everything tends to show that the extensive propaganda made since 1904, is giving the best of results. The decision of the government to erect the Pavilion of Canada at the Liège Exhibition, and to bring before the Belgian public the agricultural and mineral products of the country, has greatly helped our efforts. The general interest taken in Canada is exemplified by the fact that in not less than 22 schools the geography of Canada is taught, and this mostly in schools for adults. The atlases and large maps are forwarded upon the demand from the teachers of certain localities where lectures are given or where principals take an interest in the matter. The press has also given on many occasions vivid descriptions of the richness of the country and of the bright future that awaits the farmer in Canada.

During the past three years there has been continual emigration of farmers' sons, who went out to get acquainted with the country, and to make the choice of homesteads or farms, being followed by their parents or families, who having sold out their belongings have sufficient capital to settle down at once, relying upon the experience acquired by their sons. This kind of practical emigration attracts the attention of the neighbours and is sure to give the best of results.

The volume of correspondence is increasing continually. No less than 8,086 letters were received at this office in 1904-5 and were promptly answered when necessary. Besides this, personal inquiries are so numerous that on certain days I am kept from morning to evening answering questions. The emigrant now applying for information generally belongs to the farming class, as I give little encouragement to tradespeople. I always solicit correspondence from those who emigrate, as well as from old Belgian settlers; in most cases the letters received eulogize the advantages offered by the country. A certain number of these letters were printed in the winter of 1904-5 in a propaganda publication which gave also the names of numerous Belgians settled in Manitoba and the North-west, from whom information could be obtained. This little paper was in great demand as it stated facts that could easily be verified.

Your obedient servant,

D. TREAU DE CŒLI,

Canadian Government Agent.

OPERATIONS IN THE UNITED STATES.

No. 1.

REPORT OF W. J. WHITE, INSPECTOR OF AGENCIES IN THE UNITED STATES.

Department of the Interior,
Ottawa, July 6, 1905.

The Superintendent of Immigration,
Ottawa.

Sir,—Attention was directed last year to the commencement of work by this branch in the eastern and New England states. The prospects were such that it was decided to establish agencies at Boston, Syracuse and Pittsburg. Although this was only done in January last, the results are such as should satisfy the department.

The several agencies in the United States now under the control of the immigration branch are as follows:—

M. V. McInnes, No. 6 and 7 Avenue Theatre Block, Detroit, Mich.
James Grieve, Auditorium Building, Spokane, Wash.
J. S. Crawford, 125 W. Ninth Street, Kansas City, Mo.
E. T. Holmes, 315 Jackson Street, St. Paul, Minn.
T. O. Currie, Room 12 B., Callaghan Building, Milwaukee, Wis.
C. J. Broughton. 430 Quincy Building, Chicago, Ill.
W. V. Bennett, 801 New York Life Building, Omaha, Neb.
W. H. Rogers, Third Floor, T. & T. Building, Indianapolis, Ind.
C. Pilling, Clifford Block, Grand Forks, N. Dak.
H. M. Williams, Room 20, Law Building, Toledo, Ohio.
C. O. Swanson, Scandinavian Agent, 315 Jackson Street, St. Paul, Minn.
C. A. Laurier, Marquette, Mich.
Benj. Davies, Dunn Block, Room 6, Central Ave., Great Falls, Mont.
J. M. MacLachlan, Box 16, Watertown, S. Dak.
Thos. Duncan, Syracuse Bank Building, Syracuse, N.Y.
J. C. Duncan, Third Floor, House Building, Pittsburg, Pa.

In addition to these there are several sub-agents working under the head agent of the territory. These are paid on a per capita basis. They prove of some assistance, but are not all equally successful. Several have been cut off in the past two or three years, and I am informed that the commission paid in this way is much less in the aggregate than in previous years.

The work of the agents has been most satisfactory during the past year. If it was necessary for the agent to work strenuously six or seven years ago when the work was in its infancy, it is just as necessary to-day. Then he had his work of education to perform; he was kept busy seconding the efforts of the advertising in keeping his clientele informed of conditions in Canada. Hard work on his part is as necessary today as it was then, as it is necessary to keep up as vigorous an advertising policy as it ever was. The reasons are too many to enumerate in a report.

The very thing that has given Canada and Canadian lands the prominence that they have in the United States has brought about a condition that is working against our interests. Following the plan pursued by this branch, western and southern railroads running through vacant lands, long ago considered worthless, started on a vigorous campaign, exploiting these lands, and in this way distracting the attention of the possible mover. Land companies, seeing that it was possible to create an interest by advertising, resurrected from their archives titles to lands long since considered of little value, and commenced a telling advertising campaign. Those desirous of securing people for the western states (in which Canadian lands were arousing a deep interest), worked influence with the federal government, and a large grant has been made for irrigating vast areas of lands in Montana, Dakota, Washington and Oregon. So, there are many of these influences at work, whether for the purpose of holding the people with whom our agents are working, or in some way exerting influence which will keep them from moving. Our agents, therefore, find that they must lose no opportunity, and in fact I think a little opposition inspires to better work. The agents follow up the correspondence which comes as a result of the advertising, they go into country districts near and remote, see individuals singly and collectively. They arrange at the different county and state fairs for the exhibition of products of the soil of Canada, and in this way do a great deal of good. I endeavour to attend as many of these fairs as I possibly can. The exhibits placed by Canada are always the most attractive, and cause the most favourable comment. This is a feature of the work that should always have consideration. These exhibits are a great educator, and visits are frequently made to them by those who have friends in Canada.

The mover relies upon the government agent to secure him the lowest rates over the different railway lines for himself, family and effects, and in many cases he finds it necessary to render personal assistance in the loading of cars.

It is found now that the government agent is required to take the place of commercial and consular agent, and these in addition to his other duties, keep his time fully occupied.

There does not seem any lack of interest in any of the districts in which our agents are operating, and despite the fact that homesteads for the past year or two have become more inaccessible and the price of land increased, the number of personal inquiries is as great as ever. The correspondence is increasing and the prospect for next year is as assuring as in the past.

It has not been thought advisable to change the plan of advertising adopted when the work began a few years ago. The best of the agricultural papers, the home and country weeklies are selected; advertisements and reading notices changed each week, keep the press and public advised. This plan has worked well. The correspondence resulting from this is followed up by personal letters, visits and a reasonable supply of literature. It is gratifying to be able to report that the agencies operating at Great Falls and Spokane are doing good work. Reference is made to these, as it was considerable of an experiment when they were established.

The exhibit placed by the Department of Agriculture at St. Louis, in charge of Commissioner Hutchison, was a splendid object lesson. A room in the Canadian building was in charge of our agents, and the work carefully looked after. It will doubtless bring good results.

During the year, Mr. Laurier was transferred from Sault Ste. Marie to Marquette. Mr. O. Tessier has been placed on the staff, and has been rendering valuable assistance amongst the French in Michigan. Mr. F. J. Lange was placed in the Milwaukee office as assistant to Mr. Currie.

I wish to add to this report, as I have added to others, that I am pleased to be able to state that all our agents have carried on their work during the year with loyalty and devotion, without which it would have been impossible to succeed. Only in this way can satisfactory results be brought about.

Your obedient servant,

W. J. WHITE,

Inspector U. S. Agencies.

No. 2.

REPORT OF M. V. McINNES.

CANADIAN GOVERNMENT AGENCY,
ROOM 6, AVENUE THEATRE BUILDING,
DETROIT, MICHIGAN, July 1, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit my report for the year ending June 30, 1905.

Continued success has marked my labours. Many more home seekers have gone to western Canada than went last year, and the interest taken in our country and the knowledge of its wonderful agricultural opportunities are more wide-spread throughout Michigan than ever before. Excursions over American lines, during the summer months, offering very low rates, have induced a considerable number of outgoing settlers from Michigan to go into western Canada, and hundreds of excellent home seekers have availed themselves of the opportunity offered by these excursions. These settlers of course are not recorded to my credit in the certificate books of the office.

I anticipate another active season. There is a fair field ahead for vigorous work. Three potent causes combine to this end. The commencement of the Grand Trunk Pacific Railroad, the near completion of the Canadian Northern Railroad, already pushed through to Battleford, and the promise of an abundant harvest and an immense wheat crop. These causes will, I believe, almost double our activities during the present year.

Since my last annual report quite a number of German-American families have joined the German colony at Alameda. This community is progressing most favourably, as I predicted in my annual report of two years ago. Its numbers are steadily increasing by most desirable additions, and in a few years time it will constitute a large and flourishing settlement. I am at the present time working up another German-American colony for Alberta. An excellent commencement has been made and every thing points to favourable results. These Americanized Germans make splendid settlers, and I hope to induce a very large number of them to make Alberta their permanent home.

About 40 Swedish-American families have been secured for the west, after considerable labour, at Gaines, Genesee county, and Caro, Tuscola county, Michigan. They form an active and enterprising community, and I entertain great expectations from these quiet and law-abiding people. Like the North Germans, they are frugal, fond of home and agriculture, and their provident habits admirably adapt them for lives of husbandry on our broad prairies. I will watch their progress with much interest.

During the year I held a number of meetings, principally in prominent agricultural centres throughout the state, and met with uniform success. Everywhere I went there was a deep interest manifested in our western country, and I am satisfied that Michigan will still continue to swell the volume of United States immigration for many years to come. The smaller farmers who operate holdings on lease—and there are thousands of these in the state—are quick to contrast their condition, hampered as they are by a large rental, with the free settler of the west, unimpeded by such restraints. From this class of Michigan husbandmen I expect to count in a large number of settlers.

The annual Michigan state fair again held at Pontiac last September occupied my attention during a week of that month. The greatest interest was manifested by every person who examined our exhibits. The farmers were pleased beyond measure, and were amazed to see the agricultural wonders that met their eyes. It was hard to make many of them believe that the wheat and grain and grasses displayed were the products of Canada. The very best results have flowed from these exhibits. I also attended, with a supply of exhibits, at nine county fairs, held at widely different points in middle and southern Michigan. Each was opened at an agricultural centre of note, and all were largely attended by the rural population. The products that I placed on view at every one of these exhibitions were great attractions to the farmers. They were intensely interested in all they saw, and I know that many good settlers were recruited from the districts in which these fairs were held. Ths Michigan state fair will be held hereafter annually and permanently in Detroit. An extensive tract of land in the outskirts of the city has been acquired by the management and large and imposing buildings are in process of construction. When completed the state fair grounds of Michigan will compare favourably with those of any other state in the Union. The first exhibition, under the new auspices, will take place next September, when it is expected that there will be 150,000 Michigan farmers in attendance. Being at headquarters, this will be exceedingly favourable for my work. I can secure a larger space than was available at any previous exhibition, and will be able to make a much more extensive and impressive exhibit than before. From every point of view the prospects for an enlarged and desirable immigration from Michigan and adjoining states to western Canada during the present year are bright and cheering.

Your obedient servant,

M. V. McINNES.

No. 3.

REPORT OF C. A. LAURIER.

CANADIAN GOVERNMENT AGENCY,
MARQUETTE, MICH., July 1, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit my report for the year ending June 30, 1905. The outcome for the year just closed, so far as this office is concerned, has been, I think, most successful. Western Canada is awakening more and more interest among the people living throughout the upper peninsula of Michigan, where I have principally devoted my time since I have been connected with the Immigration Department. There have been 580 settler's certificates issued from this office, divided as thus, viz:—

Upper peninsula of Michigan	360
Lower peninsula of Michigan	220
	580

representing a total of 1,179 persons. The class of people that have gone from this territory can be considered of the most desirable, many of them possessing a capital ranging from $2,000 to $7,000. They have taken with them 31 carloads of effects, and in addition nearly $225,000 in cash; these figures are a large increase in all respects over the preceding year. During the month of September I have made exhibits of grains and grasses at the county fairs of Marquette, Houghton and Gogebic counties. These exhibits have in every case proved to be special attractions, winning the admiration of all visitors to the fairs.

I have held several public meetings during the winter months in different parts of my territory, and called on as many as possible of the people with whom I had had correspondence. In this way I was enabled to come in direct contact with a great number of prospective settlers who appreciated verbal information as usefully supplementing that obtained from our literature.

In the last twelve or eighteen months we have been meeting with a very strong opposition throughout this part of the country, from land companies owning lands in this upper peninsula. They make use of the press and have a thorough system of advertising, working in concert to stop the movement to the Canadian North-west; but regardless of all their efforts it is gratifying to note that the interest in Canada continues to increase with the people; the number of letters of inquiry coming to this office is constantly growing, and by continuing to work on the same lines we have been doing in the past, I am confident of a larger immigration from this district to western Canada this coming year than we ever had in the past.

Your obedient servant,

C. A. LAURIER.

No. 4.

REPORT OF E. T. HOLMES.

ST. PAUL, MINN., June 30, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I beg leave to submit my report for the states of Minnesota and Iowa for the year just closed, and feel able to state that the past year has, I think, been one of the best for immigration from this district Canada has ever seen. One pleasing feature is that most of the settlers coming from my territory have been able to buy lands adjoining their homesteads, also stocking and working same, many of them taking with them several thousand dollars besides from one to three carloads of effects. I sent one man from Iowa, who, after buying 800 acres of land at $22.50 per acre, when moving with his family took four carloads of effects and about $100,000 in cash. Exceptional interest is manifested here in the Grand Trunk Pacific, a great many having asked the route it will likely take, locating near proposed route, feeling assured they will have railroad accommodations within a reasonable time. I have had exhibits at the state, and many of the county fairs, and have held meetings at rural towns in the winter, most of which have been well attended. I also drive into the country in all parts of my territory, calling on those who are interested or likely to be interested in western Canada. The prospects for immigration next year are good, as there is every indication of an abundant crop in these states, which will put lots of prospective settlers in a good position to move.

Your obedient servant,

E. T. HOLMES.

No. 5.

REPORT OF C. J. BROUGHTON.

CANADIAN GOVERNMENT OFFICE,
420 QUINCY BUILDING,
CHICAGO, ILLINOIS, July 1, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to herewith submit annual report from July 1, 1904, to June 30, 1905. During this period this office received 6,130 letters, sent out 11,550 pieces of mail, and interviewed 7,020 persons. The number of people who have left this state, through this office and sub-agents, during the year was 1,759, with 150 sent by land companies, and 100 people for New Ontario, making a total of 2,009 people, which is a substantial increase over last year. There were also 103 carloads of settlers' effects. There would have been more than this, if the freight rates had not been raised and a limit put on the size of the cars to be used. The people are a very good class of settlers, all having some means and all being well satisfied with their new homes in western Canada. On account of the exhibition at St. Louis last year, we did not have any exhibit at the Springfield State Fair. I frequently attended the exhibition at St. Louis, and had a great many Illinois farmers meet me there. On December 1 of last year, after your visit to Chicago, we moved into new quarters, and have found a larger office more suitable in every way. In the last report an increase of from 50 to 65 per cent was anticipated in the number of people being sent to our country from this territory; this, I think, we have had, and what with the Canadian Northern Railway being now through to North Battleford, the Canadian Pacific Railway extensions from Wetaskiwin and Lacombe east, and the homestead land being brought nearer to the railroads and markets, I think that during the coming year we ought to have again this much of an increase. Most of the sub-agents have had more or less business this year. While I have been away on the road, the office has been looked after by my able assistant, Miss Glock. And during the year all settlers coming through the Chicago gateway were met, and in many instances these people were accompanied by me to St. Paul, where I had special cars engaged for them, had their hand baggage transferred and their other baggage checked through to destination, in this way obviating all chances of their being left in St. Paul, or missing connections there. With your authority last fall, I left the first part of September for a trip through western Canada, met Mr. Speers in Winnipeg, he accompanying me to Davidson, Saskatoon and Rosthern, and from the latter place we started and drove to Battleford, and north from there, returning via Saskatoon. This, of course, gave me a splendid idea of the homesteads still vacant in this section of the country, and familiarized me with the lay of the land, &c. This year I hope to go from Battleford to Edmonton, or perhaps from Yorkton across. In conclusion, I wish to say that the Wisconsin Central Railway, through their general passenger agent, Mr. J. C. Pond, was a great help to us in supplying freight cars and coaches for the use of the settlers going to our country. Mr. W. R. Callaway, general passenger agent of the Soo Line, also did all that was possible for the comfort of the people from St. Paul on.

Your obedient servant,
C. J. BROUGHTON.

No. 6.

REPORT OF BENJAMIN DAVIES.

Great Falls, Mont., U.S.A., July 10, 1905.

The Superintendent of Immigration,
Ottawa.

Sir,—I have the honour to submit to you a report of my work from June 30, 1904, to June 30, 1905. I find from the records in my office that 1,570 intending settlers were sent to western Canada during the year. The sub-agents working under this agency sent 273 of the above number. The value in cash and effects taken in by these settlers amounted to $1,856,955. One hundred and two carloads of effects were taken in by those from this office; sub-agents did not report the number of carloads; large numbers of cattle and horses were driven overland, of which I have no account, it being impossible to obtain information over such a vast tract of country used by those driving through. There were 2,661 letters received at this agency, and 5,695 letters sent, and 1,668 interviews accorded to inquirers after general information relative to free and other lands in western Canada, all of whom received due attention, information and literature. I have sent atlases and other books of information into thousands of farmers' homes in Montana, Wyoming, Idaho, Colorado and Nevada, these five states being in my territory. You have also received from me thousands of names and addresses of parties in these and other states, to whom literature relative to western Canada should be sent. I have personally visited farmers in their homes and given them information regarding western Canada in all cases leaving atlases and other literature with them, these personal visits have been much appreciated, and good results in most cases followed. I would have done more personal visiting, had I had an assistant earlier. Since April 1, this year, I have had one, and it is my intention to do as much visiting of outstanding districts as possible, as my assistant is conversant with the general working of emigration and posted on the Canadian west, and can give information to inquirers both verbally and by letter; from past experiences I have found much good was accomplished by these personal visits to farmers' houses, and by lectures delivered at special points through the districts under my supervision. E. W. Davies, of Edmonton, Alta., was employed to attend the state and county fairs of Montana, five altogether, with an exhibit of western Canada's grains in the straw and threshed, also grasses, vegetables, dairy and other products. Thousands of atlases and other literature were given to the visitors. This way of advertising has proved so good that it is my intention, with the approval of the department, to exhibit in Idaho and Wyoming, as well as Montana this season, and shall advise you more fully regarding this matter in a short time. Reports from those who wrote, and from those who called at this office after locating, were very satisfactory. Notwithstanding the haying and harvest season will soon be upon us, I expect the usual number of emigrants from here, the grass being strong, which many have been waiting for who intend driving overland; they are now taking advantage of these conditions and driving through in large numbers. A large number of stock men have located in South Alberta and Saskatchewan this past year, from Montana, Idaho and Wyoming, taking with them their effects and stock. Some went by rail and some by trail; there was one outfit pulled out from here with 13 carloads of stock, on a special freight train containing 460 head of young cows and calves and farming implements, also household goods, they intended unloading at Calgary and driving across country north-east to their ranch, 35 miles. There is a constant stream of intending settlers driving through, the majority taking cattle and horses and effects. Emigration continues to flow north to western Canada from these western states; indications point to a heavy exodus for the coming year.

Your obedient servant,

BENJ. DAVIES.

No. 7.

REPORT OF JAMES N. GRIEVE.

SPOKANE, WASH., July 17, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa, Canada.

SIR,—I beg to submit my annual report for the year ending June 30, 1905.

Statement showing number of settlers sent in during each month since last report:

1904.	
July	201
August	227
September	315
October	269
November	188
December	104
1905.	
January	106
February	190
March	537
April	665
May	482
June	329
Sent by sub-agent, Seattle, Wash	517
Sent by sub-agent, Tacoma, Wash	242
Sent by sub-agent, Los Angeles, Cal	323
Total	4,695

Settlers' effects—

Carloads, including shipments of settlers' stock	200
Shipments in less than carload lots . . . pounds	200,000

The number of letters received at this agency during the year was 6,729; number of letters sent 6,513; number of visitors who called at my office, 7,052, all of whom received some printed matter dealing with western Canada. In addition to circulating literature direct from my office, I sent in lists, containing thousands of names to the department, where I presume they received proper attention. As will be seen by the foregoing, the year just closed has been most successful viewed from every possible standpoint. Owing to the amount of work at my office I have travelled very little over my territory, and consequently have not reached a good many who only can be reached in that way. In September of last year I made arrangements with the directors of the Oregon State Fair at Salem, Ore., to place an exhibit of grasses and grains at their annual fair. They allotted me a very fine space in their main building, and for one whole week I was fully engaged in explaining the many advantages offered by the Canadian government to the ambitious homeseeker in western Canada. My work at the Oregon State Fair has already borne fruit, as a great many people from that district have since visited the North-west, and the great majority of them have either bought railroad land or homesteaded government land. I also exhibited at the Interstate Fair held in Spokane, where my efforts to bring samples of the products of the North-west before the people seemed to be greatly appreciated by the thousands who passed during the nine days of the fair. From Spokane I shipped my exhibit to the Idaho State Fair, held at Boise, Idaho, but owing to the delays on the part of the railway companies, part of my exhibit did not reach Boise in time for the fair, so I had to be content with circulating several thousand pamphlets, which fortunately reached me in time. I attribute much of my success, in the way of landing a good class of immigrants, to this system of advertising. During the coming year, I intend to place exhibits at the following places: Portland, Ore., Lewiston, Idaho, and Spokane, Wash. On June 26 last I left Spokane with a party of homeseekers for Alberta, going through as far as Edmonton. I visited the midsummer fairs at Edmonton, Wetaskiwin and Calgary, and procured some twenty-five samples of different kinds of grains for my office, where they are now on exhibition, and will be of great assistance to me in the prosecution of my work. I was much pleased with the appearance of the crops all along the way, on my trip through the North-west, and judging from the character of the exhibits at the different fairs, particularly the stock, and the appearance of the thousands of well-dressed and comfortable-looking farmers, with their wives and families, one must come to the conclusion that our western plains are being filled with a happy, contented, and prosperous class of people.

Your obedient servant,

JAMES N. GRIEVE.

No. 8.

REPORT OF H. M. WILLIAMS.

Toledo, Ohio, July 5, 1905.

W. D. Scott, Esq.,
Superintendent of Immigration,
Ottawa.

Sir,—In submitting my report for the fiscal year just closed, I can, with much pleasure, state that it has been the most successful year's work for this office, we having sent many more settlers and cars of effects than last year to western Canada.

As a result of visiting the country last August, with the president of a German colony, together with a few other leading Germans, living in and around Cincinnati, some 35 families took up their residence in western Canada in the spring of this year, with prospects or some 25 to 50 families more to join them this fall. The president thinks that fully 200 families will soon represent his colony, and all are well pleased thus far.

I attended the usual number of fairs last fall, with much satisfaction apparently to all. I think it a very effective way of demonstrating the products and agricultural resources of western Canada.

I can notice an increasing interest by correspondence and personal interviews, and by faithful attention to the work I look for increased numbers of emigrants from year to year.

In the early part of June, this year, by direction of W. J. White, I, with a first-class exhibit of grains and grasses, &c., attended the annual convention of the German Baptist Brethren, held at Bristol, Tennessee. There were some twenty thousand people in attendance on certain days, and I feel certain that much good was accomplished by our exhibit and the presence of your agent there. We already have one colony of these people, and hope to see another before the close of another year.

At the present time I have an advance guard of Kentuckians touring our country, and believe they will be pleased and that fifty to seventy-five families will emigrate this season, as they have all sold their lands to an eastern coal syndicate and want new and cheap homes.

Your obedient servant,
H. M. WILLIAMS.

No. 9.

REPORT OF W. V. BENNETT.

OMAHA, NEBRASKA, June 30, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my report for the fiscal year ending June 30, 1905.

During the year just ended we have had a great many things to contend with, and especially the latter part of 1904. The St. Louis Exhibition attracted a good deal of attention and kept a good many from Canada. The Kinkaid Land Law, that was passed and went into effect in Nebraska, granting settlers a homestead of 640 acres with no additional expense over and above what they were charged for 160 acres formerly, and all the railways working against the northern movement, combined to interfere with our business. Yet, I feel that I have been fairly successful in keeping in touch with the movement, and have during the year issued certificates to 2,344 intending settlers, taking with them 207 cars of effects.

The outlook is very good for the coming year.

Your obedient servant,
W. V. BENNETT.

No. 10.

REPORT OF CHAS. PILLING.

GRAND FORKS, NORTH DAKOTA, July 27, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to report that the movement of settlers from the state of North Dakota to western Canada for the year ending June 30, 1905, shows an increase over the preceding year, the certificates issued to intending settlers being 1,240 more than the number issued for the year ending June, 1904. The number of cars of settlers' effects shipped of which I have record for the year is 719. The plan of attending fairs and large public gatherings has been followed as in previous years, and I was present at the opening of the Fort Totten reservation at Devil's lake in August, with a display of the products of western Canada which undoubtedly diverted a large number of people to our western country. During the month of May I arranged with the Canadian Northern Railway to run a special from Emerson to Wadena, with 35 cars of settlers' effects and two passenger coaches containing 105 persons, all from Cavalier county. The officials of the company gave me every facility for loading these cars, and their transportation to destination was effected without delay at any point, and in record time. If the harvest fulfils the promise of the present crop conditions, I am satisfied that the movement from North Dakota to the Canadian west will, in the coming year, continue unabated.

Your obedient servant,
CHARLES PILLING.

No. 11.

REPORT OF THOS. DUNCAN.

SYRACUSE, N.Y., June 30, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to bring before you a report of my work since opening this agency, covering a period of about four months. During that period I have received 781 letters of inquiry (so far as I have been able to judge most of them coming from people of the agricultural class). I have also issued 24 certificates, representing 46 persons. While actual results up to the present have not been very great, it should be remembered that the work in this state is entirely new, and judging from the number of inquiries received I feel justified in looking forward to much better results in the future. In addition to the above mentioned number of letters received since the opening of this agency the names and addresses of a large number of people have been forwarded to me from your office, with whom I have corresponded as far as circumstances would permit. I think it is very noticeable that in this state, although close neighbours, the people know very little about even eastern Canada, and almost absolutely nothing about our western country, so that extensive advertising and a large amount of personal work requires to be done before the people can be brought to realize the great advantages we have to offer, from an agricultural standpoint, in western Canada.

Your obedient servant,

THOS. DUNCAN.

No. 12.

REPORT OF W. H. ROGERS.

INDIANAPOLIS, IND., July 4, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my report for the year ending June 30, 1905. In my report of one year ago, which was made shortly after my arrival in this state, I expressed the opinion, after a tour of careful investigation, that the 'Old Hoosier State,' as it is familiarly called, would before long contribute liberally towards swelling the tide of emigration to the Canadian west. In view of the known difficulties in the way of starting such a movement from this state, it is with rather more than ordinary satisfaction I am able to report that the work of the year, both as to its direct as well as its indirect results, has been such as to confirm me in this conviction. During the last twelve months upwards of 300 have gone to the Canadian North-west, and scores of others have assured me of their intention to do likewise before the end of the present calendar year. In addition, many others who have become interested in the North-west, are planning to visit the country on a tour of inspection in the near future, with a view of selecting land if they are suited, while not a few who but a short time ago lightly dismissed the subject with a mere wave of the hand are now free to admit 'the Canadian proposition is well worth careful consideration.' Another encouraging feature of the work is the fact that several of the most intelligent and practical men among those who have gone from this state, are quite enthusiastic over the opportunities and prospects of the North-west, and by their letters and personal influence are inducing others to share in the advantages offered. On my arrival here I found in addition to the usual obstacles in the way of a movement Canada-ward from states similarly situated, that this state has been thoroughly and systematically worked by agents from the southern and western states, aided by an army of local real estate men and farmers. As a result the streams of emigration from this state all flowed in these directions. To such an extent was this true that those were practically the only fields to be considered. To change all this, to turn the currents northward towards a country so 'very far north,' in the mind of the people as to be regarded dangerously near the regions of perpetual snow and ice, seemed as one man significantly put it, like 'trying to get water to flow up-hill.' However, by a persistent and energetic use of the best means at our command, a good beginning has been made in this direction, and if nothing unforeseen occurs, there is every indication that this stream will continue to enlarge and flow with increased momentum. One of the many suggestive evidences pointing to this fact is that several of the most active and successful real estate men who had previously directed their clients south and west, are now, just as actively, directing them to the Canadian west. But a few days ago, one of those men assured me it was much easier to sell Canadian lands, and besides, a much larger proportion of his men remained on their farms. The state is a very large one, and as, for obvious reasons, it was important to come in contact with a large number of people at the earliest possible date, I found the most satisfactory way to do this was to hold meetings at different points. At each of those meetings an opportunity was given, at the close of my address, for all who desired to ask questions. In this way I was able to give more specific information than would otherwise have been possible in so short a time. To add to the practical benefits of these meetings I brought with me such a collection of grains, grasses, &c., as would give a good idea of the variety and quality of our North-west products. Those meetings, usually well attended, were much appreciated, especially by those we were most anxious to reach—the farmers—and no doubt they will be productive of good results. Reviewing the work of the year, there is every reason to believe that with continued favourable conditions in western Canada, there will be an extensive movement from this state, and also from Kentucky.

Your obedient servant,

W. H. ROGERS.

No. 13.

REPORT OF T. O. CURRIE.

MILWAUKEE, WIS., July 3, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I beg leave to submit my annual report for the year ending June 30, 1905. I beg to say that our efforts have been successful in securing an A1 class of settlers from this state. We began attending fairs last year in August, and attended fairs until the last fair billed in the state was ended, as already reported. At the conclusion of the state fair, I divided my exhibit and showed at two county fairs each week thereafter, as far as was in our power. Our exhibits at these fairs have had a telling effect upon the people of this state, as thousands are now anxiously inquiring about the advantages of the west. Numbers from this state have gone and purchased from a section to ten sections of land in western Canada. These men, upon their return, have virtually become our distributing agents, and we have given them all the assistance we could in furnishing them with our literature. With these influences at work we believe we will be much more successful in the future than we have been in the past.

I am pleased to say that from this office and through local agents certificates have been issued to 1,055 persons to go to various points throughout western Canada. We have record of 52 cars of settlers' effects shipped, while very many have taken less than carload lots.

Quite a number of persons have gone from this state into Northern Ontario by way of Iron Range, while many more have gone by way of Sault Ste. Marie to engage in the iron and pulp wood business in Northern Ontario, in which great interest is being taken in this state at the present time.

Your obedient servant,

T. O. CURRIE.

No. 14.

REPORT OF J. M. MACLACHLAN.

WATERTOWN, S.D., July 7, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my report for the year ending June 30, 1905. During the year certificates have been issued from this office to 1,451 persons, and for 175 cars of settlers' effects. It is a difficult matter to give an accurate report as to the number of persons going to western Canada, as I frequently hear of parties having gone from different parts of the state, who started without obtaining certificates from this office. In some instances the rates were arranged through different land companies. I also find that many people who obtained certificates failed to state that they were taking cars. I think, therefore, that I can safely say that at least 1,800 persons left South Dakota for the Canadian North-west last year, and that at least 200 cars of settlers' effects were shipped, the value of which at a very low estimate would amount to at least $500,000. This compares favourably with the report of last year. The late spring in 1904, to which I referred in my last report, undoubtedly affected the work to a large extent up to the end of the fiscal year, insomuch, that a large number of landseekers were prevented from going out last year owing to the floods in North Dakota, also along the Prince Albert branch, and north of Yorkton. Discouraging reports were brought back by some of those who started out but did not succeed in locating, on account of overflow of streams. It will naturally take some time to regain the ground which we may have lost through these causes. I am pleased to report that during the month of June just closed, we issued certificates to 62 more persons than in June, 1904. Another drawback is the difficulty many farmers have in various districts in disposing of their farm lands. Were it not for this I have no doubt that a much larger number would have gone to western Canada. During the year we received at this office 2,224 letters and mailed 3,334, and have had nearly 800 callers. In addition to the large number of publications distributed from this office and at the fairs which I attended last fall, I have forwarded to the department lists containing about 1,600 names to whom publications were to be sent. Last fall I attended several fairs, the most important of which were the Interstate Fair, at Sioux City, Iowa, and the South Dakota State Fair, at Yankton, S.D. Our exhibit attracted much attention at both of these large fairs, as well as at the smaller county fairs in other parts of the state. In April I accompanied a number of settlers and landseekers to Milestone, Weyburn, Wetaskiwin, and Edmonton. The heavy train was taxed to its limit with a crowd of hopeful people from Kansas, Missouri, Illinois, Nebraska, Iowa, Minnesota, and South Dakota, and it was a matter of pleasure to note that the people being sent to western Canada by our agents in the different states had every appearance of being intelligent and well-to-do, and not of a class that would very readily become discouraged while making for themselves homes in a new land.

I look for a still larger movement from this state during the next twelve months.

Your obedient servant,

J. M. MACLACHLAN.

No. 15.

REPORT OF J. S. CRAWFORD.

KANSAS CITY, Mo., June 30, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit report of immigration work for our country in the states of Kansas and Missouri and tributary territory for the year ending June 30, 1905. During the year I have sent to western Canada about the same number as last year (over 1,600 settlers and 120 carloads of effects), with a large additional number of cars of cattle for our ranches. I have distributed a large amount of literature during the year, and find that it is well up-to-date and greatly prized by those receiving it. I also held meetings at quite a number of places where good results have followed.

The policy of granting much free transportation is being followed by all railroads in the United States having land interests in the south. On homeseekers' dates, as the result of this, from early fall until spring, twelve to fifteen thousand homeseekers from the north pass through the Kansas City and St. Louis gateways seeking free homes and cheap lands in the south. I cannot but feel that if the lines of railroads reaching our country north of the St. Paul gateway could be induced to open the flood-gates and adopt a more liberal policy many of these people going south seeking homes could be induced to examine the north country.

The fairly good prospects for crops of all kinds in my district will afford the means for many to move north who otherwise would be unable to go, while in some cases this will serve to keep others from going. On the whole a good crop, which is only periodical here, means help to go north.

Your obedient servant,
J. S. CRAWFORD.

No. 16.

REPORT OF THOMAS HETHERINGTON.

BOSTON, MASSACHUSETTS, July 26, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my report for the year ending June 30, 1905.

I settled down to business in Boston on December 19, 1904, after having spent over a month visiting the different agricultural districts in our Canadian North-west. I commenced my work by the distribution of publications descriptive of the country. I soon found an increasing demand for both literature and visits to the different out-sections of Boston. I addressed several meetings and was warmly welcomed by the people, mostly former Canadians and their descendants. I issued certificates for 261 people desirous of settling in western Canada, taking with them more than $45,000 worth of effects. I am proud to say that no better class of immigrants ever settled in any country. I am fully convinced that the coming year will see a wonderful increase in the number of people going from this state to the Canadian North-west, and the very class of immigrants that Canada wants.

Your obedient servant,

THOS. HETHERINGTON.

No. 17.

REPORT OF O. TESSIER.

SAGINAW, MICHIGAN, September 1, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my report, as immigration agent, from the date of my appointment, February 1, 1905, to July 1. During the months of February and March I delivered lectures in the French language, and distributed literature, in the following localities in the state of Michigan, to wit: At the city of Detroit, at Delray, Rivière Rouge, Ecorce, and at each of the small villages on the United States side of Lake St. Clair, from the city of Detroit to Mount Clemens. I also lectured in the English language to farmers in the said state, to wit: At Flint, Pontiac, Oxford, North Branch, Silverwood and Clifford. When not lecturing I went to see, at their homes and at hotels, people willing to listen to information concerning the attractions of the Canadian North-west offered to settlers. I interviewed in all about 750 of them. From April 1 to July 1, 1905, I kept lecturing and distributing literature in the counties of Saginaw and Bay, to wit: At East Saginaw, West Saginaw, South Saginaw, East Bay City, West Bay City, Carrollton, Zilwaukee, Auburn, Beaver, Cass, Flint River, at hotels and at gatherings of farmers at road crossings in the country. I interviewed, in those counties, about 1,200 persons and informed them about Canada. Having noticed that women were very desirous of hearing about that new country, I suggested to farmers to take their wives and daughters along with them to meetings; they did so, and I think they will be a valuable help in promoting the cause of immigration.

Your obedient servant,

O. TESSIER.

No. 18.

REPORT OF C. O. SWANSON.

WETASKIWIN, ALTA., July 1, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit the following report for the fiscal year ending June 30, 1905.

We have had another successful year in immigration work among Scandinavians. Since July, 1904, I have had four excursions up to November and this year so far I have had six very successful excursions, starting from St. Paul and Minneapolis over the Soo Line, people joining me at different places along the route. I have accompanied these myself. I have also sent a good many people via Emerson over the Canadian Northern Railway. The majority of these settlers have brought in one or two carloads of effects each. With the exception of a very few the landseekers that I have brought in this year, have either taken homesteads or bought land. The last parties I brought in have had to go out over a hundred miles from the present railroad to get land to suit them, at the same time expecting that new railroads would come to them in the near future.

The advertising that the department has been doing in the Scandinavian papers has brought good results, as my assistant has answered letters of inquiry averaging at least twenty-five a day. These letters have been reported to the department through Mr. Holmes, and personally I have answered about 450. Through the winter months I visited several places in the states where I thought it was most necessary, and I am convinced that Scandinavian immigration from the United States will increase rather than diminish, and from Sweden and Norway I have had double the number this year that I have had any year before.

In regard to servant girls, the number has been less this year, but those who have come are of a superior class.

Your obedient servant,

C. O. SWANSON.

No. 19.

REPORT OF REV. FATHER M. BLAIS.

MONTREAL, June 28, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to inform you that my colonization work for the year ending June 30, 1905, has been practically the same as that of preceding years. I have contributed to the organization of several excursions, which are always so profitable; I have answered a considerable number of letters; I have given many interviews and some public lectures. Since the month of January last I have principally worked in the New England states. I have every reason to hope that the work of repatriation will in the future be easier and more fruitful than in the past. I am happy to state that our compatriots who have come from the states and the different provinces of Canada to settle in Manitoba and in the North-west Territories, are on the whole very satisfactory and succeed very well.

Your obedient servant,

M. BLAIS, O.M.I.

No. 20.

REPORT OF REV. H. L. VACHON.

MONTREAL, July 11, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my annual report for the year ending June 30, 1905. I have continued during the last year the work taken up in previous years, that is, of lecturing in the western states among the most prosperous French settlements in farming districts. The result, I am pleased to say, has been satisfactory with regard to the quality and quantity of settlers. Those emigrants formerly from Canada form a very desirable class of settlers, as they are men who have acquired fortune and experience in farming in the United States. I must say that the interest in the North-west is increasing among the French people; this is evidenced by the numerous invitations sent to me from different parts of the country to lecture on Canada. One of these invitations came from as far as Butte City, Montana; I took advantage of this invitation tendered to me to go and lecture in several French settlements of Montana, and not without effect, as it is noticed that the percentage of French settlers from that direction is higher this year than previously.

I had to interrupt my work of lecturing to proceed to Europe last winter, after obtaining leave of absence from the department. Although not travelling in my official capacity I made a point of visiting several French villages in Brittany to lecture on the Canadian west, and if I judge by the number of letters received from France, I have awakened there a deep interest in our country.

My last trip in connection with immigration work was made in the state of Massachusetts, where I lectured in Lawrence and Lowell before large audiences. The newspapers have given a good account of my lectures, and their reports will no doubt help to a large extent the cause of immigration in that part of New England. Besides giving lectures, a great part of my time was occupied in visiting families at home, and writing several hundred letters to people seeking information.

Your obedient servant,

H. L. VACHON, O.M.I.

No. 21.

REPORT OF A. RIBOUT.

MATTAWA, July 10, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit the report of my work for the year ending June 30, 1905.

During the summer months I have devoted my time to visiting our colonization districts, encouraging the newly arrived, and accompanying delegations and new settlers coming from the eastern United States, where I had delivered lectures during the winter. I delivered twenty of these lectures in the eastern states and four in the province of Quebec. In all cases the attendance was large and very attentive; after my lecture was over I had to answer many special questions about the country. I must say that through the eastern states that I have visited the majority of the French population is anxious to come back and see our new settlements in Canada. During my lectures I have called the attention of my audience to the advantages that can be found on the settlements in New Ontario, districts of Nipissing and Algoma, Northern Timiskaming and county of Pontiac, P.Q.

Colonization for year 1904-05 in New Ontario and Northern Temiscaming, especially in the districts of Nipissing and Algoma East and county of Pontiac has been successful, not only as to the number of settlers, but also in respect of the amount of capital invested. During this last spring, delegations from the United States, sent by intending settlers, came to visit the different settlements and report to those who sent them. I went with them each time that I was able; they were generally satisfied with the country and reported very favourably.

I attended to a large correspondence. This year I have received 885 letters; I have answered 831, and I have sent 1,434 parcels of pamphlets and maps, amounting to 5,409 pamphlets and 327 maps.

I have delivered certificates for reduced rates of transportation to 391 souls, and I know that a great number came into my territory through my work of propaganda, with certificates delivered at Montreal by the Society of Colonization and other agents, and I know a number of settlers who are now residing in our settlements who have come without calling for reduced rates.

The crops of every kind have a very good appearance and promise a fine harvest to the settlers of New Ontario and Northern Timiskaming. I consider that for this country the year 1904-05 has been a successful one for colonization. I have also good expectations for 1905-06.

Your obedient servant,

A. RIBOUT.

No. 22.

REPORT OF DAMASE GAUTHIER.

LAURENTIDES, June 30, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour of presenting my report to you for the year ending June 30, 1905.

I have worked at my mission in the eastern states, where there is a large population comprising French-Canadians, upon whom I have urged emigration to Canada. The towns where I have carried on the work of propaganda are as follows: Westbrook, Lewiston and Biddeford, in the state of Maine; Waterbury and New Haven, in Connecticut; Lowell, Lawrence, Fall River, New Bedford, Holyoke, Northampton, Indian Orchard, Chicopee, North Adams and Adams, in Massachussetts; Woonsockett and Manville, in Rhode Island; Cohoes, in the state of New York; Marlboro and Hudson, Fitchburg and Gardner, in Massachussetts; Manchester and Nashua, in New Hampshire. I have also carried on the work of colonization in the province of Quebec, but without on that account neglecting the eastern states, to which I have been assigned.

My work consisted in visits to the houses of the people, articles to the papers, correspondence, distribution of books and lectures. The visits to houses were confined to those to which I had been asked. In those manufacturing centres, where the class which can furnish immigrants is composed of men working by the day in the factories, it is difficult, not to say impossible to do any work except in the evening.

I have written a large number of articles in the papers of Canada and the United States and particularly in *Le Canada,* of Montreal and *La Presse,* of the same town, in *L'Independant,* of Fall River, *L'Etoile,* of Lowell, *L'Avenir National,* of Manchester, *La Justice,* of Biddeford, *Le Messager* of Lewiston, *Le Progrès,* of Lawrence. Besides I have given information to the reporters of these papers about Canada and colonization, and it has been published.

I have received a large number of letters asking me for information about Canada. I have always replied to these letters as soon as possible, and in a way that should give satisfaction. I have distributed about a thousand packages of literature. My principal work was to organize meetings in such a way as to come into contact with the largest number of people possible in my circuit, and to give them all the information about Canada, and the new regions in particular. I have delivered twenty lectures. I believe that a fruitful work can be carried on in the eastern states in the interests of immigration. The workingman of the cities is discontented with existing conditions. He has on the other hand a very favourable opinion of affairs in Canada. This class of immigrants is not rich, but this is usually the case with those who emigrate, and I have every reason to believe that they will be good colonists.

Your obedient servant,

DAMASE GAUTHIER.

No. 23.

REPORT OF R. A. BURRISS.

PORT ARTHUR, ONTARIO, July 13, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I beg to report as follows for the year ending June 30, 1905. We have continued to find settlers by advertising; have supplied them with low transportation rates, provided them with temporary accommodation in the immigration building, supplied them with land guides, and seen that they were satisfactorily located on land. The following settlers were handled during the year: From Canada, 458; United States, 381; England, 144; Finland, 83; Scotland, 18; Switzerland, 6; West Indies, 4; Norway, 3; Germany, 3; Trinidad, 3; Sweden, 3; British Guiana, 3.

One splendid means of advertising the resources of New Ontario has been New Ontario's exhibits of farm products at the Toronto Exposition, also at the London and Whitby fairs. These exhibits of grains are secured from the settlers, and are carried by the Canadian Pacific Railway Company free of charge to Toronto. The exposition authorities have been very liberal in the allotment of space, and other courtesies in our behalf. In proof that New Ontario is a valuable dairying district we had on exhibition 150 varieties of native grasses. We secured a large number of farm 'photos, which were enlarged and framed, and these were displayed with the grains at the various exhibitions. Our literature is peculiar to New Ontario, most of it being prepared in this office, and is of the most reliable character, for there is no advantage to be derived from exaggeration. The New Ontario Exposition had been another means of advertising our district. I have been made secretary-treasurer, and general manager of this institution, and our fair was held in Port Arthur last year from September 13 to 15. We purchased from the Live Stock Association at Toronto, thirteen pedigreed bulls and two heifers, and sold these at public auction to the settlers. We also secured a large number of fine sheep, and poultry, which were purchased by the settlers. We secured from the Agricultural Department at Toronto two expert judges, also two ladies who gave demonstrations in domestic science. All of these features were new to this part of the country, and were favourably commented upon. All who visited this fair were impressed with the progress that our new settlers are making.

No failures of crops have ever been recorded in this part of Canada, and in the light of this experience we can assure our settlers bountiful crops annually. The Rainy River valley is being filled with a most excellent class of people. A couple of years ago Rainy River was a village of one or two houses, to-day it is a town with electric lights, two large saw-mills, and they are arranging for water-works, sewers and telephones, and have an engine for fire protection. All of the other towns along this river have made material advancement, especially Fort Frances. Here the water-power is being developed. At the present time our available free grant lands are almost exhausted. Last fall we asked the Ontario government for a new survey of 20,000 acres, all of which has been taken up, and we are calling for more surveys. One of the great difficulties to be overcome in this wooded country is the lack of colonization roads. We have made an effort to secure trunk roads through the centre of every new surveyed township, which would facilitate the settlement and save the settlers time and money, but so far this desirable feature of colonization has not been accomplished. The making of colonization roads is under the supervision of the Provincial Public Works Department, and all the lands of New Ontario are under the supervision of the Provincial Agricultural Department. The White Fish River valley on the Duluth branch of the Canadian Northern Railway, south-west of Port Arthur thirty miles, has made great development this year. This valley was opened for settlement six years ago.

When we explored this valley, and concluded to place settlers in it, there was a question as to its adaptibility to agricultural purposes, but now we have a settlement fifteen miles long, and seven miles wide, with more than 400 families, and a population of 2,000 people. There are three schoolhouses, and others being organized, also various church organizations. We know of no more prosperous colony in Canada. They find a good market at Port Arthur and Fort William for lumber, ties and cord-wood, therefore the settlers are kept employed all winter. Good trunk line colonization roads have been constructed. The Finland colony in Lybster township in the White Fish river colony have proved themselves most valuable settlers. They are constantly adding to their number. The 'All-British Contented Colony' (as they called themselves) in Strange township have not proved as successful as they anticipated, as many of them were artisans, and unaccustomed to agricultural pursuits; many of them have moved into town; however, the land which they occupied has been taken up by others. The settlers in Slate River valley, south-west of Fort William, known as New Illinois, in New Ontario, are succeeding beyond their most sanguine expectations. No more fertile valley can be found in Canada. They have just completed a new brick schoolhouse which cost $2,000, and a brick town hall costing $1,500. This is one of the best rural school districts in the province, the assessment being $50,000. All of this speaks well for the colony. A large number of the people are from North and South Dakota. The colony in Dorion township, on the Canadian Pacific Railway, east of Port Arthur, are doing nicely. They have had a great many disadvantages to contend with, but notwithstanding these, they are making substantial progress. This is largely a mixed community made up mostly of French-Canadians from the United States, and English people. Two post offices, two schools, and a saw-mill have been established, and very good colonization roads are being made. The Ontario experimental farm station is located at Dryden, on the Canadian Pacific Railway. This settlement has made satisfactory progress during the year. A large number of German settlers moved there from Dakota. The townships of Gorham and McIntyre are being settled mostly by Canadians from Wisconsin and Minnesota, and Italians. Last year in the municipality of Shuniah when the local elections were held, fourteen votes were cast, this year seventy-five. All the towns in Rainy River and Thunder Bay districts are being rapidly populated by a splendid class of people. Port Arthur and Fort William, situated at the head of Lake Superior, is now a great commercial centre. The erection of the blast furnace, coal and ore docks, and roasting ovens; the terminals of the Grand Trunk Pacific, the development of Kakebeka Falls, and the erection of other business utilities demonstrate the great prosperity that prevails here. Three large saw-mills are kept running in Port Arthur. Our lumber industry is one of the main stays of New Ontario. With our mineral and fishing and other industries which afford every opportunity for employment of common as well as skilled labour, the settler need not hesitate to come here and make his home.

Prospects for 1906 are good. The knowledge of the advantages here is becoming widespread. The town councils and boards of trade of our various towns and villages are becoming alive to the necessity of making our numerous advantages known. Our literature is in great demand, being called for from almost every part of the continent. We have even been requested to supply articles for the large papers in England, Scotland, Barbados, and in the United States. The best evidence that our settlers succeed is that they are prevailing upon their relatives and friends to come to New Ontario. The prejudice which once existed against this part of the country, as being a fit place for mixed farming, has been exploded, and now our settlements are looked upon as a substantial product of our body politic. The policy of the people everywhere is 'build up New Ontario.' With our sixteen million acres of land to the north of us, and the building of the Grand Trunk Pacific railroad, we can give homes to thousands of families right in the heart of this great Dominion. I know of no more promising field on the continent.

Your obedient servant,

R. A. BURRISS.

No. 24.

REPORT OF THE MONTREAL COLONIZATION SOCIETY.

(Société Générale de Colonisation et de Rapatriement de la Province de Quebec.)

MONTREAL, August 24, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—Operations of the Colonization Society of Montreal for the year ending June 30, 1905, were:—

	Settled.	Visitors.
North of Montreal	716	654
Timiskaming	716	654
Lake St. John	79	28
Metapedia Valley	87	66
Bay des Chaleurs district	21	
North of Ontario	131	34
Canadian west	263	
Total	1,485	830

Origin.	1904.	1905.
From Montreal	909	1,253
France and Belgium	95	155
Province of Quebec	425	579
United States	228	275
Switzerland, England, Russia	17	53
Total	1,674	2,315
Increase for 1905		641

Your obedient servant,

L. E. CARUFEL,
Secretary.

No. 25.

REPORT OF THE LAKE ST. JOHN REPATRIATION AND COLONIZATION SOCIETY.

QUEBEC, October 2, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—We have the honour to transmit the seventh annual report of the operations of our society, covering those for the year ended June 30, 1905.

The Quebec and Lake St. John Railway Company, as in former years, has continued its wise and generous policy of free transportation for new settlers and their household effects, as well as special rates to visitors and delegates.

The following is a statement of the number of settlers who established themselves in the regions of Lake St. John and Chicoutimi, under the direction of our society, during the season of 1904, showing the countries from which they came:—

From the United States	1,076
" Province of Quebec	1,124
" " Ontario	48
" France	305
" Belgium	73
" Finland	40
" Norway	27
" England	23
" Russia	32
" Sweden	54
" Germany	15
" Denmark	29
" Austria	14
Total	2,860

The number of delegates to visit this territory increases annually, and they agree in their published reports upon the brilliant future which is in store for the districts we are colonizing.

This year, as usual, these delegates, to the number of 225, have been carried gratuitously, both ways, over the line of the Quebec and Lake St. John Railway. They represented 121 parishes in Canada, 6 cities of the United States and of Europe, and 36 counties of Canada. In addition to these, 114 visitors took advantage of the half-rate to go and study the country, with a view to future settlement there.

There were five settlers' excursions. These excursions are becoming more and more popular in consequence of the very much reduced railway fares given on such occasions, which mean much to these people. These reduced fares permit of a stopover of thirty days, which affords ample time to the holders of the tickets to inspect the country. Those taking part in these excursions numbered as follows:—

Dates, 1904.	Number of Excursionists.
July 5	729
August 23	375
September 20	194
September 27	49
October 4	89
Total	1,436

This year (1905) four settlers' excursions were arranged for the following dates: June 27, August 29, and September 19 and 26. The trains left Quebec at 8.15 a.m., and as in the past, agents of the colonization society accompanied each train.

During 1904-05 we received and dispatched 3,724 letters relative to colonization at Lake St. John.

Our lectures have produced very good results. Unfortunately, our limited resources prevented us from increasing their number.

We have lately published a new edition of our 'Settler's Guide' in the Flemish language. This special edition is calculated to render great service to our cause in Flanders and at the Liège exhibition, where it is being distributed. This pamphlet is well illustrated and has a very fine appearance. It was prepared under the supervision of M. Treau de Cœli, at Antwerp.

There is a constant and steady progress in the industries of the Lake St. John and Chicoutimi region, and plenty of work is to be had everywhere at remunerative prices.

The Quebec and Lake St. John Railway is at present engaged in constructing 40 miles of new roadway in the direction of La Tuque. This line is destined to assure to Quebec and to Lake St. John a large part of the traffic of the St. Maurice region. It is furnishing employment to more than a thousand men, and will render great service to colonization and industry in this province.

The Lake St. John region will largely benefit by the establishment of a model farm for youth, under the charge of the Franciscan Order. This will be the worthy counterpart of the school of housekeeping maintained by the Ursuline Sisters, at Roberval, whose work has become so popular, especially during the last few years.

So far as we are concerned, we shall continue our work, proud, no doubt, of what has been accomplished in the past, but ambitious to make the future better still. We count, more than ever, upon that devotion to the cause on the part alike of the authorities, of our subscribers and of the public, which has never failed us.

The work of our society is the work of our Canadian land, and the aim which we have in view is a noble one, since we hope, by the conquest of the soil, and by making it as valuable as possible, to add more and more to the richness, the greatness and the grandeur of our province.

RENE DUPONT,
Secretary.

No. 26.

REPORT OF THE OTTAWA VALLEY IMMIGRATION AID SOCIETY.

OTTAWA, July 24, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit the following report showing the work done by our society from July 1, 1904, to June 30, 1905.

We find that the offices we occupy since the formation of the society at 50 Rideau street, are very central and well adapted to our undertaking. Intending settlers, travellers, and also residents of the city, in great number, are seeking daily information, literature and maps on the farming districts of the Dominion of Canada. We distribute hundreds of pamphlets every month. The lectures delivered are as numerous as it is possible to make them. On account of the preparations and arrangements needed for them, two lectures a month is the best we can do. During the past year the society has inaugurated the system of giving lectures on colonization and agriculture in the various English and French-speaking schools of the city and neighbourhood. All these lectures are well attended and bearing good results. We have two regular employees at our office, one typewriter and stenographer, who has charge of the correspondence, and who also fulfils other duties, and one lecturer, who has charge of the office while in the city, but whose chief duty is to organize and deliver lectures. In July, 1904, our lecturer started out on a lecturing tour which met with great success. At the end of May, 1905, he left again for the same purpose. He will deliver lectures at the following places: Richelieu county, St. Ours, St. Roch, Ste. Victoire, St. Aimé, Sorel, St. Joseph de Sorel; Charlevoix county, La Malbaie, St. Irénée, Les Eboulements, Baie St. Paul, Ste. Agnes, St. Fidèle, St. Urbain; Kamouraska county, La Rivière Ouelle; Temiscouata county, Fraserville; Lévis county, Lévis. He will also go across the border in the states of Wisconsin, Michigan and Minnesota. On December 14, 1904, a delegation composed of the principal officials of the board of direction of the society proceeded to Montreal to confer with the authorities of the Canadian Pacific Railway about the interests of colonization in New Ontario. At a meeting of our society, December 6, a motion was adopted to the effect of suggesting to the Canadian Pacific Railway authorities to consider the necessity of extending the Mattawa branch from Timiskaming to Ville Marie. We are gratified to learn of the probable building of this extension. This would open to the settlers a most desirable country, and is greatly wished for by all those interested in colonization work.

The following table will better explain our work:—

Year.	Lectures.	Maps and Pamphlets.	Visitors.	Certificates.
1904.				
July	.....	450	261	27
August	2	800	300	33
September	3	805	216	43
October	3	600	325	21
November	1	655	381	18
December	.....	720	376	12
1905.				
January	2	980	245	12
February	1	1,136	284	14
March	2	1,312	328	20
April	3	1,573	238	39
May	2	2,030	378	36
June	4	1,950	417	54
Total	23	13,011	3,749	329

Your obedient servant,

R. CHEVRIER,

President.

REPORTS OF IMMIGRATION OFFICIALS IN WESTERN CANADA.

No. 1.

REPORT OF THE COMMISSIONER OF IMMIGRATION.

WINNIPEG, MAN., July 1, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I beg to submit the following report, based, for the most part, on a collation of the reports of immigration agents, land agents, land guides, interpreters, and others who come directly in contact with new arrivals and with the general business of the Immigration Department in western Canada.

A large increase is noticeable in the volume of business we have to attend to, owing, no doubt, to the great 'spread' of settlement over the whole of the North-west. This has required an increase in the staff in order to keep the new arrivals within the purview of our officers, so that advice and assistance, when needed, could be readily afforded, thereby preventing what might, in some isolated cases, lead to unnecessary hardship.

It continues to be a deplorable fact that those who fail to find conditions of life in western Canada entirely to their liking take the unfair method sometimes of exposing what they call the 'disadvantages' of western Canada through the columns of various newspapers. It is scarcely to be expected that all who come will at once find what they seek, and the department makes no claim to absolute perfection; but after all it may be said that very few of the new arrivals fail to find satisfaction and leave the country. In attempting to enumerate the disappointed ones the mistake is often made too of confounding those who are returning to their native land for a trip with those who really regret having come to Canada. The former class are increasing steadily year by year, and the city of Winnipeg (as a single example) is unique in this respect, that a large number of artisans are in a position financially to make the trip to the old country and back, but instead of these being counted as disappointed ones leaving Canada, they should be classed as self-appointed immigration agents for the Dominion.

The widespread settlement which has been going on for the past twelve months has filled up many gaps in districts only partially settled in previous years, and opened up thousands of miles of new area where the department has found it necessary to place officers to guide the new settlers; and the policy of treating each individual case upon its own merits having been continued as the most advisable, the details of the work connected with this branch of the public service have become multitudinous and past any system of computation. To have accomplished the peaceful settlement of such an army of individuals of such varied nationalities and different conditions with so little friction, and practically no adverse comment, is, I beg to respectfully suggest, a matter of considerable credit to the many officers of the department engaged in the work during the past twelve months.

The prominent improvement noticeable in the number of new arrivals is the large addition of those from the British Isles, the board of trade reports published by the Imperial government bearing out the satisfactory increase, and it is a pleasure to note the very decided improvement in the material and financial capacity of such British immigrants, which has made it possible for the officers of the department to feel better able to do their work than in previous years.

In this connection, I desire to bear distinct testimony to the personal efforts of all the agents of the government to maintain the high reputation which the government of Canada has secured through careful, courteous treatment of all new arrivals. What has been said in previous reports about the absorption of this army of individuals by western Canada may be repeated now. At no time have the resources of the department been so overtaxed as to create a congestion of business, and those desiring situations on farms at least have all been readily placed, no matter what time of the year they came. Nothing is needed beyond this fact to prove the extent of the fertile land of western Canada, and exhibit the fact that immense new areas are being brought under crop each succeeding year.

One regret to be recorded is a slight falling off in arrivals from the United States. This was not unexpected. Our agents have been in immediate touch with very large numbers of those who have already arrived, and from them there is no difficulty in gathering such information as points to a determined effort on the part of American railway companies, land companies, banks and other kindred institutions to combine and organize a movement against emigration to Canada. If I may be permitted an opinion on this feature, I think it would go without contradiction that the arrival of so nearly the same number as the previous year from the States is abundant evidence of the increased activity and improved organization of the immigration forces of Canada in the States. The opposition to our work was, and is, of such a determined and influential character as to threaten to wipe out a very large portion of our intending immigration, that it is more than gratifying to find that notwithstanding all such opposing forces, Canada has secured so many of the very best people from the states south of the border.

Appended is a detailed statement of the arrivals recorded in this office for the fiscal year. Nothing more need be added to figures on British immigration, which tell their own story.

WELSH.

We are not yet receiving as large a number of Welsh people as we would desire, but the record of those already in western Canada will have a stimulating effect upon this branch of the work. Whether in towns or on farms, Welshmen have carried forward their well known national characteristics, and their progress is marked. The principal Welsh settlement is at Llewellyn, and our reports show that they have the following under crop: Wheat, 2,150 acres; oats, 1,036 acres; barley, 54 acres; flax, 19 acres; potatoes, 30 acres; new breaking, 1,783 acres. Livestock: horses, 198; cattle 510; hogs 99; poultry 1,446; and, considering these people have only been on their land a short while, this is direct evidence of their prosperity. The homesteading land in their district has been all taken up, and some of the adjoining sections purchased by the settlers, proving that they are not only satisfied with their conditions, but have secured the means to purchase additional land. Within the settlement are four school houses; in three of them school is conducted every day by qualified teachers, and the fourth is preparing to receive scholars.

GERMANS.

The German immigration into western Canada has been largely from the United States, and has had the special attention of our German officers. Practically all those who arrived from the States have settled in the North-west Territories, while of the ocean port arrivals some have remained temporarily in Manitoba; about 2,000 have settled on land in the North-west Territories, and 66, being miners, have gone to British Columbia. The class of Germans we have been receiving is in every respect desirable; and it is hoped some special means can be taken to secure a much larger number for western Canada. The Germans throughout western Canada are uniformly successful, and speedily adopt the language and institutions of the Dominion.

HEBREWS.

Most of the Hebrew arrivals claimed to be farm labourers, but, a very small percentage remained where they were sent, the remainder being scattered throughout Manitoba and the eastern portion of the Territories, making their living by peddling and trading; yet among the earlier Hebrew settlers there are remarkable instances of success on the land. There are 50 Jewish settlers in the Hirsch colony at present, and nearly every one has more than 100 acres under cultivation; 1,200 acres of new land was broken this summer. The crop prospects are excellent, apparently the best since the colony was first started. It would seem that during the last few years those of the original settlement who remained on the land have diligently applied themselves to the work of farming, and it is the opinion of the Rabbi in charge that in a year or two, a repetition of the present prospects would enable most of his people to be free of debt and individual owners of 320 acres of good fertile land.

SWISS.

These people are in every way desirable and are either on homesteads of their own or working as farm labourers.

SCANDINAVIANS.

Reports from all Scandinavian colonies indicate great success, and good prospects for a banner crop. If the crop is safely harvested good reports will be sent abroad, and immigration should be largely augmented thereby. This will apply not only to the poorer class, but the well-to-do who have money to invest in land, and with the early construction of the Grand Trunk Pacific Railway and other railways, it is reasonable to hope that a large number of Scandinavians will move from the States into Canada. This year's immigrants have been of the most desirable class, and brought with them considerable money, in some instances varying from one to three or four thousand dollars. This is especially the case with those who came from the States and who sold their farms there at a good price. The health of this class of immigrant has been very good. No sickness to speak of has been noticed upon their arrival, although several labourers in railway and bush camps have suffered from fever. All Scandinavians willing to work at fair terms have been furnished with employment at wages from $15 to $25 per month on farms, and $1.50 to $2 a day at railway work. A number have been sent to saw-mills and mining camps in British Columbia. The demand for domestic servants has been far ahead of the supply, and Swedish girls seem to be in particular demand for positions in private families at very good wages. I am pleased to note the excellent results which have been obtained by those settled in Canada re-visiting their old homes, as they frequently bring a number of their friends back with them.

DUTCH AND FLEMISH IMMIGRATION.

This being the first year there has been anything to note of Dutch immigration, a great deal of difficulty has been experienced, as would seem natural, on account of these people not having any friends previously in the country; further, their inability to speak English made it very difficult to find employment for some of them; but these initial difficulties have been overcome, and they are all placed on farms or at railway work. These people are a little slow in their ways and are not so easy to satisfy as others; but they are likely to prove very desirable settlers, as they were successful farmers in their own country, especially in the dairy line. It is pleasing to note that all this class of immigrant are well able to read and write, and speedily pick up the English language. A number of them have already taken homesteads in the neighbourhood of Davidson, Assiniboia, but the greater number are out working in order to gain experience and money. In connection with this particular class, it would seem advisable that the agent of the government in Holland should be directed to advise the people not to come before April or May. Those coming earlier than the middle of April find that spring is not so far advanced as it was when they left Holland, and their ideas are very much upset in consequence; and when there is no work for them at that time, they at once become a burden to the department and the ground work for disappointment is at once laid. It is not advisable that tradesmen should be encouraged to come, unless they speak English, or are prepared to take up any kind of work The mechanic who does not speak English, and insists upon his own line of employment, is about the hardest class of man we can have to place. He cannot understand what is told him, and naturally the foremen consider they have no time to waste.

As to the Flemish colonists, it has been easier to place them at work. There are already a considerable number of them in the country, and the older settlers assist the new arrivals. The Flemish are well liked in railway and bush work and, as a rule, are not long in saving up enough money to take up their own farms. A number of Flemish are also settling with the Dutch near Davidson.

Having got over the initial difficulties of this new type of immigration, it is hoped that our efforts will be such as to warrant those arriving this year spreading the good news and improving the immigration for our next annual report.

RUTHENIANS AND GALICIANS.

A large number of this year's arrivals evidently received help from those already in Canada, and, curious to relate, the steady movement from Galicia and Bukowina has seriously affected the price of lands there so as to make it more difficult for those who have land to realize upon it before leaving for Canada. This class of immigration has not been coming forward in such large numbers in single parties as in previous years, but has been arriving frequently and passing through to friends in a good many cases without much difficulty. Of the total arrivals considerably over one-half immediately went out on to land in Manitoba and the Territories, the balance being settled in Winnipeg and other towns in Manitoba, where they are earning money to enable them to homestead subsequently. Besides the Ruthenians, some Bohemians arrived from Austria composed mostly of labourers and townspeople. The result of personal investigation shows that the Galicians are making very satisfactory progress, and their operations on land have been very generally successful; indeed, some of the older settlers have over 100 acres in crop this year, and herds of cattle varying from 20 to 50 head. The prospective construction of railways throughout the North-west will afford ample employment for all of this class who require this work, and for many thousands of others who might safely be induced to come to Canada.

HUNGARIANS.

Hungarians came as usual from Europe, from the United States, from eastern Canada, and of the adult males 216 were agriculturists and 169 labourers. Hungarian settlers, as a rule, come here for the purpose of taking up farms, and until a year ago scarcely any were found in the towns. They are generally very healthy, willing, and able to work, and are a very hardy class. Possibly one-half the above number settled around Esterhazy and Lipton, amongst their fellow-countrymen; Esterhazy being one of their oldest settlements, while Lipton (near the Touchwood hills) is a new settlement started by Officer Woodcutter last year, and in which colony there are about 90 families settled at the present time. Others of this year's arrivals are remaining in Winnipeg and other towns, making and saving money with which to take up their homesteads. Generally speaking, the Hungarian settlers throughout the west are well satisfied in comparison with affairs in Hungary, which are far from prosperous. The prospect of getting 160 acres of homestead land is a good step forward for them, and they soon earn sufficient to send for their friends to follow. Our correspondence shows that a large number of Hungarians would leave Hungary and the United States, only they have become so poor as not to have the necessary money for their passage. They are not in the habit of asking for assistance and seldom, if ever, is it found necessary to offer the assistance of the department to one of this nationality.

DOUKHOBORS.

This class of settlers appears to be improving in material prosperity from year to year. Unfortunately, they have not devoted much time or attention to the necessities of education, but seem to have devoted their energies more to getting land broken up and put into crop. Their crops appear to be generally as good as others in the same district, and amongst the Doukhobors in Assiniboia there are 10 steam ploughing outfits and 310 good heavy teams of horses. It is estimated that this settlement has nearly 13,000 acres under crop, which amount will be largely increased by next spring. It is estimated that 5,765 souls are in this settlement, and of this number about 850 of the men are out at work on railway construction and elsewhere. The same condition of success seems to be following the efforts of the Doukhobors who have located in and about Redberry lake, in the province of Saskatchewan, and our reports indicate that the health of this community is very good. Beyond an occasional attempt at a pilgrimage by three or four misguided members amongst them, the department has had no difficulty with these people during the past twelve months.

FRENCH.

The feature of this year's work has been the arrival of a large number of people from France having with them their families, and I am pleased to report that we have been able to secure work for all of them at good wages, and their reports should be satisfactory reading for immigration purposes in Europe. These new arrivals are fully up to the high mark of arrivals from the same country during the previous year. They willingly accept the work offered to them, particularly from those of their own nationality, and are eager to save sufficient money and gain the necessary experience to enter into farming operations on their own account.

I am pleased to report that throughout western Canada the French and Belgian people are succeeding to a very gratifying extent. Their operations in the agricultural line indicate the energy and capability which they are able to put into their work.

ICELANDERS.

All these people, whether from Iceland direct or from the United States, were of a very good class, all having more or less means, especially those from the States. Our agent met one party at Emerson on May 24 last which had a special train consisting of two passenger cars and thirty-five cars of stock and effects, and went to Wadena. It is expected that a number of Icelanders will emigrate from North Dakota to western Canada this year, as North Dakota is getting over-crowded, and land is very high in price.

IMMIGRATION ACCOMMODATION.

The department has erected and maintained immigration halls at Winnipeg, Brandon, Saskatoon, Lethbridge, Moose Jaw, Yorkton, Qu'Appelle, Dauphin, Regina, Rosthern, Prince Albert, Calgary, Strathcona, Craik, Davidson, Duck Lake and Lloydminster, and has rented for the same purpose buildings at East Selkirk, Macleod, Saltcoats, Ponoka, Innisfail, Lacombe, Birtle, Minnedosa, Edmonton, Prince Albert, Rosthern, Olds, Battleford, Leduc, and furnished suitable tent accommodation, or tents for sale, at the following points: Alameda, Arcola, Bonnington, Balgonie, Battleford, Blind Man's River, Brandon, Broadview, Calgary, Caron, Carstairs, Claresholm, Coutts, Dauphin, Davidson, Didsbury, Duck Lake, Dundurn, East Selkirk, Edmonton, Elkhorn, Estevan, Esterhazy, Glen Mary, Grandview, Grenfell, Halbrite, Hanley, Heatherbrae, High River, Herbert, Indian Head, Innisfail, Irvine, Killarney, Kaposvar, Lumsden, Lacombe, Lamerton, Leduc, Lethbridge, Lloydminster, Moose Jaw, Macleod, Macoun, Manor, Medicine Hat, Melfort, Milestone, Millet, Moosomin, Mowbray, North Portal, Okotoks, Olds, Osler, Ponoka, Prince Albert, Quill Lake, Fort Qu'Appelle, South Qu'Appelle, Red Deer, Red Willow, Regina, Rosthern, Rouleau, Russell, Ranchvale, Saltcoats, Swift Current, Saskatoon, Sifton, Solsgirth, Sprague, Swan River, Strathcona, Teulon, Treherne, Vegreville, Virden, Wapella, Wauchope, Wetaskiwin, Weyburn, Whitewood, Wilcox, Wolseley, Yellow Grass and Yorkton.

Progress is being made with the erection of the new and much-needed immigration buildings at Winnipeg.

EMPLOYMENT.

Four hundred and fifty-one applications for married couples were received at this office during the fiscal year, but as most applicants were unable to take couples with families, the department did not fill all these applications. Nearly 6,000 direct and individual applications were received from farmers for farm help, and there was little difficulty in distributing new arrivals. Scotch ploughmen arriving during the year are now receiving $240 per annum besides board and lodging, and the demand for their services continues to be a vigorous one. It is estimated that there are 100,000 young ploughmen in Scotland between the ages of twenty and thirty-five years, many of whom would make useful immigrants for Canada.

In order to safely garner the crop of 1904, 12,391 farm labourers entered western Canada from the east, distributed as follows:—

Main line, Winnipeg to Moose Jaw	5,174
Winnipeg to Yorkton	866
Winnipeg to Souris	1,236
Beresford to Estevan	1,727
Arcola Branch	524
Deloraine Branch	2,060
Other branches	804
	12,391

CORRESPONDENCE.

The number of letters received in this office for the fiscal year ending June 30, 1905, was 27,540, and the number sent out 33,337.

CROPS.

Keeping pace with the large number of new arrivals has been the increasing area year by year under crop, the area under wheat alone this year being returned as 2,643,588 acres.

It is interesting also to note that the expenditure on new farm buildings in the province of Manitoba during 1904, was reported to be $2,950,710, not to speak of the much larger sum expended in buildings in cities, towns and villages. So large a sum expended on permanent improvements on farms is a fair index of the general developmen and prosperity of the west.

HEALTH OF IMMIGRANTS.

The inspecting health officer of the department here has, during the year, inspected all immigrants coming into the country from points east of Winnipeg, and has attended all those who have been accommodated in the Winnipeg immigration buildings from time to time. He has made 383 visits to the hall, and given medical attendance to 249 cases of sickness. Two children died of pneumonia following measles, and certificates were furnished regarding 43 undesirable immigrants who were deported. Three isolated cases of small-pox from different steamers were discovered, but by prompt, adequate measures, no other cases resulted, and the three patients in question fully recovered from the disease. These cases of small-pox were undoubtedly contracted on the steamer crossing the ocean, and were not discovered until they reached Winnipeg, about the end of the period usually taken for development of this disease. As the department has at present no quarantine or infectious hospital for the treatment of such cases, arrangements were made with the city of Winnipeg for the use of their small-pox hospital under the control and expense of the department while these cases were treated. The health of the great bulk of the new arrivals has been exceptionally good.

DUTIES OF TRAVELLING AGENTS.

Upon the travelling agents fall many exacting duties, and I note with pleasure the great tact and care with which the newcomers are met and handled by these officials, who receive them into the great west at first hand. Their work brings them into contact with most, if not all the arrivals coming into western Canada from eastern Canadian or trans-ocean points, and under the regulations of the department they are often instrumental in securing comforts and facilities for new arrivals which they would not otherwise enjoy. At divisional points precautions are taken to see that the necessary attention is given to a plentiful supply of water, cleanliness of the cars, &c. At important divisional points, such as Chalk River, North Bay, Chapleau, White River and Schreiber, the railway company has now arranged to supply hot water for the colonist cars free of charge. It is observed that there has been a greater number and better class of cars provided for immigrants by the railway company, and with new tourist sleepers for second-class passengers attached to many of these trains, the comfort of the newcomers on what appears to them a very long journey, is better provided for.

AT EAST SELKIRK.

It has been found necessary to continue to detrain large numbers of foreign-born immigrants at East Selkirk for better distribution, and to care for them until their friends are located or their disposition is decided upon. At this point during the year there were received 3,533 new arrivals, principally of German and Austrian nationalities. This number is much less than previous years, but is accounted for by the fact that this class of people now come through in smaller parties, arriving more frequently, and are often ticketed direct to their friends.

DISTRICT REPORTS.

Our agent at Stuartburn, in south-eastern Manitoba, reports that although his district is fairly well settled so far as surveyed land is concerned, during the year he received 60 applications for homesteads, largely from Galician settlers who are succeeding especially well in this district, their crops being in good condition, and their material wealth by way of livestock, &c., making a very creditable showing.

Since the main line of the Canadian Northern Railway has been pushed westward, many new points of importance have arisen, but Dauphin still maintains a proud position as a junction town. Our agent reports the immigrants coming to this district as principally English, Irish and Scotch, and of a much better class than in previous years. Fully 500 received accommodation at the immigration hall, and those who required work were furnished it without any trouble. Five hundred and twenty new homesteads were entered for during the year.

Swan River, in the extreme north-western corner of Manitoba, is favoured by many newcomers of a very superior class from eastern Canada, the United States, Great Britain, and also some from New Zealand. The first settlers appear to be receiving the reward of their labour and some of them have sold their homesteads at prices varying from $2,500 to $3,000 each. Fifty-seven cars of settlers' effects were unloaded at this point.

The Swedish settlement named Alpine, in township 32, range 29, W.P.M., is growing and showing splendid signs of advancement.

Much building is under way in the various towns along the Canadian Northern Railway.

Tisdale, in Saskatchewan, within a district which has recently been opened up by the construction of the railway, is attracting English, Scotch, American and Canadian settlers.

Brandon, in the heart of an old settled district, in Manitoba, has been absorbing a large number of new arrivals as farm hands. During the spring season of 1905 alone over 600 persons arrived and received accommodation in the new immigration building at Brandon, and were immediately placed with farmers and others in the surrounding district. The city itself is developing to an extraordinary extent, and this being but a reflex of the condition amongst the farmers there has been no real difficulty in finding work for all able-bodied willing men. It is estimated that 15 per cent more is under crop this year than in 1904, and the prospects for a bountiful harvest appear to be reasonably certain of realization.

Our agent at Moosomin, on the main line of the Canadian Pacific Railway, reports particularly that all the British settlers in his district are doing well, and most express themselves as well satisfied. One instance in particular is that of a Scotchman who with his family arrived and homesteaded there two years ago with $600 capital; broke up 90 acres, and has 50 acres now in crop. His cattle, horses and implements are worth $2,000.

The large district around Moosomin has probably been augmented by a thousand new arrivals during the past year, and the high standard has been maintained.

At Wapella is reported an increase of settlers, although lack of homesteads makes it almost impossible for anyone to secure a free entry except by cancellation. It is noted that the Finnish colony have absorbed all the available homestead land in their vicinity, and are progressing satisfactorily. The Hebrew colony is slowly diminishing in numbers; only the best of them have remained on the farms, the others going into business in towns.

The departmental officer at Grenfell reports that the new settlers going in to townships 14 and 15, ranges 5, 6, 7 and 8 W. 2 M., three years ago, when it was all wild prairie, have now crops that will average from 25 to 30 bushels per acre, and many large fields will go 40. The newer part of the German colony to the north of Grenfell appears to be just as good as that on the south. Most of these settlers came in very poor, and consequently their progress has been slow; nevertheless, it is very marked.

In order to meet the demand for homesteads in the Alameda district, township 8, in ranges 19, 20 and 21, and township 7, in range 21, W. 2 M., have been surveyed, and thrown open for settlement. The settlers arriving during the past year are of a superior class, the majority being practical farmers from the United States. The number of homesteaders in this district about equals those of the previous fiscal year.

The town of Redvers, Assiniboia, received a very fair proportion of the tide of immigration. Forty cars of effects were unloaded at this point during the season, and about 450 settlers arrived, all of a good class, chiefly from the States and older provinces of the Dominion. Homestead land is being all taken up, and a great deal of other land is changing hands to actual settlers. Two large elevators were erected at Redvers during the past year, besides three large general stores.

The Carlyle district has received a substantial increase in the way of settlers during the year, and many are purchasing improved farms and paying from $20 to $25 per acre therefor.

Notwithstanding the extension of the railway beyond, Arcola continues to be of prime importance, and the district surrounding has made rapid advancement during the past year. Many hundreds of first-class settlers have come in, and the acreage under crop has increased 25 per cent. Never in the history of the district has so much new land been broken as during the spring of 1905. The fact that in this district there are prosperous settlements of Germans, Norwegians, Americans and French, has induced large numbers of these nationalities to settle in the district, the portion of foreign-born to British-born settlers being 25 per cent. Two hundred and twenty homesteads were entered for in this sub-agency during the year.

The construction of the railway from Arcola to Regina has opened up a wonderfully fertile district, and already the traffic is so great that trains and special freights are running both ways daily. The prospects for a good harvest are very bright.

With the advent of the Kirkella branch of the Canadian Pacific Railway, many towns have sprung up. Of these Esterhazy is one of the most promising. The settlers in the district are making splendid progress. The land is being brought rapidly under cultivation, and the settlers are greatly encouraged in doing so by the splendid yields of the past few years, and the convenience of a good market near at hand.

In the Hungarian colony evidences of prosperity are seen on every hand; many new buildings are going up. The village of Esterhazy has come to importance in less than two years; all trades and professions are fully represented, and business is brisk. The English colony to the north of the town is showing the same general prosperity, and nearby one large land owner from Minnesota is breaking up a thousand acres of land this year.

Another important point is at and around Stockholm (so-called because of the large and progressive Scandinavian settlement there). Lands are rapidly changing hands in the district, being purchased by original settlers and new arrivals. Those already on the land appear to be making good progress, and the acreage under crop is nearly double that of the previous year. The construction of the Kirkella branch of the Canadian Pacific Railway, has greatly improved the conveniences in this district, and Stockholm itself has become quite a centre, with one elevator, two lumber yards, two implement houses, three general stores, two hotels, hardware and furniture store, two livery stables, dwelling houses, &c.

Our correspondent at Dubuc, Assa., reports the new arrivals in his district at about 700 souls. One hundred and forty-three homestead entries were made at this sub-agency and the whole district appears to be enjoying prosperity.

The sub-agent of Dominion lands, Touchwood Hills, remarks upon the change from a ranching to a general farming district. The settlers coming in embrace those from the United States as well as Canada and the old country. It is also pointed out that in the northern section of the district, where the settlers are largely Germans and Hungarians, these people are cleanly, industrious and well educated, and the majority of them have been engaged in farming in their native land.

At no point on the Pheasant Hills branch of the Canadian Pacific Railway has there been shown more vigorous development than at Lipton. The whole district is in a flourishing condition, with excellent prospects for this year. Seven hundred and twenty-two homesteads were taken up there by a class most suitable for the country. In the Loon Creek settlement 22,000 acres are under crop; Fort Qu'Appelle, 4,500 acres in crop; Kronsberg, an Austrian settlement south-west of Lipton, 6,000 acres in crop; Hayward settlement, 3,000 acres; Roumanian Jewish settlement, 2,000 acres in crop; Headlands, a new settlement a year old, 1,000 acres in crop; Balcarres, 35,000 acres; LeBret, 4,000 acres. Wheat at the date of this report is 3 feet 9 inches high, and barley 4 feet high. Churches and schools are being established in every part, and the general prospects could not be brighter.

Along the Yorkton branch, Minnedosa reports the more closely settling up of the district, and homesteads which have been rejected by others are now gladly sought, daily applications being made for such in person and by letter.

The agent at Ranchvale, Manitoba, reports that the Galician settlers in his district, although settled on land difficult to clear, have succeeded admirably; in the aggregate a large quantity of the land has been cleared, averaging, probably, 12 to 20 acres for each settler, and is producing the very best of crops. Many have horses and cattle and good buildings besides up-to-date agricultural machinery. A number of schools are urgently needed in this district.

The main line of the Canadian Northern Railway lying to the north of this district has opened up a very large agricultural area, and the same has been rapidly taken up by a large number of settlers. This has caused a number of small towns to spring up every ten or twelve miles along the railway. It is noticeable that the new settlers arriving are of a class that are sure to succeed, and land which has been passed over for years, as being second or third-class, is now eagerly taken up by practical farmers. In this district are to be found a number of Galicians, Doukhobors, Hungarians, Germans and Icelanders, and it is claimed they have by industry and frugality given an object lesson of what can be achieved in western Canada, even by those who cannot at first speak the language. The majority have erected comfortable dwellings, good out-buildings, and have large areas under cultivation, also holding from ten to one hundred head of cattle and horses, &c. If the Doukhobors could be induced to break away from the community principle, there is no reason why they should not be as successful as some of their own class in the Swan River district who have individual farms, and have 65 acres in crop this year.

At the very important wheat and cattle shipping centre of Yorkton, the agent reports the incoming of settlers in undiminished numbers. These have taken homesteads along the Canadian Northern Railway main line, on the Quill Plains and in the Last Mountain valley. It appears the larger proportion of these settlers passed to their destination over the new railway mentioned, the nationalities preponderating being Canadian and American. The English and Scotch settlers seem to have preferred the Last Mountain valley district. The number of homesteads granted at this office during the year was 4,471.

Our land guide at Kristnes, Assiniboia, reports the new arrivals prove very desirable settlers. The acreage of the immediate vicinity comprises 6,000 acres, about double that of the previous year.

The agent at the new town of Canora, reports this new district to be settling up very fast and the crop acreage rapidly increasing.

Further west along the main line of the Canadian Northern Railway is the town and district of Humboldt, Saskatchewan. As this is an entirely new district, it is impossible to state definitely the degree of land under cultivation, or the condition of the settlers, but most of the homestead land around Humboldt is taken up, and the demand for homesteads still keeps up strongly. Notwithstanding the newness of the district, it is estimated that 20,000 or 25,000 acres will be in crop this year, of which 8,000 acres is in wheat, and giving evidence of a good harvest.

The rapidity with which the German Catholic settlers from the States have established themselves in substantial homes, and brought immense areas of land under cultivation is a special tribute to the desirability and capacity of these farming people.

Regina is in the very heart of an immense wheat raising district. During the year just closed our immigration hall there provided accommodation for 3,709 souls as compared with 1,958 in the previous year. The class of immigrants passing through is a decided improvement over those arriving in previous years, and while the greater majority were from Great Britain, Germans were a close second, and of a very desirable kind, most of them being farmers from the western States, with considerable capital. No serious sickness was noticed among the newcomers, and the milder ailments received prompt attention and treatment.

The immigration movement of the year has been particularly strong towards Saskatchewan, and passing northward from Regina, all points present the same favourable report. At Craik many persons were provided with shelter at the new immigration hall. One hundred and forty-three cars of settlers' effects were unloaded here during the year, accompanying them being 179 families of settlers.

Davidson sub-land agency reports a busy season, and the value of the immigration building at this point has been much emphasized. Two hundred and fifty-two cars of settlers' effects have been unloaded at this station.

Our reports show that nearly 1,500 new settlers, mostly Canadians and Americans, have located in the Hanley district during the past year. One hundred and seventy cars of settlers' effects were unloaded at this point.

Saskatoon continues to be an important business and distributing centre. The immigration hall at this point has afforded accommodation for over three thousand souls, indicating the large volume of business which has been attended to at this point. Four hundred and forty cars of settlers' effects were unloaded, and these are estimated to be worth at least $800,000. Two thousand one hundred and forty-two applications for homestead were made in Saskatoon during the past year, principally by Americans and eastern Canadians, with a small percentage of English and French. A very large number of the homesteaders have been going south-west of Saskatoon into townships 29 to 34, ranges 10 to 15, W. 3 M.

The immigration agent at Rosthern reports that the influx of settlers into that particular district has not been as great as in the previous year, owing to the shortage of available choice free homesteads and the opening of new railways which has placed settlers nearer the vacant lands than Rosthern. This agent has recently visited different colonies in the district, consisting of German, German-Mennonites, German-Catholics, Galicians, Doukhobors, Hungarians and others, and reports that satisfaction prevails throughout the district. A large new colony of German-Mennonites has recently been located in the Quill Lakes district, south of the Canadian Northern Railway, and a large number of people have already settled there.

Prince Albert, Saskatchewan, is yearly becoming a more important railway centre, with the prospect of continuation of the Canadian Northern Railway to some point on the main line east of Battleford. During the year 777 souls were accommodated in the immigration hall. A large number of persons arrived seeking homestead lands. In the Shell River district the settlers are making great improvements. They are well satisfied and prosperous. Twenty-five per cent more homestead entries were granted than in the previous year, the total recorded for the twelve months to date being over 2,000, a marked feature of which has been the steady regularity with which they have been made throughout the year. Incoming settlers were Americans, Canadians, British, Scandinavian and French. The chief centres of settlement have been the Great Bend country, Hoodoo Plains, Shell Brook and Tisdale.

The land guide at Great Bend P.O., Saskatchewan, reports on the district surrounding Maymont station, on the main line of the Canadian Northern Railway. The settlers coming into this district are mostly from Manitoba and the United States. The best homesteads are all taken within an easy radius, and a large quantity of other lands purchased by actual settlers.

Battleford reports an enormous influx of people and not less than 1,500 persons more are located on homesteads than were settled there a year ago. A large number of new arrivals come from the agricultural states of the Union, including a number of former Canadians and their descendants. Over 200 British immigrants arrived in one party from England early in 1905. The whole of the newly added population intend to engage in agricultural pursuits, 80 per cent having been farmers before their arrival. The favourite field for colonization during the year has been the newly sub-divided areas south and west of Battleford, from Manitou lake to Tramping lake, and southward from the Battle river. There is no hesitation on the part of these new arrivals to go a long distance ahead of the railway construction. A number of settlers have also gone in between the Saskatchewan and the Battle rivers in the vicinity of Lloydminster, and many north of the Saskatchewan river, east of Battleford. The Canadian Northern Railway is now in operation to this point, and scores of settlers arrive by each of the tri-weekly trains.

The agent of Dominion lands, at Battleford, confirms the appreciative feelings of the settlers in the district by saying the arrival of the main line of the Canadian Northern Railway has marked an epoch in the history of that part of western Canada. When it is remembered that in the previous report it was stated that settlers were obliged to travel from Saskatoon one or two hundred miles westward, whereas, they can now take the train to Battleford and, shortly, a great distance beyond, the extraordinary increase in the business of the department at this point is not to be wondered at. During the past fiscal year 3,618 homestead entries were made at this point, and for some distance on both sides of the main line the district is now thickly settled. One remarkable and most satisfactory feature of this year's immigration at this point is the large number of homesteaders who come to stay, and take immediate possession of the land. The element of speculation seems to have very largely disappeared.

A large settlement of Germans from the States has been located in the Tramping Lake district; it is expected their numbers will be augmented this fall by a thousand families, and as they have sold their lands in the United States they come equipped with money, a good knowledge of the modern ways of farming, and are inclined to be thrifty and industrious.

The agent at Lloydminster, Saskatchewan, reports a large number having settled in his district during the year, the number of Canadians and Americans far exceeding those of any previous year. During May, 1905, a party of Britishers, over 200 in number, arrived and all those eligible for homesteads were located very rapidly. It is pleasing to note that the original settlers of what was then called the 'Barr Colony' are now in better condition, and are appreciating the fact that extra individual work will bring satisfactory financial results. They are getting a large acreage under cultivation, and it is anticipated that the next two years will show a very decided advance over the last two.

Our land guides at Breage, near Vermillion river, in Saskatchewan, report a very large influx of settlers, although, up to the present time there has been no railway in the district. The newcomers are practically all English-speaking people, having come from Great Britain and the States in anticipation of the railway which it is expected will reach Edmonton through this district by the end of 1905. There is great need of a traffic bridge across the Vermillion river, to give the large number of new settlers north of that river access to the railway. Between 4,000 and 5,000 acres of land have been broken this year, and the crops that have been put in already give promise of a magnificent yield. The advent of the farmer has driven the ranchers further back, and the district is rapidly becoming one of great importance as a very large area of desirable land is still available there.

Continuing westward from Regina, the district of Moose Jaw has exhibited remarkable progress. Half a million bushels of wheat were marketed at Moose Jaw, realizing about 70 cents per bushel. The city of Moose Jaw itself is spending large sums in permanent improvements, and the whole district is filling up with the best class of people. During the season 171 people have been accommodated at the immigration hall at this point. The acreage under crop has increased 25 per cent, and from present prospects an army of labourers will be required to secure the same. The special efforts of the Moose Jaw Board of Trade to attract settlers to the district have been very successful.

Our travelling immigration agents stationed at North Portal and Moose Jaw, Assiniboia, report that during the twelve months 12,765 settlers passed in at North Portal, with 1,495 cars of settlers' effects and stock. The class of settlers appeared to be of a high standard and very desirable. Many of the American citizens have now become naturalized, and it is gratifying and noticeable that most aliens are anxious to become citizens as soon as they can, and invariably express appreciation of the institutions in Canada.

The agent at Willow Bunch reports that lack of railway communication with that district has prevented many new settlers reaching there, and for the same reason little farming is done. Stock raising is very successful, however, and with abundance of rain during the months of May and June of this year the grasses and garden vegetables are in excellent condition. This district is well adapted for mixed farming; has good soil; water is easily obtained: and coal and timber in abundance within easy distance; and it will be a very desirable location for settlers when railway communication is obtained.

Coterminous with the Moose Jaw district is that of Caron, where 25,000 acres of land have been broken during the past season. Six steam ploughing outfits are being worked. The increase under cultivation this year will be 15 per cent over that of the previous year. The district appears to be well thought of by new arrivals, as very large numbers are continually arriving there, and many are settling along the proposed new line of railway from Moose Jaw to the Elbow of the Saskatchewan.

The sub-agent of Dominion lands, at Maple creek, Assiniboia, reports a slight falling off in the number of homestead entries through his office, but the whole district has steadily improved, and at present the acreage under crop is estimated at 3,500 acres, which is remarkable in view of the fact that the district has always been considered a stock-raising country. During the year there was reported from the States at this office 3,764 head of cattle, 506 horses, and 2,977 sheep. All live stock appear to be doing well.

Swift Current has undergone a transformation the past year. Miles of prairie rich in grasses and with soil equal to the best in Manitoba for grain-growing is now dotted with settlers' homes, and a large acreage is being broken by steam ploughs, two, four and six-horse teams and ox teams. A steady stream of settlers of a very desirable class is coming to this district. As evidence of the great increase in settlement of the district, Swift Current has grown from a small hamlet to a town, and is enjoying a gradual growth of prosperity which has a greater tendency to be lasting. There are still large tracts of fine agricultural land open for homestead entry within an easy distance of the main line of railway.

A point of considerable importance and greatly improving year by year, is Medicine Hat. Abundance of moisture has continued the desirable change of making what was considered a grazing district admirably suited for farming operations. At this point 244 new homesteads were entered for during the year.

The city of Calgary enjoys the distinction of being a railway centre of great importance, and an immigration point at which many newcomers are distributed. Fourteen hundred and thirty-one immigrants were accommodated in the government building there, consisting of: English 462, Irish 39, Scotch 61, German 122, Scandinavians 124, French and Belgians 25, Americans 354, Canadians 116, and other countries 128. Immigration has been large, especially so in the country lying north-east from Calgary, and the settlers between Calgary and Macleod were very much more numerous than in any previous year, and what was formerly known as a stock ranching country, with ranges from 5,000 to 15,000 acres, is now almost entirely divided into farms of from 160 to 640 acres, well fenced, and containing large fields of wheat, oats and barley, surrounding substantial farm houses. These settlers appear to be well content with their new homes. A decrease in the number of homestead entries in the Calgary district is noted, as land within easy distance of the railway has been largely taken up.

The immigrants settled this season about High river, Alberta, are principally Americans; 300 homestead entries have been granted.

At Nanton, Alberta, there has been a steady influx of settlers, and 400 new arrivals are now comfortably and well situated. Within a radius of 30 miles six new school districts have been formed.

Claresholm, Alberta, continues on the high road of progress so marked during the last three years. About 500 homestead entries were made in this district, and a large number of those who homesteaded the previous year have moved up with their effects and become permanent settlers. Over 250 cars of settlers' effects were unloaded at Claresholm. Four steam ploughs are now in operation breaking sod, and reports indicate that implement dealers at this point have sold during the year 130 gang and single breaking ploughs.

The land guide at Staveley, Alberta, presents a pleasing report of his district. An instance is the fact that the little town of Staveley, which did not exist two years ago, nor was there a settler within 40 miles, has now two general stores, hardware store, two meat markets, two hotels, three livery stables, three blacksmiths' shops, lumber yard, two elevators, school house, church and a number of other buildings. Most of the government land in the immediate vicinity has been homesteaded, and railway land which was bought at from $3 to $7 per acre two years ago is now readily sought at from $12 to $25 per acre. The class of settlers is uniformly good, and a general air of prosperity and contentment is very noticeable.

Nominally, Lethbridge is the gateway for immigrants from the western States, being but a short distance from Coutts, the customs port. The report from that point, therefore, covers a large part of Southern Alberta. The total arrivals at Coutts from the United States for the year are 2,845, a decrease of 371 from the previous year, which is largely accounted for by a diminution of the influx from the state of Utah. It is possible, also, that the immigration has been partly diverted by the gigantic schemes of reclamation and irrigation of land adopted by some of the western States. Of the number above referred to, 1,778 remained in Southern Alberta, 731 went to Northern Alberta, 184 to Assiniboia and 152 to Saskatchewan and other parts; and the nationalities were as follows: Americans 2,216, British 162, Canadians 141, Germans 73, Swedes 41, Finlanders 63, Norwegians 58, Hungarians 38, Danes 24, French 17, Swiss 6, Italians 6. Of the total number close upon 1,400 males were farmers and ranchers. The past high character of immigrants into this district has been maintained, and the value of stock, farm inplements and household effects exceeds that of last year, and apart from dutiable importations may be estimated close upon $300,000.

The Magrath settlement, consisting of about 175 families, is the one which suffered most from drought last year. Its effect was disheartening, and several families, 36 souls in all, left for Oregon. However, they have returned, with not too flattering a report of Oregon, and decided to remain permanently.

The immigration hall at Lethbridge has afforded shelter for 462 immigrants. The town and district of Lethbridge show much progress. Lands have increased in value, and town property in proportion.

The sub-agent of Dominion lands at Pincher Creek, reports that the change foreshadowed in previous annual reports has come to pass in his district, and large areas formerly used for the ranging of cattle are fenced and waving with a promising crop of fall wheat standing from three to six feet in height. Other crops are in equally favourable condition owing to the early spring and the amount of rainfall which has been ample for the purposes of present growth.

The large herds of cattle which formerly roamed over the land now under wheat have been removed nearer the mountains, and to unsurveyed lands, while the grower of fall wheat has still his bunch of stock which is improving in quality rather than growing in numbers, hence there are more cattle owned in small bunches. In consequence of closer settlement, homesteaders and purchasers have to seek land further from the centres of the district, and unsurveyed lands are being squatted on. The class of settler predominating in the district is of British and United States origin, and it is pleasing to note that the idea prevalent in some quarters of the Americanizing effect of settlers is without the least foundation, as no class appreciates Canadian laws and regulations more than does the settler from the United States. In this district the crop appears to be generally good, and each settler has from 30 to 200 acres in wheat, cats, timothy, barley, &c.

In Northern Alberta the story of progress and contentment is continued around Didsbury, the crop acreage is 65 per cent greater than the previous year, and the satisfaction experienced by the older settlers has drawn a large number of their friends into western Canada. The weather up to the time of this report has been very favourable for the crops, and winter wheat is looking especially well, and better than last year, when the crops realized from 35 to 50 bushels of winter wheat per acre. Seventy per cent more land will be in crop next year, and 200 per cent more fall wheat will be sown in 1906. As an instance of the rapidity with which wealth can be acquired in this district, mention is made of a man who homesteaded four years ago and had $68 in cash over and above his household goods. This year he sold out his homestead, and the proceeds of his sale amounted to over $5,000. Another case is a farmer who reached there ten years ago some hundreds of dollars in debt and has to-day a fully equipped farm and a considerable amount of stock, all of which would realize $15,000. The winter season appears to have been exceptionally favourable for livestock, and cattle are fattened on the wild hay alone and made fit for export.

In the Carstairs district 540 homesteads were taken during the past year; all by good American and Canadian farmers.

The sub-agent of Dominion lands at Olds, Alberta, reports 373 homesteads entered for in his office during the previous year.

The important centre of Red Deer, Alberta, reports the last year as being one of unprecedented prosperity; the great influx of settlers has been caused largely by the prosperity of those who had previously made their homes in the district, and the construction of the branch line east of Lacombe. It is hoped that this line will be extended eastward as rapidly as possible.

The Swiss colony situated in townships 38 and 39, ranges 18 and 19, W. 4 M., has received material additions to its numbers, and appears to be prosperous, contented and happy.

A large number has also been added to the French colony situated in townships 38, 39 and 40, ranges 14 and 15, W. 4 M. These are a very desirable class of settlers, having brought a large amount of wealth to the district.

The Finnish settlement to the west of Red Deer is also prosperous, and steadily increasing in number.

Our land guide at Lamerton, east of Red Deer, reports double the usual acreage under cultivation; the class of buildings is improving; two creameries have been opened and are doing good business; seven schools and two churches have been built in the district during the past season.

Red Willow, Alberta, further east still, reports settlers and land-seekers coming in large numbers and entering into occupation of their homesteads. Land bought for $3 an acre three years ago is readily selling at $10 to-day. Ranchers are moving further back and farmers are taking their places. The breaking up of the prairie appears on all sides and stock was never in better condition so early in the season. The class of settlers generally is good, and they are energetic, as proved by the fact that they are now rapidly filling up the land a hundred miles east of the Calgary and Edmonton Railway.

At Blackfalds, Alberta, the new arrivals have not been very numerous, but they were of a very good class.

At Leduc a large number of homesteads have been taken by new arrivals, a number being Galicians who have gone into the timber land, where they appear to succeed better than any other class.

Our agent at Heatherbrae, Alberta, reports settlement progressing so rapidly that many homesteads are already taken 60 miles east of there. A large percentage of people from the old country join with those from the States in expressing satisfaction with the agricultural and other conditions of this district. Ten school houses and two churches have been built in this vicinity within the last three years.

Strathcona reports 2,289 immigrants, bringing 119 cars of effects, and the town and district generally appear to be in a satisfactory condition.

The Edmonton district has progressed at an extraordinary rate. Additional railways are reaching for this point, and justifying the claim that it will be one of the most important points in western Canada. The influx of new arrivals into this district has been of a much superior class, especially from the old country, and most of them have settled east of Edmonton. Towards the Vermillion valley along the proposed route of the Canadian Northern Railway homesteads are nearly all taken up for a hundred miles by energetic farmers, which gives promise that in the near future millions of bushels of grain will be raised in that district. West and north-west of Edmonton, which is more woody, is also settling up with good farmers from all parts of the old country and the United States, who prefer that to bare prairie land. A large number of farmers have gone in for raising fall wheat, which has proved a success. The large settlement of Galicians north-east of Edmonton is progressing rapidly. They are raising hogs and cattle as well as grain, and not a single Galician has applied to the government for assistance during the past year. The immigration hall at Edmonton has been continuously occupied by English and German-speaking people, but has at times been inadequate for those desiring accommodation. It is pleasing to note that it is the intention of the department to erect a larger and more substantial immigration hall in the near future. The agent of Dominion lands at Edmonton reports that in spite of the fact that there is need of more land for selection, the homestead entries exceed those of the previous year. The entry of the Canadian Northern Railway, which is anticipated by the first of December this year, will provide ready means of communication with the outside district east of Edmonton.

At Fort Saskatchewan the number of settlers was considerably in excess of the preceding year, and of excellent class.

Lac Ste. Anne, Alberta, 50 miles west of Edmonton, is a locality that four years ago was inhabited solely by Indians and half-breeds, but a very large number of new settlers have come in and settled.

Our immigration agent at Kamloops, B.C., reports the number of arrivals larger, but applications for land have been fewer; work on the railway from Spence's Bridge to Nicola has relieved the situation of the local labour market, so that there have been no complaints from immigrants, and the district appears to be generally progressive.

The Pacific coast forms an agreeable ending to the agreeable task of writing the story of western Canada's great progress during the year. The overflow from older settlements east of the Rockies, and many of the north-western States of the Union continues in an encouraging manner. The more lands are sub-divided in this district, the greater prosperity, as the clearing of an area of 40 acres even affords good scope for mixed farming, fruit growing and poultry raising. The cities and towns are increasing rapidly in population and business progress. Hill-side lands, formerly not desired, are now found useful for fruit growing, and are being taken up for this purpose.

Pursuant to the policy carried out for some years past, special attention has been given to securing fair specimens of grain-in-the-straw, threshed grain, grasses, vegetables and dairy products in order that the same may be exhibited through various agencies in the United States and in Great Britain as a substantial advertisement of what western Canada can produce. To collect and properly dress and pack these exhibits has been a matter of considerable difficulty and expense, but our reports indicate that there is nothing that can furnish more information to the inquirer regarding western Canada than exhibits of the products of the country, such as have been sent from time to time. During the year this branch has prepared and forwarded 382 cases of exhibits to the following agents and other persons:—

53 cases to H. M. Williams, Canadian government agent, Toledo, Ohio.
25 " J. N. Grieve, Canadian government agent, Spokane, Washington.
23 " T. O. Currie, Canadian government agent, Milwaukee, Wis.
29 " W. H. Rogers, Canadian government agent, Indianapolis, Ind.
19 " Chas. Pilling, Canadian government agent, Grand Forks, N.D.
15 " Benjamin Davies, Canadian government agent, Great Falls, Mont.
14 " J. S. Crawford, Canadian government agent, Kansas City, Mo.
9 " C. J. Broughton, Canadian government agent, Chicago, Ill.
4 " C. A. Laurier, Canadian government agent, Sault Ste. Marie, Mich.
11 " J. M. MacLachlan, Canadian government agent, Watertown, S.D.
21 " M. V. McInnes, Canadian government agent, Detroit, Mich.
2 " T. Duncan, Canadian government agent, Syracuse, N.Y.
10 " A. F. Jury, Canadian government agent, Liverpool, England.
6 " J. Bruce Walker, Canadian government agent, Glasgow, Scotland.

49 cases and 813 sheaves, untrimmed, to the Superintendent of Immigration, at Ottawa, for W. T. R. Preston, and others.

5 cases to W. T. R. Preston, Commissioner of Emigration, London, Eng.
59 " Department of Agriculture, Ottawa.
7 " David M. McLean & Co., Chicago, Ill.
7 " Haslam Land Company, St. Paul, Minnesota.
1 " E. Stone, Bristol, Tenn.
1 " Halsly Land Company, Peoria, Ill.
1 " H. E. Rogers, St. Paul, Minn.
1 " E. Shears & Co., Minneapolis, Minn.
2 " N. Bartholomew, Des Moines, Iowa.
1 " Hagland Land Company, St. Paul, Minn.
3 " Cash Caldron & Company, Iowa City, Ia.
4 " Luse Land Company, Carroll, Iowa,

and in addition a large number of small samples have been given to visitors who were returning home to assist in spreading the good reputation of Canada. A special exhibit was made by this branch at the Dominion Exhibition held in Winnipeg, in July and August last, and at the Western Fair, in Brandon, about the same time. A large quantity of literature was given to applicants at these fairs, and it is felt that advertisement by way of products exhibited is at least as lasting in its effect as any printed matter, and, judging by reports we have received, it seems that this policy should be continued and enlarged from time to time.

After covering to some extent with this report a large portion of western Canada, which is being so rapidly developed by means of railway extension and the influx of new people and new capital, it is but fair to place on record the very valuable assistance and many courtesies afforded to the department in the consummation of their immigration policy by the various railway companies, boards of trade and public-spirited citizens throughout the west.

Your obedient servant,

J. OBED SMITH,

Commissioner.

REPORT OF DR. S. C. CORBETT.

(Appended to the report of the Commissioner).

WINNIPEG, MANITOBA, July 26, 1905.

J OBED SMITH, Esq.,
Commissioner of Immigration,
Winnipeg.

SIR,—I beg to submit a report of the medical attendance and inspection service at this point, for the fiscal year ending June 30, 1905. During the rush I inspected all immigrants coming into the country at some point between Winnipeg and Rat Portage, and found the large majority of them exceptionally free from disease. I made three hundred and eighty-three visits to the hall, and gave medical attendance to two hundred and forty-nine cases of sickness. Two children died of pneumonia following measles. I gave certificates for the purpose of deporting forty-three undesirable immigrants. I met with three cases of small-pox and am pleased to report that no new case developed beyond those bringing the disease with them. There is no doubt they contracted the disease on the boat when crossing the ocean.

Your obedient servant,
S. C. CORBETT,
Dominion Health Officer.

REPORT OF THE GIRLS' HOME OF WELCOME, WINNIPEG, HALF-YEARLY REPORT FOR 1905.

(Appended to Commissioner's Report).

The board of management has held its usual monthly meetings during the first half of 1905.

During this period 873 people have been accommodated in this home, which is 200 more than in the same time last year. Of this number 294 were bona fide immigrants and the rest servants, transients, &c. The immigrants were all given 24 hours free board and lodging.

The capacity of the home has at different times been taxed to the utmost, and yet many express their appreciation of the welcome and comfort extended to them.

A weekly supervision of the home by members of the board has been faithfully carried out.

In March, Mrs. Sanford made her usual trip to Great Britain for the purpose of bringing out domestic help. Although the party was a very large one, consisting of 110 girls, yet the demand was much greater than the supply, and many fares which had been advanced had to be returned. During the absence of Mrs. Sanford, her position was filled satisfactorily by Miss Porter.

The home has also accommodated several parties sent out by English societies or through private individuals.

Your obedient servant,
JESSIE MATHESON,
Secretary.

No. 2.

REPORT OF C. W. SPEERS, GENERAL COLONIZATION AGENT.

BRANDON, August 9, 1905.

The Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit to you a report, being a review of my work from June 30, 1904, to June 30, 1905.

In July 1904 I inspected the various districts in Saskatchewan for the colonization of German people from Europe and the United States. The movement was under the direction of the Rev. A. Litwin. Report submitted to the Superintendent of Immigration July, 1904.

Under instructions from the Deputy Minister I selected a district in Saskatchewan for a large number of people from the county of Simcoe, report to J. W. Greenway, and the Superintendent of Immigration, dated July, 1904.

During the same month I completed arrangements for the reception and entertainment of the Allied Press Association of the United States, at different points through western Canada. Report to Superintendent of Immigration, dated July 27, 1904.

Later I made an investigation into certain complaints made by the Roumanian colony in the Qu'Appelle valley, and addressed to the Right Honourable Sir Wilfrid Laurier, K.C.M.G., Prime Minister of Canada, report of said investigation submitted by me July 18, 1904.

After an inspection and investigation into the Doukhobor community in Swan River, complete report submitted W. D. Scott, Superintendent of Immigration, dated July 27, 1904.

In August I inspected the colonies in the Prince Albert district, pointing out the progress made by the different nationalities, and recommended a new location for the German people who had placed one thousand families on the Quill Plains. Mr. F. J. Lange, who had settled this district, inspected the new territory at my request, which proved highly satisfactory, and he has already placed a large number of German families in the new district, being from township 37 to 39, inclusive, ranges 18-25, inclusive, west 3rd. This is known as the German Catholic colony. Report dated August 25, 1904, addressed to Superintendent of Immigration, Ottawa.

Also report on crop conditions throughout Manitoba and the Territories addressed to the Superintendent of Immigration, August, 1904.

Under instructions I received the Royal Board of Agriculture, of Berlin, Germany, showing them features of interest in our country, and also reported on the provincial exhibitions, with the distribution of immigration literature to visitors from the border states of America, and am pleased to note that the different foreign nationalities settled in western Canada, were represented by some leader of their communities, with the intention of purchasing superior animals to improve their stock, or better machinery to improve their equipment, at these large exhibitions. This goes to prove that these communities are becoming wealthy and are progressive. Report dated September, 1904, addressed to the Superintendent of Immigration.

Also further reports pertaining to German colonization addressed to the Superintendent of Immigration.

In September I inspected the Galician colonies, the Germans, the Hungarians, and the Doukhobors, reporting upon their progress and prosperity. Report dated September 28, 1904, addressed to Superintendent of Immigration.

Also a report on the Battleford district addressed to the Superintendent of Immigration.

Under instructions from the Superintendent of Immigration I submitted a report of the Galician, German and Mormon colonies, together with a map pointing out their respective districts to E. C. Nelson, of Hope Dale, Mass., report dated October, 1904.

During the month of October I visited and inspected the various setlements in the Saskatchewan country.

In November I inspected the settlement in the Yorkton district, being the German, Hungarian and large Galician colonies at Crooked Lakes, Beaver Hills and Saltcoats.

In December I visited and inspected the Hungarians, Germans and Doukhobors in Saskatchewan.

Inspected the various nationalities from time to time during the winter months, acting for a short time as Commissioner of Immigration, during Mr. Smith's absence in Europe, also subsequently assisting Mr. Moffat, acting Commissioner of Immigration, in matters of importance coming up for consideration. The question of seed grain for needy settlers, and its distribution was reported on in March, 1905. A report dated March 25, 1905, dealing with the care and reception of immigrants, as well as the conditions of different buildings situated throughout western Canada, was addressed to the Superintendent of Immigration, also maps showing the prospective districts of first-class homesteads, for the direction of United States agents, addressed to the Superintendent of Immigration, April, 1905.

I also reported to the Honourable Clifford Sifton, Minister of the Interior, certain conditions and recommendations pertaining to the Doukhobor community, report dated April, 1905.

Report submitted to the Superintendent of Immigration, April 25, 1905, and also on May 3, 1905, dealing with the different nationalities settled in Alberta, and also dealing with that large tract of land between Edmonton and Battleford.

Report dated June 7, to the Superintendent of Immigration, dealing with eastern Assiniboia, and generally with certain colonies of Belgian people settled there, with a view to repeopling with Galician settlers certain districts, also a report in June on the Galician settlers in the Gilbert Plains, Dauphin, and Duck Mountain districts. Reports adressed to the Superintendent of Immigration, Ottawa, dated June, 1905.

A complete report on settlements along the Canadian Northern Railway, being the Galicians, the Doukhobors, the English settlers at Lloydminster, the Jack Fish British settlement, and having driven to Lloydminster and Battleford, addressed to the Superintendent of Immigration, Ottawa, dated July 3, 1905.

A report of inspection of certain lands for Galician colonization, addressed to the Superintendent of Immigration, Ottawa.

A report to Commissioner Smith dated June, 1905, pertaining to reception building, land guides, and certain recommendations for more efficiently carrying out certain work.

A report dated July 3, 1905, addressed to the Superintendent of Immigration, after an investigation into certain complaints from English settlers claiming that they had paid too much for their outfit.

A report to W. W. Cory, Deputy Minister of the Interior, pertaining to the subdivision of the town of Lloydminster, complete report dated July 3 and 4, 1905.

In addition to the foregoing there are multifarious duties from time to time that require more or less attention, and I have endeavoured to give the best information possible to the very many who call upon me, and to exercise that courtesy to others pertaining to anything that will enhance their welfare that my time and knowledge will permit. Being authorized by my commission to consult with the Commissioner of Immigration on all matters of importance pertaining to immigration work in the west, I have endeavoured from time to time, in conjunction with Mr. Smith, the Commissioner of Immigration, to give strict attention and the best advice I could in the general direction of the policy of the department.

I feel grateful when I review the fact that our immigration has increased nearly five-fold since I entered the service of the department, to see so many people placed in the various districts throughout western Canada, so progressive, so hopeful, and so contented, and to know that very little difficulty has been encountered in the permanent establishment of the various nationalities. About 90 per cent of our foreign immigrants enter upon land, become farmers, and assist in developing the country.

I have endeavoured, in the discharge of my duties, to select districts suitable to the different nationalities, and adapted to the various tastes of the people.

The opening of the Canadian Northern Railway to Lloydminster and Edmonton is filling that great and fertile country with people. It is proving a boon as colonization road, and notwithstanding the fact that thousands of people had pressed their way forward in advance of construction, the enormous area of fertile land in the Saskatchewan valley is receiving its thousands, and the special tide of emigration is pouring into that district.

There is much high-class land to offer to the settler, and a year ago I referred to this country stretching from Prince Albert to Edmonton. To-day I am pleased to inform you that the efforts we have used in directing people into this country have been appreciated, and as a result a steady stream of highly desirable people has been pouring continuously into it.

We have many desirable new districts still available for colonization, and the prospect before the country of the most generous harvest ever reaped in its history, induces in the existing settlements feelings of hope and contentment.

The scale of wages, generally speaking, is high, the labourer receives more remuneration for his labour than he did a few years ago, and from present indications pertaining to farming operations and the contemplated construction of public works, there will be ample work for years to come.

Your obedient servant,

C. W. SPEERS,

General Colonization Agent.

REPORTS OF OFFICIALS IN EASTERN CANADA

No. 1.

REPORT OF THE CHIEF MEDICAL OFFICER.

OTTAWA, October 1, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I beg to submit the second annual report upon the operations of my office during the year ending June 30, 1905.

The report deals with the inspection of passengers who arrived during that period at the ports of Halifax, St. John, Quebec and Montreal, of transpacific immigrants who landed at Victoria and Vancouver after October 1, 1904, and of those who arrived at these two ports from the United States after January 1st to the end of the fiscal year.

The total number of passengers inspected at the several ports mentioned is given in the following table:—

TABLE I.—STATEMENT of the Number of passengers entering Canada at the six Ocean Ports, and of Immigrants via United States entering through Montreal, during the fiscal year ending June 30, 1905.

Port of Entry.	Steerage Passengers destined for Canada.	Steerage Passengers destined for United States.	Steerage Passengers, Total.
Quebec	64,001	9,173	73,174
Halifax	21,729	2,506	24,235
St. John	14,297	1,592	15,889
Montreal	7,566	.....	7,566
Victoria	138	51	189
Vancouver	2,347	467	2,814
	110,078	13,789	123,867

The medical inspection inaugurated at Atlantic seaports under the Act and Order in Council of 1902, has been extended during the year to the Pacific coast ports of Victoria and Vancouver. The service was instituted in September, 1904, owing to representations made regarding the large number of transpacific immigrant arrivals. Subsequently, it was found necessary to extend the inspection as well to immigrants arriving from the United States. Hence it has now become possible to estimate the extent of the immigration to Canada of a new and rapidly increasing stream entering through this western channel. In this relation, I may point out that as regards the inspection of immigrants arriving in Canada via ports on the border between Canada and the United States, there are in effect nine distinct areas to which the attention of the department has been drawn, apart from the steamboat traffic on Lakes Ontario, Erie. Huron and Superior. namely:—

(1) The New Brunswick border and railroad crossing it.

(2) The Quebec border and railroads crossing it.

(3) The Upper St. Lawrence border and railroads crossing it.

(4) The Niagara river border and railroads crossing it.

(5) The Detroit and St. Clair river border and railroads crossing it.

(6) The Sault Ste. Marie border and railroads crossing it.

(7) The Rainy river and Manitoba border and railroads crossing it.

(8) The Saskatchewan and Alberta border and railroads crossing it at Portal and Coutts.

(9) The British Columbia border and railroads crossing at Fernie, Bedlington, Northport, Grand Forks, Sumas and Blaine.

From a mere enumeration of the points of steamboat and railway communication it is apparent that the question of how far a systematic supervision of what may be considered the same class as transoceanic steerage immigrants has become necessary, is an extremely important and interesting one. The fact that the department has maintained an active immigration propaganda in the United States would indicate that immigrants from that country are not only considered desirable, but further are welcomed. Hence it may appear strange that this question of inspection has ever been thought of; but it must be apparent that if for many years it has been recognized that there is an essential need for systematic supervision of transoceanic immigrants, most of whom are so desirable, if diseased, defective and criminal immigrants are to be debarred, then it must be equally manifest that if Canada is exposed to the same extent from the United States, the necessity for inspection will be equally great, and even greater since the facilities for entrance are so many more.

In the absence of any systematic inspection hitherto it is evidently impossible to present any statistics adequately illustrating the situation. There are, however, certain data which aid us in forming some idea of the situation. An inquiry instituted at Vancouver in December last revealed the fact that a very large percentage of persons appearing in the courts there hailed from the United States. The matter is set forth in the following letter:—

POLICE DEPARTMENT,
VANCOUVER, B.C., December 8, 1904.

Dr. UNDERHILL,
Medical Health Officer.

DEAR SIR,—In compliance with your request, I herewith furnish you with the total number of prisoners arrested and entered in our prison charge books during the past year, commencing December 1, 1903, and ending November 30, 1904, of the following nationalities: United States, 178; China, 144; Japan, 46.

Yours respectfully,
THOS. CRAWFORD,
Police Station Clerk.

Another equally important statement is that taken from the report of the immigration agent for the port of Victoria, for the half-year from January 1, to June 30:—

TABLE II.—Statement showing number of passengers on vessels arriving or touching at Victoria, from United States ports, from January 1, to June 30, 1905.

—	Number of Passengers.	Deportations.		
		Disease.	L. P. C.	Cripple.
Canadian Pacific SS. Co., from Seattle	6,081	3	0	0
Alaska SS. Co., from Seattle	6,086	3	8	1
Pacific Coast Line Co., from San Francisco	11,357	2	6	0
Total	23,524	8	14	1

Not the least important fact gathered from these figures is the nationality of those persons who have been refused admission to Canada at these ports. Of the passengers in vessels from United States ports touching at Victoria, a very large proportion were simply in transit from one United States port to another, so that out of probably not more than 15,000 other passengers, 23 persons were deported, or one in every 650 persons.

The agent of the port gives the following table of those who may fairly be called immigrants:—

TABLE III.—STATEMENT of Number of Passengers arriving at Victoria from San Francisco, Seattle and other foreign Pacific coast ports from January 1, to June 30, who may be considered Immigrants.

Month.	1st Class. European.	2nd Class. European.	Chinese.	Japanese.	Total.
January	96	36	....	2	134
February	80	43	....	....	123
March	117	54	1	3	175
April	170	83	....	1	254
May	138	51	....	....	189
June	132	48	....	16	196
Totals	733	315	1	22	1,071

Such illustrations as those given are based upon actual data; but to fully comprehend the extent of the problem the character of the resident and immigrant population of especially the industrial northern States must be considered. In 1903-4 the total of aliens arriving in the United States was 921,315, of whom 6,440 were debarred from entering. Of this grand total 421,844 were Italian, Hebrew, Polish, Slovak or Magyar. Of those debarred 16 were idiots, 33 insane, 4,798 pauper, 1,560 suffered from loathsome disease, 167 were convicts and 117 were prostitutes. That all, however, of the admitted classes, and of the immigration of previous years (amounting to 5,933,822 in twelve years) were not fitted to become good citizens may be judged from the following figures, taken from the last annual report. In 1904 there were of immigrants resident in public or private institutions in the United States 20,485 insane, 14,675 paupers and 9,825 criminals. Of these over one-third had been in the country ten years or less, or of the nearly 6,000,000 immigrants arriving in the last ten years, some 800 were insane, 550 were paupers and 400 were criminals. When it is further remembered that the states of New York, Massachusetts and Pennsylvania, all adjoining Canada, contain 23,531 of this total it will be apparent that to allow the class from which such are taken freedom to come at all times into Canada, while being liable at the same time if aliens to be refused re-admission to the United States, raises a question of much moment. The fact that the effects of malign forces at work in society are not at once observable, except in the more acute cases, as of contagious physical disease and overt crime, has ever been the reason why the people and those who speak for them are slow to take action to prevent or ameliorate the operation of such influences; but the fact that 60 per cent of the pauperism, insanity and crime is in aliens who have been more than ten years in the United States fully confirms the far-reaching result of such influences.

METHODS OF INSPECTION.

The procedure indicated in the extracts from 'Instructions to Medical Officers,' printed in last year's report, has been closely followed at the several ports of entry at either coast. With greater facilities in enlarged immigration buildings at all the Atlantic ports and increased experience on the part of officers, the work of inspection is now of a very satisfactory character, and since the hospital service under the supervision and control of the department has been instituted at the several ports the work of treating immigrants detained on account of disease has gone on with ever increasing efficiency and freedom from complaint.

That this work of inspection has resulted in the exclusion of many diseased persons and others undesirable owing to physical or moral defects, will be evident when it is stated that of the total immigrants landed at Quebec, Halifax, St. John and Montreal 498, and of those landed at Victoria and Vancouver 113, were refused an entry to Canada and were returned by the steamship companies to the ports whence they sailed. The following table will be of interest as showing the extent and distribution of the work:—

TABLE IV.—STATEMENT for the Ports of Halifax, St. John and Quebec, showing the Number of Immigrants detained and the Number of Immigrants deported in the year 1904-5.

SS. Line.	Port.	Number examined.	Detained.		Deported.	Ratio of detained to Number examined.	Ratio of deported to Number examined.
			Male.	Female.			
Allan SS. Line..........	Halifax.	17,695	188	54	32	1 in 73	1 in 553
"	St. John......	3,308	9	3	1	1 " 276	1 " 3,308
" "	Quebec.	35,297	146	32	82	1 " 198	1 " 430
	Totals....	56,300	343	89	115	1 in 130	1 in 490
Dominion SS. Line	Halifax.	3,580	88	15	4	1 in 35	1 in 895
"	Quebec.	17,617	199	54	51	1 " 70	1 " 345
	Totals....	21,197	287	69	55	1 in 60	1 in 385
Hamburg American SS. Line.	Halifax. ...	2,582	72	32	....	1 in 25	....
Can. Pacific SS. Line ..	St. John......	12,271	114	13	2	1 in 97	1 in 6,135
" "	Quebec.	18,384	623	66	198	1 " 27	1 " 93
	Totals....	30,655	737	79	200	1 in 38	1 in 153
Donaldson SS. Line......	St. John.... .	174	6	....	3	1 in 29	1 in 58
" "	Quebec.. .	640	49	17	49	1 " 10	1 " 13
	Totals....	814	55	17	52	1 in 11	1 in 16
Canadian Lines Ltd	Quebec.	1,234	182	54	74	1 in 5	1 in 17
Other Lines..........	....	516	....	....	....	.. ..	....
	Grand totals	113,298	1,676	340	496	1 in 56	1 in 228

In view of the very considerable numbers arriving at different seasons of the year, and their several nationalities it has made the results of the work of inspection as regards detentions and deportations to vary for different ports. Thus during the winter there is practically only one steamship line bringing immigrants to Canada, which has a regular vessel service with a continental port, while Halifax has had only an occasional vessel this year coming from a continental port. Something too as regards the type of immigrant depends upon the season of the year, since it appears that a notably greater number of detentions is made during the spring than in the later summer and autumn months.

TABLE V.—Showing the number of Immigrants detained or deported from Montreal and from Victoria and Vancouver during the Fiscal Year ending June 30, 1905.

Arrivals.	Total Number Arriving.	Port of Arrival.	Total Detained.	Total Deported.	Total Released.	Still in Hospital.
Montreal	7,566	New York.. Boston...... Portland....	146	2	135	9
Victoria	189	Victoria......	397	113	234	50
Vancouver	2,814	Vancouver....				
Totals	10,569		543	115	369	59

Referring to some of the details of this routine inspection. those contained in Tables IV. and V. are of interest. An examination of a similar table in last year's report makes plain the fact that the number of passengers arriving from different ports, who were detained varied notably for different ships, and that differences in the number detained appear in the immigrants carried by different companies. It appears that of the 113,298 steerage passengers who arrived at the ports of Quebec, Halifax and St. John 2,016 were detained, and of these 496 were deported. That is 1 in 56 was detained and 1 in 228 was deported. Almost the total number debarred were so dealt with on account of disease. Of the number of persons debarred by the United States out of 921,315 arriving in 1903-4 whether via United States ports or Canada, it appears that 1,609 were debarred on account of disease, or but 1 in 572. If, however, the 4,793 paupers excluded at United States ports be added, then the total excluded in 1903-4 was 1 in 142. If the 2 at Montreal and the 113 excluded at the Pacific ports of Victoria and Vancouver be added to the 496, or 611 in all, then in a total of 123,867 there was 1 in every 202 steerage passengers excluded at the ports of entry of Canada. That the comparison may fully illustrate the results of the inspection instituted at Canadian seaports, it appears that of the total immigrants arriving in the United States in 1903-4 there were 88,733 British in a total of 921,315, while in 1904-5 there were 65,359 British in a total of 123,867 steerage passengers arriving at Canadian ports. Of the total British arriving at United States ports 377 in all were deported on account of disease and pauperism, while only 13 of those arriving at Canadian ports were deported. It will appear plain therefore, that of the 58,508 of other nationalities, there were deported 598 persons, or 1 in every 98 immigrants.

TABLE VI.—STATEMENT showing the Detentions by Nationalities and by SS. Lines of Immigrants for Canada and for the United States via Quebec, Halifax and St. John, for the Fiscal Year 1904-05.

Nationality.	Allan Line.		Dominion Line.		Hamburg American Line.		C.P.R. SS. Line.		Donaldson Line.		Canadian Lines, Ltd.		Totals.	
	For Can.	For U.S.	For Can.	For U.S.	For Can.	For U.S.	For Can.	For U.S.	For Can.	For U.S.	For Can.	For U.S.	For Can.	For U.S.
Austrian, N.E.S.	1	2	4				29	3	1				35	5
Buckowinian					11		7						21	
Galician	4		7		87		196		8				302	
Hungarian, N.E.S.	1		1	1	3		11	5					16	6
Ruthenian									2				2	
Slovak		1												1
Belgian	9		2				7						18	
Dutch							4						4	
German, N.E.S.	8	11	27	4			2	11			1	1	38	27
Prussian	1												1	
English	9	2	3				2	1					11	3
Scotch	1						1		1				3	
Irish	1		1										2	
Greek	6	1	2										8	1
Hebrew, N.E.S.			2				3	1					5	1
" Russian	125	28	132	19			216	13	6	6	37	10	516	76
" Polish	2		3						1				6	
" Austrian	4			2			3						7	2
" German			1				6	1			1		8	1
Italian	1		19				198	8			3		221	8
Poles, N.E.S.	11	3	9	1			18	2				3	38	9
" Austrian									1				1	
" German		4					2						2	4
" Russian	26	8	7	3			12	5	25	15			70	31
Roumanian, N.E.S.	7	1					1						8	1
Russian, N.E.S.	32	19	43	3			21	7	4	2		2	100	33
Finns	21	27	2	2				1					23	30
Swiss			1										1	
Danish	3	4						2					3	6
Icelandic	2						1						3	
Swedish	4	10	4	5			2	3					10	18
Norwegian	3	13	3	1			4	1					10	15
Turks	1	1	3	2									4	3
Armenian	1	2	15	4								14	16	20
Syrian	11		17	1			6				108	56	142	57
Totals	295	137	308	48	104		752	64	49	23	150	86	1,658	358

The figures in Table VI. show the great initial differences in the physical condition of immigrants of different nationalities.

Thus of 65,359 British but 22 were detained at ports of entry. Of 6,926 Galicians 302 were detained, while of 2,704 Germans 65 were detained, of 1,887 Russians 133, and of 1,323 Finns 53 were detained, while of 745 Poles 155, and of 1,123 Buckowinians 21 were sent to hospital. Notably the largest number of detentions was of Hebrews, of whom 622 were detained in a total of 7,715. Of 3,473 Italians 229 were detained, while of 630 Syrians 199, of 78 Armenians 36, and of 30 Turks 7 were detained.

While it does not follow that the same proportion of those detained was deported, yet it will appear from the following table that a general ratio exists between the number detained and the number deported at Atlantic parts. The work of inspection resulting in the detention of 2,559 steerage passengers has been already set forth in Tables IV. and V. The following table illustrates the nationality of those persons who were admitted to the hospitals and who were debarred from entry for some specific cause.

TABLE VII.—Statement of Deportations by Nationalities of Immigrants seeking admission to Canada during the Fiscal Year 1904-5.

Nationality.	Atlantic Ports.		Pacific Ports.		Totals.		Total.
	For Canada.	For U.S.A.	For Canada.	For U.S.A.	For Canada	For U.S.A.	
Australian			1		1		1
Austrian, N.E.S	14	1			14	1	15
Buckowinian	7				7		7
Galician	58				58		58
Hungarian	2	1			2	1	3
Ruthenian	2				2		2
Belgian	2				2		2
Chinese			2	7	2	7	9
French			2		2		2
German, N.E.S	3	7			3	7	10
Prussian	1				1		1
English	6	2	1	1	7	3	10
Scotch	1		1		2		2
Irish			1		1		1
Greek	1				1		1
Hebrew, N.E.S	3				3		3
" Russian	86	22			86	22	108
" Austrian	2	2			2	2	4
Italian	65	4			65	4	69
Japanese			57	13	57	13	70
Poles, N.E.S	7	2			7	2	9
" Austrian	1				1		1
" German	1	4			1	4	5
" Russian	34	24			34	24	58
Roumanian, N.E.S	2	1			2	1	3
Russian, N.E.S.	21	20			21	20	41
Finns	3	7			3	7	10
Danish	1	2			1	2	3
Swedish	1	1			1	1	2
Norwegian		5				5	5
Turks	1	1			1	1	2
Armenia	8	3			8	3	11
Syrians	47	9			47	9	56
U.S.A. Citizens			27		27		27
Totals	380	118	92	21	472	139	611

NOTE.—N. E. S. Indicates nationality *not elsewhere stated.*

WORK OF DETENTION HOSPITALS.

The report for 1903-4 referred to the work of instituting the series of hospitals at the several ports, equipped and managed by officers of the department. The first of these was opened in May, 1904, at Quebec and has been in operation throughout the fiscal year. In all 1,422 persons were detained there in 1904-5, including both patients and accompanying members of the family. With the opening of the winter season, a hospital at St. John was equipped and opened, and 145 persons were detained. Arrangements were made for taking over the temporary hospital at Halifax in March. During the season 449 persons were detained. Thus in all 2,016 persons passed through the three hospitals. Under the amending Act of 1902, which provided for landing diseased passengers for treatment under such conditions as might appear satisfactory to the department, arrangements were made with the various steamship companies whereby a per diem charge for each immigrant detained was made. At the opening of the season at Quebec in 1904, after a rough estimate that 50 cents per diem might be adequate to pay running expenses, a temporary arrangement was made, but after one season's experience it was found that with the cost of transfer to a hospital beyond the city limits and other incidental expenses, a deficit resulted to the department. Hence a new arrangement was made, going into force in November at St. John, by which 75 cents per diem is guaranteed by the steamship companies. By this arrangement it has been found possible to largely cover the cost of actual treatment and maintenance. The earnings and expenditures will be found set forth in Table VIII. With the initiation only in September of medical inspection at the Pacific coast, the absence of hospital facilities left the treatment of any detained immigrants in private hands; but since May 1, provision has been made both at Victoria and Vancouver for the regular detention and treatment of immigrants. A hospital is under construction at Vancouver, while another at Victoria, will, it is hoped, be erected during the coming year. The absence of any hospital at Montreal was sorely felt last year, but arrangements were completed in January whereby a large building convenient to the railways was converted into offices and an hospital. Its necessity and usefulness have been demonstrated from the fact that 146 immigrants arriving via United States Ports were detained there during April, May and June. The expenses of this hospital have hitherto been borne by the department, in the absence of sufficient legal power to compel the transportation companies to provide for the maintenance, except in those cases where the immigrant or his friends have paid in whole or in part for his detention and treatment.

TABLE VIII.—Statement shawing the Expenditure and Earnings of the Detention Hospitals at Quebec, Halifax, St. John and Montreal.

Port.	Year.	Days in Hospital.	Rate for Patients, 75c.,	Earnings.	Expenditure.	Balance.
			Cents.	$ cts.	$ cts.	$ cts.
Quebec	July to Dec., 1904.	13,937	50	6,968 50	..	..
"	1904-5.	803	30	240 90	..	..
"	May and June, 1905	11,272	75	8,454 00	..	..
"	......	503	50	251 50	13,300 00	..
Halifax	1964-5.	2,836	75	2,127 00	..	..
"	1904 5.	352	50	176 00	2,400 00	..
St. John	1904-5.	2.160	75	1,620 00	..	..
"	1904-5.	35	50	17 50	2,486 62	..
Montreal	1904-5.	2,472	75	1.854 00	..	..
"	1904-5.	44	50	22 00	1,530 52	..
		34,414		21,731 40	19,716 14	2,015 26

The earnings and expenditures of the hospitals as above given show a credit balance of $2,015.26, but it must be added that $15,122.70 only, on account of the total revenue earned had been received by the department at the end of the fiscal year. The balance due includes $2,500 which is charged against the Canadian Lines SS. Co., Ltd., which has become insolvent. Expenditure on capital account for hospitals and their equipment, and the expenses incurred by the Public Works Department on account of the heating, water supply and lighting of the hospitals are not included in these statements; but heating, lighting and water supply might very properly be entered as fair charges. However, it is gratifying to know that the large number of 2,559 persons were cared for 34,414 days, at no cost to the department, and but a small amount against the public revenues.

In the following table will be found classified the causes for which the 2,559 immigrants were detained at the several ports of entry.

TABLE IX.—Statement giving the Diseases and other causes for which Immigrants were detained at the ports of entry Quebec, Montreal, Halifax, St. John, Vancouver and Victoria.

Class of Disease.	Cause of Detention.	Number Detained.	Number Released.	Number Deported.	Number still in Hospital.
I. Contagious diseases......	Measles........	1	......	......	1
II. General diseases......	Dropsy........	1	....	1	....
	Rheumatism........	1	....	1	....
	Syphilis........	1	....	1	....
	Tuberculosis........	3	....	3	....
	" and trachoma......	1	....	1	....
	Totals........	7	....	7	....
III. Eye diseases........	Trachoma........	2,029	1,346	486	197
	" cicatrization........	2	2	....	....
	" and cataract........	1	....	1	....
	" and broken arm.-....	1	1	....	....
	" and keratitis........	1	....	1	....
	Phlectenular keratitis........	1	1	....	....
	Pterygium........	1	1	....	....
	Conjunctivitis........	245	240	2	3
	Mixed conjunctivitis........	4	2	2	....
	Blepharitis........	2	2	....	....
	Ulcer of cornea........	3	3	....	....
	Partial blindness........	1	1	....	....
	Totals........	2,291	1,599	492	200
IV. Nervous system........	Epilepsy........	3	....	2	1
	Idiocy........	1	....	1	....
	Insanity........	3	....	2	1
	Mental infirmity........	3	....	3	....
	Melancholia........	1	....	1	....
	Locomotor ataxia........	1	1	....	....
	Paralysis,........	1	....	1	....
	Spinal sclerosis........	1	....	1	....
	Totals........	14	1	11	2
V. Circulatory system........	Heart Disease........	3	....	3	....

TABLE XIII.—*Concluded.*

Class of Disease.	Cause of Detention.	Number Detained.	Number Released.	Number Deported.	Number still in Hospital.
VI. Respiratory system...	....	....	....	....	....
VII. Digestive system..	Hernia....	1	1	....	....
	" and poor physique....	1	....	1	....
	Inguinal hernia....	1	1	....	....
	Totals	3	2	1	....
VIII. Genito-urinary system......	Suspected kidney disease........	1	1	....	....
	Chancre....	1	....	1	....
	Gonorrhoea....	1	....	1	....
	Totals....	3	1	2	....
IX. The skin....	Eczema....	3	3	....	....
	" and tiachoma....	1	....	1	....
	Favus "	2	....	2	....
	"	7	2	5	....
	Varicose ulcer....	1	....	1	....
	Totals....	14	5	9	....
X. Locomotor system....	....	....	....	....	....
XI. Malformations—diseases of infancy and of old age...	Cripple....	2	....	2	....
	Deformity....	1	....	1	....
	Senility....	1	1	....	....
	" and debility....	4	3	(1 died)	....
	Totals	8	4	3	(1 died)
XII. Accidents, &c.....	Accidental poisoning....	1	....	....	1
XIII. Ill-defined causes....	Poor physique....	1	1	....	....
	Loathsome disease....	1	....	1	....
	Totals....	2	1	1	....
XIV. Other causes....	Accompanying patients....	123	99	13	11
	Likely to become a public charge.	75	20	55	....
	Refused by U.S. officers....	1	....	1	....
	Vicious characters....	12	....	12	....
	Criminals....	1	....	1	....
	Totals	212	119	82	11
	Grand totals	2,559	1,732 1	611 (died).	215

It has been for the first time possible to collate the total number of immigrants detained on account of disease, and to classify the several diseases according to the general classification now adopted by the registrars general of the different provinces and in the census tables for 1901.

In Class I. but one case was detained, it being measles. This is naturally to be expected and illustrates the care exercised at the quarantines prior to the landing of immigrants for inspection at the ports of entry.

Under Classes II. and V., it is apparent that but few cases are likely to occur or be detected. It must be confessed that a closer inspection of the very large number of British immigrants now entering than that which has been hitherto adopted will be necessary, if medical officers are to be expected to detect cases of heart disease, kidney disease, and other general diseases in persons who, at the end of a sea voyage, appear to them as having every appearance of health. What is further very difficult is to detect under the bronzed skin after a sea voyage, evidènce of pulmonary disease. The cough may not be present or noticed in the rapid examination, while wasting and emaciation may not be advanced. In this disease, as in that of the equally and even more important epilepsy and mental unsoundness, the results of the past year have demonstrated that while the inspection is becoming yearly more strict yet greater care and closer investigation must be exercised if the entrance of such cases is to be reduced to a minimum. In order, however, that the medical officers may be informed that they have overlooked cases, it is desired and expected that medical practitioners and municipal officers throughout Canada will notify the department, giving particulars of cases, rather than allow incorrect or exaggerated reports to reach the public press. That 14 cases of nervous diseases were detained and 11 deported compares very favourably with the 36 of the same class deported from the United States ports in 1903-4; while, as will be seen in a later table, 10 cases of insanity and 2 of epilepsy occurring within a year after admission, were subsequently deported. Remarkably few persons suffering from some disease in classes V., VI., VII. and VIII., were detained, there being but 9 in all. That the immigrants admitted were of a healthy class generally may be concluded from the figures taken from the total immigrants actually treated in the hospitals of Manitoba and the Territories, as seen in Table X. Skin diseases, as seen in Class IX., were very few in number, being but 14 in all. The reason is evident since inspection will promptly detect this type of disease, and that few have subsequently cropped up has been shown by systematic inquiry at the large city hospitals, such as those of Montreal and Winnipeg. The same may be stated of Classes X. and XI, which include diseases of locomotion and deformities. It does happen occasionally that a cripple wanting a leg may present himself for inspection, or a man with club feet may seek entry. Three such were deported, but some have been admitted, their admission being based on their having a trade, and being otherwise able-bodied. At the same time it must be said that none such arriving without money, sufficient as evidence of his previous ability to earn a living, has a right to expect admission. Hence, stricter inquiries into such cases are being made and more stringent measures with regard to their exclusion are being adopted. A glance at Table IX. will at once show that eye diseases were the chief causes for which immigrants were detained. Thus there were 2,291 out of a total of 2,559 who suffered from either acute, sub-acute or chronic ophthalmia. Of the acute there were 245 cases of conjunctivitis, of which but 2 were deported, while 17 other cases were of various diseases more or less serious. The total 2,029 detained solely on account of trachoma indicate the extent of this chronic ophthalmia. References to the table of detentions by nationalities will show how few of British origin were detained on account of this disease; while the nationality of those detained marks the prevalence of the disease, especially amongst continental immigrants and those from China and Japan. A total of 486 deportations in 2,029 cases, with 197 still in hospital fully indicates the serious nature of the disease, and how the length of time required to effect a cure makes it necessary that either the patient should have abundant funds to bear the cost of treatment or that the steamship company which brought him to the port should be responsible for his maintenance while in hospital. The detention on account of this disease fulfils quite accidentally another most important requisite, that of a closer observation of the moral and mental type of the immigrant. It will be apparent that during the examination of a shipload of immigrants, no great opportunity is given for inquiry into the character, other than that of physical soundness, of any individual. But when detained in hospital they are under daily observation of the medical officers and guards, who very soon detect mental and moral defects, which most properly form an element in the decision which must be arrived at as to whether or not an immigrant is not only readily curable of his disease, but also whether he is in other respects desirable. It likewise serves another desirable purpose in giving immigrants who have been for weeks in crowded cars, barracks and ships, an opportunity for being made clean, both in person and clothing; while the fact that during the whole year but one death occurred in hospital will illustrate how the rest, cleanliness, fresh air and good food in hospital have proved the salvation of many a mother and child who were exhausted by the hardships of travel.

If improvement in health and contentment while in hospital, and expressions of appreciation of their treatment mean anything, then there can be no doubt that the temporary inconvenience of detention had been in all cases more than compensated for by the good received. Regarding the work of the medical officers and staff who have not only charge of the hospitals, but also have the yet more difficult task of treating cases and determining their curability in the matter of trachoma, which, until most recent years has been medically considered as an intractable and almost incurable disease, the most satisfactory results have been obtained. The not unfounded grounds for complaint of past years that many suffering from this disease were being allowed to crowd into the congested parts of our cities have now been wholly removed. How far this is due to the thorough work of inspection at the ports of entry and to the scientific treatment in our hospitals may perhaps be gathered from the report of the United States Commissioner of Immigration (Annual Report, 1903-4). He says: 'Not only has Canada deported large numbers of undesirables who sought to permanently settle in Canada, but of the 24,797 applicants for permission to pass through Canada to the United States, those who were rejected by your officers as unfit persons under United States laws, because of being afflicted with loathsome, contagious diseases, were deported to Europe by the Dominion immigration authorities, the steamship companies bringing them to Canada being compelled to return them and to assume all expenses incident thereto.'

'It would be impossible for one not thoroughly familiar with the situation as it existed here only a few years ago to even approximately appreciate the advanced position we now occupy in these matters, and it may just as truly be said that the steps already taken are but an earnest of what may be expected to follow should circumstances require a more drastic course to be taken to weed out from the increasing hosts that continue to arrive at Canadian ports the mental and physical low-grade elements.'

This fact is further illustrated by the figures from the following Table X., of the diseases for which immigrants were treated in the hospitals of Manitoba and the Territories.

TABLE X.—STATEMENT of the Diseases for which Immigrants were treated in Hospitals of Manitoba and the Territories.

Disease.	St. Boniface, Winnipeg.	Brandon.	Calgary General.	Calgary Holy Cross.	Edmonton.	Medicine Hat General.	Prince Albert.	Dauphin.	Total.
Typhoid Fever	317	34	25	13	1	19	11	..	420
Scarlet Fever	10	2	1	1	..	..	..	..	14
Diphtheria	4	3	..	..	..	..	..	..	7
Measles	16	1	4	..	..	1	..	..	22
Mumps	2	..	..	..	..	..	..	..	2
Influenza	17	1	..	..	1	1	..	..	20
Tonsillitis	10	..	4	..	..	..	..	..	14
Pneumonia	9	6	..	..	2	..	..	..	17
Cancer	2	..	..	..	..	..	..	..	2
Erysipelas	5	..	..	3	..	3	..	..	11
Septicæmia	13	..	..	2	..	..	..	..	15
Febricula	..	4	1	..	..	..	..	..	5
Anthrax	1	..	..	..	..	..	..	..	1
Pleurisy	2	3	1	..	..	1	..	..	7
Rheumatism	58	8	4	..	6	9	..	..	85
Hemorrhage	2	..	..	..	..	..	..	..	2
Tuberculosis	14	4	1	3	5	..	..	..	27
Bronchitis	9	3	1	1	..	3	..	..	17
Asthma	..	1	..	..	..	..	..	..	1
Syphilis	1	..	..	..	..	..	..	..	1
Pernicious Anaemia	..	1	1	..	..	..	..	..	2
Alcoholism	2	1	1	..	..	..	..	..	4
Dysentery	5	2	..	..	..	2	..	..	9
Gastritis	15	2	1	..	2	9	1	..	30
Appendicitis	12	3	3	..	1	2	..	..	21
Jaundice	1	..	..	..	..	..	..	..	1
Hepatitis	1	1	..	..	..	1	..	..	3
Peritonitis	3	1	..	..	..	..	..	..	4
Diabetes	..	1	..	..	..	..	..	..	1
Tape Worm	1	..	..	..	..	..	..	..	1
Hemorrhoids	2	..	..	..	..	..	..	..	2
Hemiplegia	..	..	1	..	..	1	..	..	2
Palsy	..	..	1	..	..	..	..	..	1
Insanity	..	..	..	..	1	1	..	..	2
Epilepsy	1	1	..	..	..	..	..	..	2
Sunstroke	..	..	..	..	..	1	..	..	1
Sciatica	2	3	..	..	..	..	..	..	5
Debility	8	2	..	..	1	..	1	..	12
Prostration	..	1	..	..	..	..	..	..	1
Neuritis	8	..	..	..	..	..	..	..	8
Heart Disease	10	..	..	..	..	..	2	..	12
Nephritis	3	1	1	..	..	3	..	..	8
Cystitis	..	..	..	..	2	1	..	..	3
Orchitis	..	1	..	..	1	..	..	..	2
Hernia	5	..	2	..	..	..	..	..	7
Phlebitis	..	..	..	..	..	1	..	..	1
Displacement of Kidney	..	1	..	..	..	..	..	..	1
Metritis	11	1	2	..	4	..	1	..	19
Cellulitis	19	..	1	..	..	..	..	..	20
Puerperal Fever	..	1	..	..	1	..	..	..	2
Pregnancy	..	4	1	..	..	..	..	..	5
Ovaritis	2	2	..	..	..	..	..	..	4
Laparotomy	..	1	..	..	..	..	..	..	1
Lacerations	..	..	1	..	..	..	..	..	1
Baby and Mother	..	1	..	..	..	..	..	..	1
Miscarriage	1	..	..	..	..	..	..	..	1
Trachoma	..	..	..	..	..	..	1	..	1
Eye Injury	2	..	1	..	..	..	..	..	3
Iritis	1	..	..	..	..	..	..	..	1
Ophthalmia	1	..	..	..	..	..	..	..	1
Fractures	7	..	..	..	..	..	..	..	7
Amputations	5	1	..	..	..	..	..	..	6
Fractured leg	..	5	2	3	..	2	..	..	12
Frozen leg and foot	12	9	1	..	1	2	..	..	25

TABLE X.—*Continued.*

Disease.	St. Boniface, Winnipeg.	Brandon.	Calgary General.	Calgary Holy Cross.	Edmonton.	Medicine Hat General.	Prince Albert.	Dauphin.	Total.
Sprained ankle	..	1	..	..	..	2	..	..	3
Frozen arm and hand	4	..	..	..	..	..	..	..	4
Gunshot	..	1	..	..	..	2	..	1	4
Traumatism	53	2	4	..	1	7	1	..	68
Wounded arm and hand and fractures	2	5	3	..	..	3	..	..	13
Dislocations, arm	..	1	..	..	..	1	..	..	2
Operations	28	..	..	..	..	..	..	..	28
Fractured sternum	..	2	..	..	..	.	..	..	2
Injuries of face	..	2	..	..	1	2	..	..	5
Injuries to back	..	3	..	..	..	2	..	..	5
Injury to head	1	4	1	..	1	5	..	..	12
Caries	1	..	..	..	..	.	..	1	2
Osteomyelitis	3	..	..	..	..	..	..	..	3
Phimosis	3	..	..	..	..	..	..	..	3
Eczema	16	3	..	..	..	2	..	..	21
Tinea Barba	..	1	..	..	..	..	..	..	1
Psoriasis	..	..	1	..	..	..	..	..	1
Thyroid Cyst	..	..	..	..	..	1	..	..	1
Synovitis	..	..	..	..	..	2	..	..	2
Lymphatic Adenoids	..	..	..	..	..	1	..	..	1
Hip abscess	..	..	1	..	..	..	..	..	1
Haematoma of thigh	..	..	..	..	..	1	..	..	1
Burn	..	..	..	..	..	1	..	..	1
Abscess	32	3	1	..	..	10	..	..	46
Opium poisoning	..	1	..	..	..	..	..	..	1
Lead poisoning	1	..	..	..	..	..	..	.	1
Neuritis	3	..	..	..	..	..	..	..	3
Varicocele	6	..	..	..	..	..	..	..	6
Circumcision	1	..	..	..	..	..	..	..	1
Totals	783	146	73	26	32	105	18	2	1,185

In addition to the immigrants who were detained at the several ports of entry and deported without being admitted to Canada, there will be found such others in the following table as, after admission to Canada, have for some cause been returned to the countries whence they came.

Table XI.—Statement showing the Number of, Nationality and Causes for which Immigrants admitted to Canada were deported after admission.

Nationality of Deported Persons.	Whence Sent for Deportation.	Male.	Female.	Class of Disease.	Cause of Deportation.	Still in Hospital for Deportation. Male.	Still in Hospital for Deportation. Female.
Deported at St. John.							
French	Winnipeg	1	....	Nervous system	Melancholia		
German	St. John	1	....	Other causes	Public charge		
English	Montreal	1	....	"	Criminal		
"	Toronto	2	2	"	Public charge		
"	Winnipeg	1	....	General diseases	Rheumatism		
"	"	....	1	Eye diseases	Blindness		
"	"	1	....	Nervous system	Insanity		
"	"	1	....	Digestive system	Chronic dysentery		
"	"	3	....	Ill-defined causes	Physical infirmity		
"	"	1	3	Other causes	Public charge		
Welsh	"	1	....	Malformations, etc	Senility & debility		
Scotch	"	1	....	Accidents, etc.	Leg amputated		
Irish	Montreal	1	....	General diseases	Tuberculosis		
Russian	St. John	....	1	Nervous system	Insanity		
Finn	"	1	....	Other causes	Public charge		
Danish	Winnipeg	2	....	"	Criminal		
Norwegian	St. John	3	....	"	"		
"	Winnipeg	1	....	General diseases	Phthisis pulmonalis.		
	Totals	22	7				
Deported at Montreal							
Galician	Winnipeg	1	....	General diseases	Tuberculosis		
English	Montreal	1	....	"	"		
"	"	....	....	Eye diseases	Going blind	1	
"	"	3	....	Nervous diseases	Insanity		
"	"	....	....	"	Epilepsy	1	
"	"	1	....	The skin	Varicose ulcer		
"	"	....	1	Ill-defined causes	Physical infirmity		
"	Toronto	1	....	"	"		
"	"	1	2	Other causes	Public charge		
"	"	....	1	"	Criminal		
"	Winnipeg	8	....	General diseases	Tuberculosis		
"	"	1	....	"	Cancer		
"	"	2	....	"	Rheumatism		
"	"	1	....	Eye diseases	Bad eyesight		
"	"	1	....	Nervous system	Mental infirmity		
"	"	1	1	"	Epilepsy		
"	"	1	....	Circulatory system	Heart disease		
"	"	1	....	Respiratory system	Chronic bronchitis		
"	"	1	....	Locomotor system	Enlarged knee		
"	"	1	....	Accidents	Feet amputated		
"	"	10	....	Ill-defined causes	Physical infirmity		
"	"	5	1	Other causes	Public charge		
"	"	1	....	"	Criminal		
Scotch	"	1	....	Nervous system	Insanity		
Hebrew, N.E.S	"	....	1	Other causes	Public charge		
Pole, N.E.S.	Montreal	....	1	Nervous system	Insanity		
Finn	"	1	....	General diseases	Rheumatism & locomotor ataxia		
Danish	Ottawa	....	1	Nervous system	Mental infirmity		
Swedish	Montreal	1	....	Other causes	Criminal		
"	Winnipeg	1	1	General diseases	Tuberculosis		
Norwegian	Montreal	....	1	Ill-defined causes	Physical infirmity		
	Total	46	11			2	

Of the 86 immigrants deported it may be said that they are almost exactly the same number as in 1903-4, and present the same general causes, except that 20 are returned as being liable to become public charges, and 9 as criminals. Of the diseases the largest number, 14 were tuberculosis, 10 were persons insane or had a mental infirmity, 2 were epileptics and 16 were put down to physical infirmity. As regards the nationalities, 63 were English, 2 were Scotch and 1 each was Irish and Welsh; of the total 58 were deported from Winnipeg. It would at first sight appear remarkable that while less than half, or 48,847 of the 102,614 European immigrants destined to Canada were English, the number sent back to England was 63, or just three-fourths of the total deportations after landing. The reason for this is given in last year's report, where reference is made to 'the relatively high proportion of British immigrants that have been deported either under the order of a medical inspector, or who after residence in hospital at some point and after evidence of their inability to make a living owing to physical disease, have at their own request been returned home.' It is still more worthy of remark that 9 criminals were deported. This is the first report in which this class to any extent appears, and it is creditable to the scrutiny of the officers of the department that 9 were discovered and deported, since the United States report for 1903-4 gives but 53 in a relatively much larger number of immigrants.

THE WORKING OF THE IMMIGRATION ACT.

Except for the amendment of 1902 relating to exclusion on account of some loathsome dangerous or infectious disease or malady, the Act relating to Immigration was passed in its present form in 1872. There have been no changes to meet the greatly altered circumstances under which immigration goes on at the present time. The population of European countries has multiplied greatly during the last 35 years, but especially is this true of urban populations. Under the influence of rapid transportation by land and water, and of modern inventions the rural people have removed to the cities, creating, as in England, an urban population some 80 per cent of the whole. Josef Kurosi, an Austrian statistician, gives the following figures taken from census figures of 1891: Of 31 English towns with over 100,000 population, the total in 1891 equalled 10,870,000, in 1841 equalled 4,590,000; of 26 German towns with over 100,000 population, the total in 1891 equalled 6,000,000, in 1835 equalled 1,400,000; of 11 French towns with over 100,000 population, the total in 1891 equalled 4,180,000, in 1836 equalled 1,700,000. About one-third of these 68 towns in 1840 had not 100,000 of population. To-day 21,050,000 reside in the large towns of these countries. As a natural consequence much of the immigration to America is of an urban population, unacquainted with rural habits and occupations, and of whom many are, if not unfitted for, at least averse to taking up rural residence and engaging in agriculture. As if, in some extent at least, to meet the needs or opportunities of this large class of urban residents, the growth of towns and cities in America has been as rapid as in Europe. Thus Massachusetts had an urban population in 1900 of 76 per cent of the total 2,805,346, and even Ontario, the province most advanced in Agriculture, had in 1901, 42·8 per cent of an urban population. It hence appears that if the occupation of the wide tracts of agricultural lands of Canada goes on, and the production of wealth through farming, mining, lumber, &c., continues to provide employment for the increasing urban population, no evil results need be apprehended except such as may be incident to urban life everywhere. But it is apparent that amongst the millions of dwellers in British and continental cities who are increasingly finding their way to America, there must be many who through physical, industrial and educational or moral causes, come either without means, without knowledge, or without ability or desire to make a new beginning; or having begun again are little likely to arrive at a successful issue. These divide themselves naturally into three classes, viz.: those physically diseased or unfit, those who are paupers, and those who are of the criminal and vicious class. Orders in Council have been passed under the Acts, empowering special action to be taken with regard to these, and as will be seen by the detentions and deportations, much work has been done under these provisions. It is quite true that the authority of the department and the powers laid upon officers under the Acts have been questioned and *habeas corpus* proceedings have been taken in numerous cases, with sometimes successful results; but nevertheless the line of procedure followed has indicated both the strength and reasonableness of the Orders in Council under these Acts. Recognizing the beginnings of what have proved insurmountable difficulties and even social dangers to the cities of the United States, where over 1,000,000 immigrants landed in a single year, of whom nine-tenths were non-British, it is apparent that the fullest powers must exist under our Immigration Acts for preventing or minimising similar difficulties and dangers. That such may soon become serious is evident from the fact that of the 7,715 Hebrews entering Canada during this year, 3,621 came in during the winter season. Thus October had 575, November 790, December 666, January 493, February 817, and March 280. It is quite apparent that such a number added, for the most part, to the population of a single city in the intense cold of a Canadian winter must not only suffer much individual hardship, but also become a burden on charitable organizations, on the municipal funds and entail injury upon those residents who depend upon those occupations peculiar to Canadian cities in winter. Regarding such abnormal influx within short periods of time the annual report of 1901, of the Jewish societies of New York remarks:

'No matter how earnestly we labour to care for the Jewish poor, already in our city, our burdens are being constantly increased by the thousands who come from Europe every year and settle in our midst. It is worth noting in passing, that, comparatively speaking, few of these newly arrived immigrants come to us for assistance until after they have been in New York for a year or two. Either they have sufficient means of their own to bring them to America and to support them for a period after their arrival, or they have been sent for by relatives who are able to give them assistance for some time.

'But the evil conditions of the houses, and the deteriorating influences of the sweat shops of the great Ghetto soon work havoc among these people, and after an interval of two or three years they come to us in numbers for relief. Furthermore, in line with our belief that the ounce of prevention is worth a pound of cure, and that as law-abiding citizens of our country, we should not run against public sentiment nor pose as violators of the law, we have come to an understanding with the London Board of Guardians whereby the unwise shipment of Jewish immigrants, who are not adapted to conditions of life in this country, will be stopped.'

To deal with those untimely immigrations of which that just illustrated is a type, it would appear that some special provisions by Order in Council might be made by which all steamship lines and booking agents at European ports would be notified not to give passage to poor immigrants unless they have shown to the satisfaction of an officer approved of by the Minister of the Interior, that they are in the possession of enough money to maintain them until the spring season, when outdoor employment becomes abundant. This crowding of the poor of foreign countries into Canadian cities must of necessity not only create temporary burdens upon the charitable, but also produce harassing problems which our municipalities will soon find great difficulty in coping with, as has been the case in the United States and elsewhere.

It is quite apparent, as shown in the statistics of deportations, that along with the large immigrations from foreign countries there have come and will always tend to come ticket-of-leave men and other criminals who, as appears from their own statements, have in some instances been aided by official authorities to leave their own countries. Naturally cunning, it is seldom that any information regarding such is obtainable when they are examined at ports of entry, and it is only after they have been detected by the police in some crime, or are arrested as vagrants that their record is discovered. The same difficulties are found to exist in the case of the insane and epileptic.

Not infrequently such have been allowed, and in some cases directly induced, to emigrate with the undisguised intention on the part of their relatives of unloading themselves of such undesirables. The excuse is that of giving them a new start; but to be sent with but little or no funds to a strange land, weighed down with their physical misfortune is simply refined cruelty.

The figures already given indicate that, taken comparatively, a very close and exacting inspection is made of immigrants, especially from continental countries, in the matter of diseases of the eye. Abundant reasons for this were given in the report for 1903-4, and have been further amplified in a recent paper by Dr. J. D. Pagé, Superintendent of the Quebec Immigration Hospital. But while it is true that these diseases occur especially in those classes who from other standpoints are often undesirable, yet the fact remains that immigrants, even whole families, are detained, who have made heroic efforts to reach Canadian fields, dreamed of by them as the far-off Elysium. They have been sent for by friends, or have read in our literature of what Canada has to offer, and have sold all in order to emigrate. But often after having spent almost all, they may have to undergo an enforced delay for weeks in hospital, and are further expected to pay the steamship companies, who are responsible to the department, for the cost of their detention. Of the financial difficulties of such for the time being, we need not speak; but of the sturdy courage and resolve of many such while in hospital, whose minds are set on the west, nothing which can be said would be too great praise. The correspondence of the department with regard to individual cases of detention is large and constant, and in the very nature of things will continue. It would cause little wonder if amongst the 123,867 steerage passengers coming by steamship, complaints of neglect and even ill-treatment were not occasionally heard; but whether in the public press or in the records of the department, the paucity of such complaints is so remarkable as to be a fair cause for self-congratulation to those officers, who from the time an immigrant lands at Quebec or Halifax are in touch with him until located in the land of his desire. Of the total 2,559 landing in Canada, and who were detained, but one died during the year in the detention hospitals, while of those who entered Canada, the returns of those who have been recorded as suffering from disease, either brought in with them or induced subsequent to arrival, is remarkably small. The average mortality as shown by the census for all Canada was 12·78 per 1,000 of the population; but the deaths or even sickness amongst immigrants en route to Canada, or on their railway journey westward have been very few. These facts, with the almost complete absence, whether on shipboard, at quarantine or at immigration hospitals or buildings of small-pox or other acute contagions, are a matter of satisfaction, and ought to be gratifying to the Minister of the department, his officers and the public at large.

Your obedient servant,

P. H. BRYCE,

Chief Medical Officer.

No. 2.

REPORT OF G. BOGUE SMART, INSPECTOR OF BRITISH IMMIGRANT CHILDREN AND RECEIVING HOMES.

OTTAWA, October 9, 1905.

W. D. SCOTT, Esq.,
Superintendent of Immigration,
Ottawa.

SIR,—I have the honour to submit my annual report as Inspector of British Immigrant Children and Receiving and Distributing Homes.

The year ended June 30 has been one of unusual activity in this branch of departmental service. Started many years ago in a small way, and promoted unostentatiously in the face of doubt, discouragement and adverse criticism, child emigration to Canada has unfolded into an important factor in the annual Anglo-Saxon immigration into our Dominion. It has successfully passed the experimental stage, and is now generally conceded to be a real benefit not only to the children whose rescue from poverty and squalor it effects, but also to Britain's chief colony as well. Juvenile immigration assists in filling a gap in an important branch of our labour market, and numbers of farmers regard the influx of the so-called English Home child as a veritable boon. It is only under exceptional circumstances that these juveniles are to be found elsewhere than with farmers. The desire of their benefactors in the old land is that as far as possible the boys should all become Canadian farmers, and the girls domestic helps. That this wish has been met in a large measure is borne out by the numbers of young farmers in the older provinces and western Canada, who came to this country as children under the auspices of the various societies, and have prospered. I have frequently heard of many youths and young men of this class going to our new provinces and taking up homesteads there.

There has been a fairly steady stream of juvenile immigrants this year, and notwithstanding this it would appear from my information that the total number of arrivals has proved inadequate to the demand.

The prevailing prosperity of our farmers, together with the shortage of help, have doubtless added to the deficit, but in the main I regard it as due more to the increasing popularity of the home boy. My view is largely strengthened by the fact that of those seeking these children their neighbours and friends have already been employers of British child labour. Some patience is required with them at first, for the reason that our conditions and social customs differ in many ways from those of the old land. Implements and utensils were known at home to the children under different names, but many farmers have informed me that it is remarkable in what a short time they acquaint themselves with our Canadian ways and become very useful helpers. The number who do not adapt themselves to their new life is comparatively insignificant. It is natural in an increasing population that one should find some derelicts. When a boy or even a girl exhibits a disinclination 'to settle down' it is the general policy of the agencies on their own initiative to return that child to the old country without notice to the department, unless it be, of course, a Poor Law or Union child. Happily this course is not found of frequent necessity.

Not long ago I personally inspected a number of bands of immigrants shortly after their arrival in Canada, and before they were dispersed to situations and homes, and found them on the whole good types, such as in my opinion would be acceptable to our Canadian people.

There is an impression in the minds of many persons that the children sent to Canada are all 'slum children' and are 'picked up' indiscriminately by the philanthropic societies from the poorer or what is known as slum districts in the large centres of the old land. Well-meaning persons, who make statements of this kind, very evidently do so in ignorance of the conditions. All children before coming to Canada receive a thorough process of training by which their characters have been very largely moulded into channels equal to almost any, and superior to a great number of our own Canadian children.

The work of inspecting the Poor Law children has been steadily kept up during the year. It usually begins in March or April of each year, and continues until the last days of December, practically without interruption. These reports, which are individual in character, and which have heretofore been transmitted to the British government annually, are hereafter to be sent at least half-yearly, owing to the increasing number of children under the department's supervision.

It may here be stated that the operations of this branch of the department are followed with keen interest by the Local Government Board in London, under whose authority many of the children are sent to Canada.

It may not be uninteresting to state that before a child can be sent to Canada, unless under exceptional circumstances, it must first express a personal wish to leave England. To many children emigration is held out as a reward for merit during their training and education in the homes.

The reports which have come before me indicate that good judgment in the main is being exercised by the agencies in the indenturing of their wards, for very few, comparatively, have been found in unsatisfactory homes and situations. There is also good reason for stating that these agencies have conscientiously maintained a proper supervision of the children by means of their 'surprise visits' and correspondence. These are features of the work most essential to the success and prestige of this admirable and unselfish undertaking.

Reflections have appeared in some of the English papers on the treatment of home children by Canadian employers. Fortunately on investigation by the department, with one or two exceptions, the complaints were unsubstantiated. The fact is that neither the children nor their employers are all the happy possessors of amiable dispositions. Indeed it would be quite unreasonable to suppose that no cases of indiscreet treatment occur. To the credit of the Canadian farmer, however, it may be said that he treats his young employee with due consideration.

The fact that the children are placed out primarily on trial, and may be returned at any period to the sheltering or distributing homes, removes any obligation on the part of the employer to retain in his service a boy or girl that does not prove *persona grata*.

When a prospective employer applies to the agency for a child, a printed form is provided containing a schedule of questions which must be filled up and returned to the home. On this document the applicant sets forth the conditions under which he wishes to take the child; the nature of the work to be done; the wages, and the religious denomination to which the applicant belongs. A certificate as to character and general standing in the community must in all cases be furnished the agent before the child leaves the home. These credentials usually bear two signatures, those of a clergyman and a justice of the peace. Within a short time after the child has been located the 'surprise visits' already referred to are begun.

When a boy or girl enters its seventeenth year departmental oversight ceases, but the societies continue their supervision for an indefinite period. Many are annually visited until they attain their majority.

The Misses Smyley of Dublin, who for many years have been engaged in philanthropic work amongst the needy children of Ireland, are about to establish a receiving and distributing home at Hespeler, in Ontario. For many years children from their Dublin homes have been sent to Canada through other agencies. These ladies spent some time in Canada last year, and personally visited many of their former children in western Ontario, and the establishment of a home in this country is the result largely of the prosperous condition in which they found their earlier emigrants. Their Canadian interests, I understand, will be looked after by an experienced gentleman, who has been identified with their work in Ireland.

The emigration work of Mr. Quarrier's orphanages has been resumed. Their first party reached Canada in October, and included 55 Scotch boys. This party was followed in May last by 102 boys. A party of girls will also be sent to Canada in the near future. These children were all placed within a few days after their arrival at the Receiving Home, Fairknowe, Brockville.

During the year I have made official visits to the receiving homes in Ontario and Quebec. At each home I have been received with wonted courtesy and hospitality, and I desire to take this opportunity of expressing my appreciation.

MRS. BIRT'S HOME, KNOWLTON, P.Q.

I inspected this home on March 22. There were but two children in the home at this date; one through indisposition and the other assisting in the household work. Mrs. Birt personally accompanied a party of children to Canada early in the year. The visitors' reports are carefully recorded and, with few exceptions, their young immigrants are doing well. Many of the children from Mrs. Birt's home have been inspected during the past year by the departmental officers. During the past thirty-two years over four thousand children have been emigrated to Canada through Mrs. Birt's agency. A careful supervision is continued until they attain eighteen years of age. The home is well maintained.

MISS MACPHERSON'S HOME, STRATFORD, ONTARIO.

On March 7, I inspected this home. There were five children in residence at this date, two were recuperating and one, a girl, was being retained to assist with the domestic work of the home. The others were quite young, and the superintendent delayed placing them out on that account. The home is kept in good order and well equipped. There are, approximately, fourteen hundred children under their supervision in various parts of western and northern Ontario.

DR. T. BOWMAN STEPHENSON'S HOME, HAMILTON, ONTARIO.

On April 18 I officially visited this home, and had an opportunity of inspecting a party of boys on their arrival from the English training homes. They were fine types, and of robust appearance, with one or two exceptions. From personal interviews with them, I learned that all had spent a definite period in training and possessed a fair elementary aducation. Each lad had a good serviceable outfit. Before concluding my visit farmers from the neighbouring country had begun to arrive at the home for their boys. This home is well arranged, and the governor takes a deep interest in the children.

MR. J. W. C. FEGAN'S HOME, TORONTO.

On the occasion of my visit to Mr. Fegan's home there were no children in residence. Their visitor had just returned from the country districts, where he had been visiting their boys. His reports show that the recent arrivals are well settled and adapting themselves to their new conditions.

MARCHMONT HOME, BELLEVILLE, ONTARIO.

(Rev. Robert Wallace.)

Under Mr. Wallace's agency 116 children were brought to Canada this year. As in former years, they were of his own personal selection. These children are under careful oversight, and are regularly visited. The reports which I have received of those under departmental inspection have been very satisfactory. As previously reported, this pioneer receiving home is well maintained.

THE GIBB HOME, SHERBROOKE, QUEBEC.

(Church of England Waifs' and Strays' Society.)

There were three boys in residence on April 6, the date of my annual official inspection. One is a permanent resident and the others were being transferred to new situations. The matron advises me that she has been unable to meet the demand for their immigrants, and while I was here personal applications for boys were made. The matron is devoted to her work. The home throughout was in splendid order, and the childrens' quarters well arranged.

THE CATHOLIC EMIGRATING ASSOCIATION'S HOME, HINTONBURG, ONTARIO.

Since my last inspection the headquarters of this association have been transferred to Hintonburg, as it was felt that this would be a more convenient point for the reception and distribution of their young immigrants. The majority of the children are located in eastern Ontario and the western counties of the province of Quebec.

The home was undergoing many alterations, which will afford comfort and accommodation for a larger number of children. The honorary manager is assisted by a permanent staff of workers, and all are deeply interested in the welfare and success of the children. The pleasure was again afforded me of being present and addressing the annual New Year's re-union of old boys and girls at Montreal, and I was impressed by the interest manifested by their former immigrants in the affairs of the association. I had the further pleasure of meeting the Rev. E. Bans, of London, England, administrator of the Homes for Destitute Catholic Children, and Arthur Chilton Thomas, Esquire, of Liverpool, honorary manager of the Liverpool Catholic Homes. These gentlemen spent some weeks in Canada, during which they visited children in various parts of Ontario and Quebec. They found the children happy and contented, healthy and well fed, and their comfort amply considered.

DR. BARNARDO'S HOMES.

In the months of April and May I paid official visits to Dr. Barnardo's receiving and distributing homes at Toronto and Peterborough, respectively. To these centres the children are sent on their arrival in Canada, the boys to Toronto and the girls to Peterborough. They remain a very short time in the homes before they are sent out to situations, which are generally selected before the children reach Canada. Applications are always in excess of the number of their immigrants. In addition to placing out under a wage agreement, the younger boys and girls are boarded out with farmers and others in Muskoka and the northern counties of Ontario, and a very liberal payment is made for their keep. These children attend school regularly, and at the age of twelve or thirteen they are indentured for service. The total number of children sent to Canada by Dr. Barnardo since the commencement of his wonderful undertaking now exceeds 16,000. The work of these agencies is systematically carried on, and a deep personal interest is taken in the welfare of the children by the general superintendent and those associated with him. The homes are efficiently maintained.

The following statement will show the number of children emigrated to Canada during the fiscal year by some of the principal societies, and the number of applications received for children during the same period:—

Society or Agency.	Children Immigrated.	Applications Received For children.
Bristol Emigration Society, St. John, N.B.	40	114
Girls' Home of Welcome, Winnipeg.*	....	....
Shaftsbury Home, Winnipeg	3	....
Catholic Emigration Society, Ottawa	328	794
Dr. T. Bowman Stephenson, Hamilton	84	482
Miss Macpherson, Stratford	200	694
Church of England Waifs' & Strays' Society, Sherbrooke, boys	45	53
Church of England Waifs' & Strays' Society, Niagara-on-the-Lake, girls.	39	387
Mr. Fegan's Home, Toronto	53	500
Rev. Robert Wallace, Belleville	116	595
Mrs. Birt, Knowlton	169	1,065
Mr. Middlemore, Halifax	....	300
Dr. Barnardo's Homes, Toronto, Peterborough, Winnipeg, and Russell, Manitoba	1,574	12,103
Mr. Quarrier, 'Fairknowe,' Brockville	157	746
Self-Help Emigrating Society, Montreal*	....	....
East End Emigrating Society, Montreal*	....	....
Working Boy's Home, Lennoxville	6	....
Total	....	....

*Not reported.

The two orphan lads depicted in the accompanying photographs were sent to Mrs. Birt's Shelter, Liverpool, England, by a gentleman who visited the district they were living in. Both were barefooted and very untidy. Their father was a miller by trade, and for 21 years worked for one firm, when he met with an accident. Afterwards he worked as a tailor. In 1892 he died in Smithdown Road Hospital. The mother died in 1894. The elder brothers and sisters seem to have left home after their parents' death, and the two youngest seem to have been left to their own devices. They were terribly neglected. A rent collector going his rounds found these two little boys in an empty attic. The landlord sent them to Mrs. Birt, with a note asking if she could give these two 'little robins' a shelter. It was just after the Robin's Christmas Dinner. Picture 1 represents these lads as they appeared when brought to Mrs. Birt's home. Picture 2 shows their appearance after their training in the home, and before they were sent to Canada. Many such cases could be deduced.

The suggestion having been made from time to time, that in view of the importance of juvenile immigration, I should pay a visit to Great Britain for the purpose of studying the nature of the training given prospective children emigrants in the various homes and schools in the United Kingdom, and that suggestion being approved by the department, I left for England in the middle of June, and shall give some account of my experiences there in my next annual report.

Your obedient servant,

G. BOGUE SMART,

Inspector of British Immigrant Children and Receiving Homes.

No. 3.

REPORT OF THE MONTREAL IMMIGRATION AGENT.

(John Hoolihan.)

Dominion Government Immigration Agency,
Montreal, June 30, 1905.

The Superintendent of Immigration.
Ottawa.

Sir,—In accordance with the obligations of this agency all immigrant arrivals are carefully checked and returns made periodically to the department.

Care is also taken to notify the department and also the Commissioner at Winnipeg, of all information in regard to nationality, number and time of departure of immigrants bound for the west.

In regard to the quality and capabilities of the immigrants who have arrived during the past year, I may say that they could not, in my opinion, be improved.

Personal interviews with the heads of all the different national benevolent societies on my part, resulted in the unanimous statement that as the years go by the number of applications for assistance on the part of the immigrants, taking into consideration the great increase in arrivals, has greatly diminished.

It is a satisfaction to be able to state that the repatriation of French-Canadians goes steadily on. While many of these return to their old homes in Quebec and eastern Ontario, a large percentage now turn their steps to the North-west.

Practically every day during the past year also English-speaking families from the United States have passed through Montreal en route to the North-west to take up land.

During the year a number of immigrants of various nationalities, and for various causes, have been deported to their native countries, and as Montreal is the point where the various steamship companies have their head offices, these unfortunates have passed through this agency. The greater number who came under our supervision were deported from the North-west.

The correspondence of this agency has, during the past year, increased almost 100 per cent. Inquiries from Europe, the United States, and elsewhere have more than doubled. Answers in the language of the inquirer, containing all possible information, have been sent to the respective writers, with pamphlets, &c.

On May 1 this agency took possession of its headquarters at No. 306 St. Antoine street. The arrangements are all that can be desired, and provision has been also made for the medical examiner, as well as for the accommodation of all immigrants it may prove necessary to detain for observation or deportation.

It gives me great pleasure to report that during the year just closed I have received no complaints from immigrants of ill-treatment or discourtesy during the ocean voyage or journey on railway. On the contrary, each and every one expressed themselves as highly satisfied with the attention paid them throughout their entire trip by sea and rail.

Your obedient servant,

JOHN HOOLAHAN,

Dominion Immigration Agent.

No. 4.

REPORT OF THE WOMEN'S NATIONAL IMMIGRATION SOCIETY.

87 Osborne Street,
Montreal, July 15, 1905.

W. D. Scott, Esq.,
Superintendent of Immigration,
Ottawa.

Sir,—In accordance with your request, in circular dated June 1, 1905, I have much pleasure in forwarding the following statistics dating from July 1, 1904, to June 30, 1905.

Six hundred immigrants passed through the homes of the society; the nationalities and religions were as follows:—

Nationalities—

English	462
Irish	31
Scotch	82
Norwegians	15
Welsh	2
Swedes	1
Danes	2
Germans	3
French	2
	600

Religions—

Church of England	368
Church of Scotland	53
Church of Ireland	6
Church of Rome	47
Presbyterians	35
Lutherans	22
Wesleyans	19
Baptists	19
Congregationalists	15
Methodists	11
Salvation Army	3
Plymouth Brethren	1
Catholic Apostolic	1
	600

Ten parties have been received from the Hon. Mrs. Joyce, President of the British Women's Emigration Association, comprising in all 402 immigrants.

One hundred and fifty-eight remained in Montreal, the rest, 244 were forwarded to different parts of Canada, principally Ontario and the North-west.

Your obedient servant,

MARION DRAKE,

Secretary.

The Catholic Emigration Association House, Hintonburgh.

Miss Macpherson's Receiving and Distributing Home, Stratford, Ont.

PART IV

REGISTRARS

No. 1.

REPORT OF THE REGISTRAR AT BATTLEFORD.

LANDS TITLES OFFICE,
BATTLEFORD, SASKATCHEWAN, July 8, 1905.

The Secretary,
Department of the Interior,
Ottawa.

SIR,—I beg leave to submit herewith a summarized statement of the business transacted at this office during the fiscal year ended 30th ultimo.

Your obedient servant,

R. F. CHISHOLM,
Registrar.

STATEMENT of Services Rendered and Fees Collected at Land Titles Office, Battleford, for the Year ending June 30, 1905.

——	Instruments Registered.	Free Certificates.	Total Certificates.	Assurance Fees.	Total fees.
1904.				$ cts.	$ cts.
July	15	5	8	0 40	60 15
August	14	2	9	15 57	57 32
September	7	1	4	9 00	40 00
October	17	5	9	2 80	37 80
November	33	26	29	9 00	33 00
December	37	18	32	16 69	88 69
1905.					
January	31	24	40	61 31	138 81
February	32	16	26	32 08	82 08
March	26	15	23	10 04	56 29
April	91	84	91	8 66	35 16
May	55	39	50	19 70	73 20
June	40	24	31	13 08	70 08
Totals	398	259	352	198 33	772 58

Certified correct,

R. F. CHISHOLM,
Registrar.

No. 2.

REPORT OF THE REGISTRAR AT CALGARY.

South Alberta Land Registration District,
Calgary, Alberta, July 14, 1905.

The Secretary,
Department of the Interior,
Ottawa.

Sir,—In compliance with your request, I inclose a report of the work of this office for the year ending June 30, 1905.

Your obedient servant,
W. ROLAND WINTER,
Registrar.

SOUTH ALBERTA LAND REGISTRATION DISTRICT, CALGARY.

COMPARATIVE STATEMENT of Registrations, &c., in the Land Titles Office, South Alberta Land Registration District, Calgary, for the years, July 1, 1903, to June 30, 1904, and July 1, 1904, to June 30, 1905.

Year and month.	Number of Instruments Registered.	Free Certificates only.	Aggregate Number of Certificates.	Assurance Fees.	Total fees.	Year and Month.	Number of Instruments Registered.	Free Certificates only.	Aggregate Number of Certificates.	Assurance fees.	Total fees.
1904.				$ cts.	$ cts.	1903.				$ cts.	$ cts.
July	501	95	355	395 40	1,605 15	July	374	56	250	356 00	1,321 90
August	696	215	536	389 50	1,787 80	August	463	136	365	403 85	1,437 65
September	511	71	343	348 00	1,604 15	September	329	47	214	250 45	1,079 10
October	571	187	42	312 75	1,435 25	October	373	41	277	375 25	1,417 00
November	485	93	347	326 60	1,507 60	November	359	27	238	297 95	1,350 25
December	484	106	339	404 70	1,521 30	December	353	62	254	277 25	1,207 90
1905.						1904.					
January	514	71	315	451 05	1,758 00	January	342	35	233	283 50	1,204 25
February	477	26	295	441 90	1,820 05	February	438	83	296	272 45	1,326 90
March	608	79	409	575 03	2,159 73	March	462	92	332	334 45	1,475 25
April	594	55	402	1,074 10	2,768 35	April	540	67	390	585 00	2,063 95
May	710	139	508	542 50	2,293 45	May	549	53	398	542 80	2,144 20
June	819	281	642	655 60	2,412 55	June	642	113	449	457 10	2,003 10
	6,970	1,418	4,913	5,917 13	22,673 38		5,224	812	3,696	4,436 05	18,031 45
Irrigation plans	4				4 00	Irrigation plans	4				4 00

W. ROLAND WINTER,
Registrar.

No. 3.

REPORT OF THE REGISTRAR AT DAWSON.

LAND TITLES OFFICE,
DAWSON, Y.T., June 30, 1905.

Report made by J. E. Girouard, Registrar, of the Land Titles Office for the Yukon Land Registration District, from July 1, 1904, to June 30, 1905.

Year and Month.	No. of Deeds recorded.	No. of Certificates of Title issued.	Income.		
			Fees.	Assurance fund.	Total.
			$ cts.	$ cts.	$ cts.
1904, July........	55	25	210 55	12 35	222 90
" August......	58	23	212 98	33 57	246 55
" September...	56	30	209 10	13 65	222 75
" October.....	40	15	137 70	13 45	151 15
" November .	17	6	61 30	2 00	63 30
" December...	11	4	30 25	11 85	42 10
1905, January.....	21	9	83 30	6 95	90 25
" February.. .	22	7	77 40	22 60	100 00
" March......	31	16	130 75	6 90	137 65
" April........	25	10	83 80	2 00	85 80
" May	51	20	168 20	11 10	179 30
" June..	50	27	206 30	17 55	223 85
	437	192	1,611 63	153 97	1,765 60

J. E. GIROUARD,
Registrar.

No. 4.

REPORT OF THE REGISTRAR AT EDMONTON.

REGISTRATION DISTRICT OF NORTH ALBERTA,
EDMONTON, ALBERTA, October 5, 1905.

The Secretary,
Department of the Interior,
Ottawa.

SIR,—I herewith inclose my report for the fiscal year ending June 30 last.

Your obedient servant,

GEO. ROY,
Registrar.

STATEMENT showing number of Registrations and amount of Fees collected in the Land Titles Office for the North Alberta Land Registration District, for the year ending June 30, 1905, and a comparison with the work done in the previous year.

Month and Year.	Number of Instruments Registered.	Total No. of Certificates Issued.	Number of Free Certificates Issued.	Amount of Assurance Fees.	Total Amount of Fees Collected.
				$ cts.	$ cts.
1904.					
July	729	433	153	421 75	1,952 50
August	735	479	260	327 60	1,616 10
September	604	354	108	355 70	1,728 50
October	539	302	95	334 30	1,575 05
November	596	323	115	315 90	1,619 70
December	705	341	74	413 55	2,069 80
1905.					
January	692	358	82	403 35	2,041 05
February	661	331	124	441 55	1,846 95
March	835	460	153	461 25	2,343 55
April	750	386	89	503 95	2,306 85
May	760	423	124	460 75	2,257 45
June	795	441	99	526 35	2,478 05
	8,401	4,631	1,476	4,966 00	23,835 55
Returns from June 30, 1903, to July 1st, 1904	8,546	5,125	1,924	4,940 75	23,930 25
Difference	145	494	448	25 25	94 70

GEO. ROY,
Registrar.

No. 5.

REPORT OF THE REGISTRAR AT PRINCE ALBERT.

Month.	Number of Instruments	Certificates issued Free.	Number of Certificates issued.	Assurance Fee.	Total Fees.
1904.				$ cts.	$ cts.
July	196	21	111	111 65	627 65
August	275	7	113	82 85	603 65
September	246	55	170	98 30	564 80
October	196	80	148	104 05	513 55
November	181	16	107	133 30	592 05
December	252	11	109	175 10	855 10
1905.					
January	260	22	120	212 75	927 25
February	308	54	271	223 35	931 05
March	387	56	362	380 00	1,345 90
April	410	76	361	307 00	1,222 25
May	419	72	463	199 80	1,093 55
June	412	75	440	240 65	1,112 35
Total	3,542	545	2,775	2,268 80	10,389 35

The total receipts for 1903-4 were $7,501.70, showing an increase this year of $2,887.65.

S. BREWSTER,
Registrar.

No. 6.

REPORT OF THE REGISTRAR AT REGINA.

REGISTRATION DISTRICT OF ASSINIBOIA,
REGINA, ASSINIBOIA, July 12, 1905.

The Secretary,
Department of the Interior,
Ottawa.

SIR,—I beg to report as follows regarding the work of the Land Titles Office for the Assiniboia Land Registration District, for the year ending June 30 last past.

The following is a statement of fees received during each month of that year:—

AMOUNT OF FEES UNDER TARIFF.

Month.	For Certificates of Title.	For Registration of Instruments	For Searches.	For Assurance Fees.	Total Fees.	For Deposits.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	2,153 30	826 75	435 80	1,653 20	5,069 05	5,069 05
August	2,105 15	630 00	307 50	1,708 25	4,750 90	4,750 90
September	1,719 70	576 75	285 10	1,263 30	3,844 85	3,844 85
October	1,822 10	685 50	418 75	1,227 25	4,153 60	4,153 60
November	1,941 55	801 50	414 55	1,100 00	4,266 00	4,266 00
December	2,285 80	932 00	546 10	1,415 05	5,178 95	5,188 95
1905.						
January	2,352 35	1,130 25	617 05	1,576 70	5,676 35	5,676 35
February	2,359 50	1,029 75	521 40	1,404 15	5,314 80	5,314 80
March	3,129 25	1,225 00	581 50	1,867 85	6,803 60	6,793 60
April	2,542 40	993 25	492 00	1,592 40	5,620 05	5,620 05
May	2,605 10	1,104 25	555 20	1,582 65	5,847 20	5,847 20
June	3,494 05	1,128 50	543 05	1,955 20	7,120 80	7,120 80
Total	28,518 25	11,063 50	5,718 00	18,346 40	63,646 15	63,646 15

Besides the above work, free certificates of title on grants to the number of 1,384 were issued, and a large quantity of free work has been done for the North-west government. Certificates of title have been issued for 38 new townsites, and additions to existing townsites.

The constantly increasing work of this office will necessitate some radical changes in connection with the office staff, space and vault room. Although it was possible to obtain the whole of the room on this flat of the land titles office, formerly occupied by the Inspector of Public Works, even yet more room should be given as, during the hot weather especially, the space is too small for the number of clerks employed. I also beg to report that the vault is almost completely filled.

Very nearly the whole time of the deputy registrar is taken up in signing registers, duplicate certificates of title, abstracts, &c., and he is able to give but very little attention to the searching of titles, while the registrar's whole time is taken up with the general oversight of the work of the office, and the conduct of the correspondence.

The business of this office would warrant the employment of two qualified examiners of titles, persons who should assume the responsibility of these matters, and not compel the registrar and deputy registrar to hand this work over to clerks, who, however competent, cannot necessarily feel the responsibility that attaches to it.

Your obedient servant,

F. F. FORBES,

Registrar.

PART V

ROCKY MOUNTAINS PARK OF CANADA

REPORT OF THE SUPERINTENDENT.

ROCKY MOUNTAINS PARK OF CANADA,
BANFF, ALTA., October 25, 1905.

To the Honourable FRANK OLIVER,
Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit for your consideration my annual report as Superintendent of the Rocky Mountains Park of Canada, which includes my second annual report of the Yoho extension, for the year ending June 30, 1905.

I am pleased to be able to report that during the exceptionally fine weather which prevailed during the autumn of last year I was enabled to do a great deal of necessary work in the older parts of the park as well as in the Yoho valley district. The latter in which is included the vast addition made in 1902, involves, as you are aware, an increased area of nearly 5,000 square miles, and has within its limits, perhaps the most stupendous and yet magnificent scenery in the world.

ROADS, BRIDGES, ETC.

As I mentioned in my last report, two miles of entirely new road have been constructed within the park limits east of Anthracite. This work was rendered necessary by the continual caving in of the overhanging cut banks, caused by the exceptionally wet weather which prevailed during the summers of 1903 and 1904. The new road is so located as to avoid any future possibility of trouble from this source. I have caused considerable improvements in the location and condition of the extension of this road from Anthracite to the eastern boundary of the park, as well as from Anthracite to Banff. This highway is being gradually put in good condition to connect with the road now being built by the provincial government from Calgary to the eastern park limits, so that in a short time there will be a good driving road throughout the whole distance from Calgary to Banff. Many of the residents in and around Calgary have availed themselves of the improvements effected to take their horses and conveyances to the National Park at very inconsiderable expense.

From Banff the bridle path to Laggan has been placed in a much improved condition, so that the trip between these two points may be easily made in a day on horseback.

At Laggan I have caused to be constructed an entirely new road to the Canadian Pacific Railway Company's Chalet at Lake Louise, a distance of more than two and a half miles. This work was in course of construction at the date of my last annual report, but has since been completed, giving entire satisfaction throughout the tourist season just past. The old road, as you may be aware, followed the course of the ravine, and it was necessary, in order to lessen the grades and to give tourists an opportunity of enjoying some magnificent scenery en route, to adopt an entirely different and more permanent location. The work throughout the entire distance was very heavy and I was compelled to cut through numerous side hills, but the results are most encouraging, as the teams travelling to and from the Chalet are now enabled to make much better time, and to travel under much more favourable conditions, besides giving visitors an opportunity of enjoying the magnificent scenic panorama which the new route has opened up. I may say that it has been my object as far as was practicable in all cases to locate new roads so as to afford the most striking views of the scenery in the park.

A new road from Lake Louise, and connected with the road just referred to is in course of construction to Moraine lake (or the Valley of the Ten Peaks), a distance of eleven miles. Two miles of this road were completed last autumn, and at the time of writing it has been completed and is in use for a distance of six miles. A substantial and pretty rustic bridge has been completed over Paradise creek, a roaring torrent which rushes down the side of Mount Temple, one of the most stupendous of the whole range. The scenery along this road was greatly admired by tourists during the season which has just come to a close, and the work of construction to Moraine lake is still being proceeded with. I hope to have the whole distance completed by June 30 next, so as to make it available for the heavier part of the next tourist season. The new road in its course skirts around the base of Mount Temple almost throughout the entire distance, and opens up a vista of unrivalled beauty and grandeur.

I may say at this point that the travel to Lake Louise this year has been increased so largely that although the capacity of the Canadian Pacific Railway Company's Chalet at that point was doubled only two years ago, it has been found necessary during the coming winter to add no less than 50 additional rooms to this beautifully located and magnificently appointed hotel.

At Banff, work has been continued up to the end of the season on the Spray river road, and five miles of good driving roadway have been constructed along the south side of the Spray river.

It is my intention (subject to your approval) to continue this road for a distance of seven miles up the river to the canyon (or Spray falls) and to construct a rustic bridge over the canyon at that point, thus enabling driving parties to return on the north side of the Spray river along the base of Rundle mountain to the junction of the Spray and Bow rivers where they can cross the Spray bridge already built. This route when completed will make a charming round trip of about fourteen miles, which will be undoubtedly one of the most charming in the Banff district, and as it will include nearly all the prominent points of interest in that neighbourhood it will undoubtedly become very popular with visitors who have only a little time at their disposal within which to visit Banff. Work is being continued on this road up to the time of writing, and I hope to complete the crossing of the river during the coming winter.

A bridle trail was cut last year from Banff to the Spray lakes, a distance of 30 miles. This trail was largely availed of this summer by tourists, who have had excellent fishing in the lakes. I have also cut and graded a bridle trail from the Banff Springs hotel to the new bath house at the upper Hot springs, a distance of about one and a half miles. This has proved a great convenience, enabling visitors at the hotel to get to the baths easily and expeditiously, and has proved itself very popular during this season.

As you are already aware, anthracite coal was discovered in enormous quantities within a short distance of the village of Banff and adjoining the road to Lake Minnewanka. The mines have been developed and are now being extensively worked by the Canadian Pacific Railway Company, and a handsome modern town has been erected within the park limits. It is safe to say that there are few, if any, points on the North American continent which possess such a beautiful location and such natural as well as artificial aids to comfort and convenience. The company has built large and commodious offices and the homes of the officials will compare favourably in size and acommodation with those in many of Canada's most ambitious cities. For the married men actually engaged in mining every possible provision has been made; comfortable cottages have been erected and are rented to the employees at a sum equal to a small percentage on the actual cost of construction. Boarding houses, all of a most modern type, have also been erected and are supplied with every convenience. As I have stated in my former report, the village of Bankhead is to-day an ideal town, which contains many streets of handsome and artistically designed dwelling houses provided with such modern conveniences as an electric light system, a water works system, and other sanitary arrangements. Far from being a detriment to the park, the village of

Bankhead adds yet another to its many attractions, and is a popular resting place for visitors to and from Lake Minnewanka. It has many attractions, and is a very popular objective point for visitors to the park. Four miles of the road from Banff to Bankhead, which were badly cut up by heavy traffic, have during the past year been graded and gravelled for the entire distance, and notwithstanding the severe tests to which it has been put, it is now in excellent condition.

In the Yoho extension a great deal of road work opening up some magnificent scenery has been commenced, and in some instances completed. The road from Field to Emerald lake has been finished and covered with gravel. Culverts have been put in where necessary and drains made in low-lying places. The drive from Field to Emerald lake almost baffles description, and is believed by connoisseurs to be the most beautiful of the many drives of the park. Owing to the extreme high water in the Kicking Horse river last spring it was found necessary to abandon about half a mile of the old trail immediately adjoining the village of Field which had been previously utilized, and to construct a new road at a point sufficiently high on the mountain's side to avoid the recurrence of injury from high water. To do so necessitated some heavy work, but the result means that for the future there will be no possible difficulty in reaching Emerald lake at any season of the year. In this connection I may say that no loss has been incurred by the change of location of this piece of road, in as much as the portion which has been abandoned was an old tote road used by the Canadian Pacific Railway Company during construction.

In my last report I spoke of the beauty of Yoho valley, one of the recent discoveries in the National Park, the scenery of which excels in extent anything yet discovered. Work is now well under way on the road leading from Field to this famous valley, and about four and a half miles of an old pack trail, constructed years ago by the Monarch Mining Company has been utilized. The trail has been graded and gravelled, bridges are being built wherever necessary, and culverts have been placed at various points along the road. The road will be completed this autumn as far as the mouth of the Yoho river, where I have found it necessary to construct two bridges so as to avoid an annual snow and rock slide which seems to be inevitable at this particular point. The first bridge, which is now in course of construction, will cross the river west of the point at which the slide usually takes place, and the river will be recrossed about half a mile farther east, above the slide referred to. These bridges which will be of rustic character, will be constructed of timber, which I have been able to procure in the immediate vicinity, and will, I think, add not a little to the beauty of this particular district.

Some idea of the amount of work involved in the construction of a rustic bridge in this locality may be gathered from the fact that the span itself of the first bridge referred to will be no less than 80 feet, with approaches on either side of 120 feet in length, built on piles to the first abutment. It is my intention if possible to complete the construction of both these bridges during the coming winter, so as to be able next spring to transport men and supplies for the continuance of the work farther into the valley. I may add here that the Yoho valley is rapidly becoming the most popular objective point for travellers, and the tourist who does not include this favoured district in his wanderings through the park misses one of the most beautiful incidents of the whole visit.

THE VILLAGE OF BANFF.

The pretty little village of Banff grows daily in health, wealth and beauty and is rapidly becoming not only the most popular summer play ground in Canada, but a winter resort which has only to become more generally known to be fully appreciated. The number of houses which are being erected has necessitated the opening up and grading of several new streets and many residences of a very handsome appearance are already to be found throughout the village and its environment. Electric light supplied by the Pacific Coal Company of Bankhead, is being utilized for the illumination of the town, and twelve arc lights have already been installed at the most necessary points. All government and other public buildings are lighted by electricity, as are also the principal hotels and residences in and near the village. The system up to the present has worked very satisfactorily and the rates are reasonable.

As you are already aware, an appropriation was made during the last session of parliament for the construction of a modern water works and sewerage system in the village. The contract for the former was let to Messrs. Breckenridge & Lund a short time ago, who are already actively engaged on its construction. It is expected that both systems will have been installed before our next season opens so that Banff may fully substantiate its claim of being the most healthy as well as the most beautiful spot in the whole Dominion.

Since the date of my last report a comfortable opera house has been built in the village, capable of accommodating three hundred people. The building is also used for other social entertainments, and fills a much needed requirement.

An excellent fleet of row boats located near the Bow river bridge is at the disposal of visitors, and owing to increased patronage new boats are constantly being added.

The *Mountain Belle* a small steam launch capable of accommodating some twenty passengers has been plying on the river for many years, but has now become entirely inadequate to the ever growing demand, and its owner, W. Mather, is about to build another steamer which he hopes to have in use at the beginning of next season. The new boat, which will be constructed for the accommodation of 100 people, will be along the lines of the sternwheel boats now running on Arrow Head lake, and will include a spacious ball room for the use of excursionists.

A new steamer was launched at Lake Minnewanka last year capable of carrying 40 passengers. This also proved to be entirely too small, and its owners are now adding 20 feet to its length, so as to enable the boat to carry 80 passengers with safety.

HOTEL ACCOMMODATION.

No less than 5,000 tourists were turned away from Banff during the past season for lack of accommodation. The Banff Springs hotel was compelled to remain open for a month later than usual owing to its increasing popularity among the travelling public. Notwithstanding the large extensions made to the building in 1903, which includes the addition of over 200 rooms, the management has since found it necessary to make arrangements for yet another large addition, the work of construction of which will be proceeded with during the coming winter. This latest addition is being built with a view to its being utilized throughout the winter.

The Banff sanitarium has also been largely added to, and is now three times its former capacity. This hotel is now well equipped and up-to-date and consequently has secured a large increase in public patronage.

The Alberta hotel, in the village, has also been doubled within the past year and is still insufficiently large for the accommodation of its patrons. The proprietors of the King Edward hotel have also found it necessary to build a large addition before next season. The Grand Villa at the Upper Hot springs is crowded with visitors all the year through, and the Hydropathic hotel also at the Upper Hot springs has been taxed winter and summer to its utmost capacity.

All these hotels with the exception of the Banff Springs hotel are kept open and are well patronized all the year through, and the fact that the latter is now erecting a large building to be used as a winter hotel also goes to prove that Banff will before long become as popular in winter as it has already become in summer.

MUSEUM BUILDINGS AND GROUNDS.

The beautiful museum building erected by the government and opened to the public in 1903 continues to attract large numbers of visitors, and still maintains its reputation as the most tastefully constructed of all western public buildings, regard being had to its size and cost of construction. All the leading daily papers and most useful books of reference are to be found in the comfortable reading room in the building, where visitors are also supplied without charge with notepaper and envelopes emblematic of the locality. This feature of the arrangement made for the comfort and convenience of visitors is much appreciated.

The location of the superintendent's office in this building is also a great convenience to those seeking information on matters connected with the park. A comparison of the statements showing the number of visitors to the museum building during the past year, with the numbers for several preceding years furnishes the best evidence of its increasing popularity.

I have again to report several additions to the exhibitions in the museum itself, more especially in the classes indicative of the flora and fauna of the mountains. I am satisfied that the specimens which the museum contains, although interesting and valuable even now, are but the beginning of what will one day become one of the most useful and interesting exhibits of the Dominion's possibilities. Since the date of my last report I have, as far as circumstances would permit, cleared and beautified the ground immediately adjoining the museum. These grounds, which were thoroughly cleared and underbrushed last year, have become a popular rendezvous for visitors, who availed themselves of the many rustic seats which I have placed at intervals among the trees. The artificial grass planted around the museum building last year has been successful notwithstanding the want of a proper water supply, but with the advent of the water works system, which I have already stated is now in course of construction, there is no reason why these grounds should not present the prettiest possible appearance.

THE UPPER SPRINGS BATHS.

I mentioned in my last annual report that owing to the inclemency of the weather and the difficulty of procuring suitable labour, I had been unable to commence the construction of the baths at the Upper Hot springs as early as I should have liked. In the spring of 1904, however, I was enabled to commence the work early, and am pleased to be able to report that this valuable addition to the health-giving attractions of the National Park was completed and opened to the public on January 1, 1905. This building, which has been very largely patronized during the last season, but which has already proved altogether incapable of accommodating the large number of persons who wished to use it, was originally 40 feet by 40 feet, divided into two entirely distinct parts, for the accommodation of ladies and gentlemen respectively. Each part contained four private hot sulphur bath rooms, sweat rooms, cooling rooms, hot and cold shower baths, hot plunge baths, comfortable dressing rooms and modern lavatories. An open-air swimming pool 48 feet long and 24 feet wide adjoins the building, the water supply is taken from the Upper Hot springs, which issue from Sulphur mountain and is received into the building at a temperature of 130° F., becoming cooled in the pool to a temperature of 100° F.

Within three months from the date of the opening of the bath houses, and at the season of the year when one might reasonably expect no danger of overcrowding, I found it necessary to add eight additional dressing rooms for bathers using the pool, and at the present rapid increase in patronage I have no doubt that it will become necessary to add still further increased accommodation during the coming winter.

The bath house itself is heated by steam, but in the bath rooms adjoining the pool we have utilized the natural hot water from the upper springs before using it outside, and in this way we are enabled to maintain a sufficiently high temperature in the rooms, besides reducing the temperature of the water before it is used in the swimming pool. Not only is this bath house patronized by visitors desirous of experiencing what to them is a new sensation, but many invalids are attracted here and owe their restoration to health to the excellent qualities of this water which has proved itself so efficient to the treatment of different diseases.

An analysis of the water from the Upper Hot Spring, made in May, 1896, by A. McGill, assistant analyst to the Inland Revenue, Ottawa, shows that it contains dissolved inorganic matter as follows:—

	Milligrammes per litre.	Grains per gallon.
Chlorine (in chloride)	6·0	0·42
Sulphuric acid (SO_3)	550·0	38·50
Silica (SiO_2)	33·0	2·31
Lime (CaO)	355·0	24·85
Magnesia (MgO)	69·5	4·87
Alkalies (expressed in terms of Na_2O)	8·9	0·62
Lithium	A decided trace.*	trace.
Sulphuretted hydrogen (H_2S)	4·3	0·30
Temperature of water	115·5° F.	
Albuminoid nitrogen	None.	None.

The revenue from this source has far exceeded all reasonable expectations as will be seen from my returns forwarded to you weekly. After payment of all necessary running expenses there is already a handsome surplus for revenue which is most encouraging in view of the fact that only a nominal charge is made for the facilities offered.

THE CAVE AND BASIN.

Notwithstanding the opening of the new bath houses at the Upper Hot springs, and the liberal patronage accorded them, the attendance at the cave and basin has not only not lessened, but has enormously increased. The revenue from this source for the year ending June 30, 1905, has very nearly doubled that for any previous year in the park's history, and as you will have seen from my weekly reports, the receipts from baths at the cave and basin during the past year are seven times greater than for the corresponding period five years ago.

The large swimming pool which was opened to the public in 1904 is a favourite resort for bathers. This bath is 100 feet long and 50 feet wide, varying in depth from four to nine feet. Ten additional dressing rooms were added during that year, but still since then I have found it necessary to add eight additional dressing rooms on the south side of the pool, and am again confronted by the fact that during the months of July and August the accommodation for bathers was altogether inadequate. It will be necessary for you to consider without delay the advisability of still further increasing the present accommodation at the cave and basin, or the alternative of utilizing the water coming from the middle springs by erecting another bath house at that important point.

All bathers at the cave and basin are now provided with a proper bathing costume, the whole cost of the baths (costume included) having been reduced to 25 cents. Fresh towels and bathing costumes are now supplied from the laundry, which adjoins, as I foresaw in enabling many visitors to use the baths at the cave and basin who could not otherwise have done so.

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* The quantity of Lithium is such as to give the Li (*a*) line distinctly, without concentration. The best natural lithia waters on the market require to be concentrated to one-hundredth volume to yield this result. Hence the Banff water contains about one hundred times as much lithium as do these waters. A sample from the Buffalo Lithia Spring, No. 2, Virginia, was used for comparison.

RECREATION GROUNDS.

The question of providing suitable recreation grounds for visitors has for some time obtruded itself upon my notice, for the reason that so many vacant lots, hitherto used for recreation purposes have been fenced in and built on by their owners. As you are aware, a site had been reserved on the town site plan of the village for the purpose of a public market. As the market is not now nor will it be for several years a necessity I have had this plot of ground fenced, cleared, graded, and sown with grass. I have also placed seats at convenient intervals throughout its limits, and as the location is most central, these grounds are very largely patronized, more especially by ladies and children. As the site comprises no less than two acres in extent, I hope to be able to raise sufficient revenue by renting the grounds for athletic meetings of different kinds to pay the whole cost of development and maintenance.

THE FAUNA OF THE PARK.

The animal paddock, most admirably located about two miles east of the village and immediately joining the Canadian Pacific Railway track, gains in popularity every year. The diary kept by the caretaker shows that no less than 8,000 persons passed through the gates during the past season, and when it is remembered that a large number of pedestrians also visit the paddock and inspect the animals from the outside fence, it will be seen that the buffalo and other animals are an ever increasing attraction.

The heard of buffalo now numbers 51 head, all of which are in a healthy, thriving condition. During the past year the Department of Interior donated two head to the city of Toronto, and two bulls have been lent to the city of Brandon. The increase for the past season numbers ten head, there being no loss whatever. The elk and moose have also done well during the past season, both species showing an increase of two over the preceding year. Here again there was no loss. Our little herd of blacktail deer have also increased by four head, without any loss, and I have also to report a satisfactory increase among the Angora goats. Our Persian fat-tail sheep are in healthy condition, although I am unable to report any increase in this class.

Three black bear captured in the mountains have also been added to our collection, as well as three red foxes and two cross foxes. I may add that I erected a windmill for the supply of water to the tank baths which I placed in the inclosures for the different animals, and the collection already shows visible benefit as the result of these additions to their comfort.

The total number of animals now in captivity in the park under my charge is as follows:—

Buffalo	51
Elk	12
Moose	7
Deer	14
Angora goats	17
Persian sheep	4
Coyotes	3
Timber wolf	1
Cougars or mountain lions	2
Red foxes	3
Cross foxes	2
Badgers	2
Black bear	3
Great horn owls	2
Total	123

THE AVIARY.

Since the date of my last report I have erected on the museum grounds a handsome rustic structure for the accommodation of different varieties of birds. The building which is octagon in shape contains nine compartments radiating from a common centre each containing a pen and run for its occupants. Through the courtesy of William Whyte, Esquire, 2nd Vice-President of the Canadian Pacific Railway Company, I have been enabled to procure from Yokohama one pair of Japanese Golden pheasants, and one pair of the Japanese Copper variety. The other varieties of pheasants in the aviary include one pair Mongolians, one pair English Silver, one pair English Ring-necks, one pair Prince of Wales and one pair Common, besides one pair Reeves and one pair of Lady Amherst. These two latter varieties are in themselves well worth a visit to the museum grounds, and during the past season they have been seen and admired by many thousands of people. I hope to have an increase from these birds next year, and I also hope, if my expectations are realized, to set some of them at liberty in the park later on, and thereby add very perceptibly to its many attractions.

Of the two Golden eagles which had been secured from British Columbia, one destroyed the other last winter, but I hope to be able to add another specimen in the near future.

FISH AND FISH HATCHERY.

Fishing in the park during the past season has been more attractive than in former years, and I am pleased to be able to report that no breach of the fishery laws has taken place as far as I can learn, since the date of my last report.

I have always been of opinion that the National Park is the most suitable place for breeding fish for the stocking of territorial streams, and I would again suggest the establishment of a fish hatchery for this purpose in some suitable location in the park.

In the autumn of 1904, 800 Nepigon trout (all parent fish) were placed in the Bow river, a short distance west of the village of Banff. These would seem to have thriven well, as several specimens have been hooked by rod-fishermen during the present season.

Mr. Walter D. Wilcox, the author of two interesting works dealing with the Rocky mountains, who has been a regular visitor to the National Park for the past fourteen years, has drawn my attention to the fact that many lakes and streams in the park which are apparently suitable for the support of fishing life are totally devoid of either lake or brook trout. This is often due, no doubt, to the presence of falls, which prevent fish from ascending the streams, as in the case of Lake O'Hara. Mr. Wilcox is of opinion that for the purpose of restocking streams which have been fished out, and of placing young fish in the lakes, &c., it would be eminently desirable that fish hatcheries should be established at Banff, where the conditions are most favourable.

PRESERVATION OF GAME.

I have been unrelaxing in my efforts to preserve the many varieties of game which abound in the National Park. In the Rocky Mountains Park proper, I have had very little trouble in maintaining the law. I regret, however, to report that owing to the southern boundary of the Yoho extension not having been clearly defined, that district which is the favourite breeding ground of wild animals has been the scene of more than one offence against the provisions of the Act.

I am now, however, arranging for the establishment of a regular and effective patrol throughout that district, and a number of log cabins are being erected at different points through the Ice River valley to serve as shelter places for the officials to whom will be entrusted the duty of seeing that the law with regard to the destruction of wild animals within the park limits is complied with absolutely and to the letter.

One offender who was convicted recently of shooting goats in that portion of the park was ordered to pay a substantial fine, and it is to be hoped that this conviction will have a salutary effect on others, and that the offence will not be repeated.

THE FLORA OF THE ROCKIES.

The flora of the Canadian Rockies is attracting more and more general attention. The climate conditions and altitude naturally lead to various formations not to be found where botanists have been working for many more years than this country has been known.

Dr. Macoun was one of the first practical scientists to discover this field of new material, and has made an extensive list of the plants discovered, and a fine collection of dried specimens. He has generously and at much labour placed on exhibition at the Chalet at Lake Louise, Field and Glacier Houses about 100 specimens, so that even the novice in botany may readily determine the scientific names of the more common varieties. Botanists realizing this new field, are becoming more and more numerous. There is a constant clamour for some work specially devoted to this region, and in a year or two several books specially devoted to the mountain section are promised. 'The traveller interested in flowers,' writes Mrs. Shaeffer of Philadelphia, who has devoted many years to the study of this, 'constantly makes the mistake of coming to study too late.' The season for flowers in this region is exceedingly short, and begins as soon as the sun sweeps an open spot. The trollins laxus of Lake Louise is seen springing forth with its white or flush pink blooms, and its delicate green leaves in three or four inches of the coldest ice water. At Glacier the beautiful yellow erythranium grandifloreum shoots forth its leaves directly through the snow, frequently in its efforts to get up actually piercing solid ice 4 or 5 inches thick. It is worth a trip across the continent tc see the acres and acres of this gorgeous yellow flower, over which insects and butterflies hover, while winter still shows blankets of white in every direction.

The exquisite calypse, that prettiest orchid of the north pushes her crimson head above the pine needles in the forests of Banff in the first week of June, and as far as Lyell's larch, I have seen nothing in flowering trees to equal it. It buds and blooms at an altitude of 8,000 feet during May and June, while yet all around the snow lies deep.

The primulas and anemones, rhododendrons, menzesia all burst forth with the first warm rays of spring, and by August the most beautiful flowers are gone, leaving only stray astors and amicas. Baron Fruzenburd of Germany has carried away many specimens of shrubs and trees to test them in the German forests. Many travellers are realizing that their own gardens may cultivate and be beautified by quite a number of the shrubs, and some of the flowers and several transplantings have been successful.

But a comparatively few of the vast number of valleys have been thoroughly searched for rare specimens, and the opening of Cougar valley, five miles from Glacier, proved that there are still cast new fields for the botanist in which to obtain fresh material.

THE VALLEY OF THE LAKES.

A new valley has this year been made accessible to the tourist. Being within easy distance of the base of supplies at Lake Louise, one may yet wander, with plenty of good food in the heart of the forests and hills with no sign of a human foot for weeks at a time. A good horse trail has been cut on the shoulder of Burnt mountain, opposite Laggan station, for a distance of at least three miles.

Rising to quite an altitude it commands a superb view of the Bow valley and the mountains about Moraine and Louise lakes. Turning to the right it drops into Ptarmigan valley, at whose head, about six miles, lies an alpine lake of the same name. At the far end of Ptarmigan lake lies a low mountain, the 'Outlook,' accessible on horse back, from which nine truly alpine lakes may be seen. The two small lakes at the left and at the foot of Outlook have been named 'Lone Tree' and 'Cliff' lakes, and the valley beyond, 'Cliff Valley.' This valley leads out to a cross valley which disclosed an old trail between the Pipestone and Red Deer rivers. On this latter trail has been discovered a beautiful red gorge, the Little Pipestone having cut through the rich crimson rock for about 2,000 years, to a depth of about 200 feet. This is a point of interest well worth seeing. The gorge itself empties out upon a beautiful grassy meadow inclosed by a horse-shoe of glacier-covered mountains. High in the bend of the horse-shoe are two more, and probably the most beautiful of all the dozen lakes to be seen. From here one wanders down the Little Pipestone banks till the old Indian trail is reached, where travelling becomes very easy. Turning a bend Mt. Molar becomes an intimate friend and looks down upon one's camp in the Pipestone valley.

Truly a trip to the valleys of the lakes will not weary and will linger long in the heart of nature's student.

DEUTSCHMAN CAVES.

The discovery of these wonderful caves in the Glacier Park reserve caused no little excitement, not only in their immediate neighbourhood, but throughout western Canada, and in compliance with instructions from the Department of Interior, I proceeded in the month of June last to the Glacier Park reserve and travelled on foot from Glacier House to the caves, a distance of six miles. On account of high water, caused by the melting snow, I was at the time unable to make any satisfactory exploration, and decided to return later.

In the month of September I again visited the caves, Mr. Deutschman in the meantime, having reported the discovery of a new cave under Mount Cheops, which he stated he had explored for a distance of two miles. What I saw far exceeded my most sanguine expectations. It would seem as if the whole mountain was honey-combed with these wonderful natural phenomena.

The exploration of the main cave was a most laborious task. The descent into The Canyon' was by means of a rope down an incline that was nearly perpendicular, about 75°, and over snow and ice for a distance of 85 feet to the bed of Cougar creek. This main cave comprises the largest area of all the underground openings thus far discovered. It naturally should, because of the additional waters entering it.

The average height of the main channel-way, measured on the dip of the strata, is about 100 feet, while the width, measured perpendicularly to the bedding faces, ranges from 8 to 20 feet. The channel-way is not, as might be supposed, of uniform width, but varies with the conditions of the flow of water at the time of its formation.

The rocks in which the caves occur are of very hard crystalline limestone, dipping about 30° to the east. These beds are very thick, and are made up of alternate bands of white mottled and grey marble. Some of the bands are very highly impregnated with fine sharp sand.

The cave has undoubtedly been formed entirely by water erosion. The stream which formed it, Cougar creek, is entirely made up of glacier and snow water, and above the cave is free from any lime salts. The fine grains of sharp sand loosened from the lime rock and caught in the swift current of the small stream that at first found its way through a shrinkage crack, of some particular bed of limestone, have undoubtedly given the water an uncommon erosive power, which through the countless years of the cave's history, has enabled that mountain torrent to carve out a mammoth channel in solid marble.

As the channel-way grew deeper and wider, through centuries of erosion, many large masses of rock from the hanging wall were loosened and fell into the channel-way; thus causing an obstruction around which the water cut its way, and at the same time cut away some of the obstruction itself. As a result many of the large places are to be seen here and there. Still others are to be seen that have been formed as pot-holes, like rounded shafts, down which the water poured, keeping the boulders at the bottom ceaselessly grinding there deeper and deeper.

To make travel easy in the caves plank walks should be built across the rough places. No blasting of any kind whatever should be allowed in any part of the caves in forming passageways or in making any improvements. The present quiet condition of the rock is thereby insured, and the breaking of the fragile carbonate of lime coating, which forms the decoration of the cave, by the concussion of the blasting, is also prevented. A blast might work ruin to this attractive feature.

The total length of the passageways surveyed and measured, so far, amounts to about 4,000 feet, or about four-fifths of a mile. To see the caves at this time, before any improvements are made, the visitor must retrace his steps in every passageway, thus doubling the distance named. He must travel 8,000 feet, or one and three-fifths miles, on the main passageways. This does not include the distance between the entrances, nor the little side trips that will be made here and there in the cave, to get closer to the various points of interest. The distance into the cave is now so great that it will require a visitor to be a person well used to climbing in order to view the entire cave in one day.

The marble rocks in which the cave is found belong, most probably, to the Devonian age. No fossils were found, however, to positively verify this conclusion.

Assuming the rate of erosion to be one thirty-second of one inch a year, to cut down 100 feet of rock, which is about the average amount eroded in the main cave, would require 38,400 years. An action greater or less than this assumption would increase or diminish the age of the cave. In some places along Cougar creek in the bottom of the cave an excellent opportunity is afforded to determine actually the present annual rate of erosion. A micrometer measuring apparatus should be used and the area of cross-section of the rock eroded, per year, thus actually computed.

In contemplating the foregoing suggestion as to the probable age of the cave it should be borne in mind that where gravel and sand lodge in the bed of the stream the rate of erosion is many times less than where the bed is continually swept clean by a more rapid current.

It is impossible to convey any more than a faint idea of the actual extent of the cave. To investigate the passages properly would mean an organized camping expedition conveying all necessary supplies, so that the search might be prosecuted until the end was reached

The caves, in the opinion of many, are well worthy of development. The surroundings are magnificent, and the spot is an ideal one in which to spend a holiday. The altitude is over 5,000 feet. The air is pure and the surroundings just as nature left them in their picturesque grandeur.

There is no doubt within a very short period, as soon as the discovery becomes generally known these caves will add yet another and perhaps the greatest attraction throughout the whole mountain district, and may prove from a scientific standpoint to be the most interesting natural phenomena on this continent.

A very easy trail for riding or walking can be made from the Glacier House to the cave by way of the Loop and Ross Peak water-tank. The length of this trail would be about 5½ miles. It would have not only an easy grade, but a location that brings to view in a new light some of the grandest scenery of this famous part of the Selkirks. This feature of itself would make it a very popular trail, even were there no cave at the other end of it.

It would also be advisable to put in a small dynamo to be run by power derived from Cougar creek, so that the entrance passageways and chambers may be lighted by electricity, to render travel safe and bring out the strong points of the several views, and I would respectfully suggest that a sum of $5,000 be appropriated to carry out the work above suggested at as early a date as possible next spring.

SUMMER EXCURSIONS.

Several parties of excursionists visited the National Park during the present season from different points in Canada as well as from the United States. Although their stay in many cases was of short duration, these visitors seemed surprised and pleased with their experience, and many intimated their intention of returning at a later date for a longer stay.

The following is a list of the principal excursion parties, with dates of arrival, who were not registered in any of the hotels:—

July	5,	Excursion of school teachers	80
"	6,	Excursion of editors	35
"	8,	Excursion of Calgary citizens	400
"	18,	Children's picnic from Calgary	400
"	19,	Excursion from Medicine Hat	60
"	25,	Mining Engineers' excursion	96
"	29,	Gates' party excursion	52
"	30,	Party from Toronto	140
Aug.	2,	Excursion from Calgary (Masonic)	750
"	6,	Excursion, Raymond-Whitman party	40
"	20,	" " "	52
"	24,	" " "	30
"	24,	" " "	126
"	24,	Excursion of eastern passenger agents	125
		Total	2,386

REVENUE.

The revenue of the National Park is now far in excess of the amount necessary for the ordinary current expenditure for salaries and maintenance. In this connection I would respectfully suggest the establishment of a capital account to which funds might be credited from time to time for improvements or developments of a lasting character, involving the expenditure of exceptionally large amounts of money. I would also suggest the opening of a contingent account to provide funds for the payment of extra salaries and for immediately necessary repairs or any unforeseen and necessary expenditure.

I have endeavoured to the utmost of my ability to expend the monies placed at my disposal so as to secure the best possible returns, and while the grants made by parliament for the improvement and development of the park have been very liberal, it must be remembered that the development of Canada's national health resort and play ground means a vast increase in the value of this magnificent asset of her people. It will be seen that even larger grants than those already made are not only justified by the circumstances but are necessary owing to the ever increasing popularity of the park. This may be seen from the statistics appended hereto, showing the number of visitors who registered from different countries at the different hotels in Banff during the past season.

A great deal of work has already been accomplished, but there is an enormous amount yet to be done before the people of Canada will be in a position to properly appreciate even a small portion of the splendour of the National Park.

I feel confident from my interviews with prominent members of the government as with representative private citizens of the Dominion, that neither the government nor the people of Canada would object to a considerably increased expenditure in connection with the development and maintenance of the park, but that on the contrary parliament will be entitled to the sincere gratitude of the nation for the continuance of a policy which has hitherto contributed so largely to the enjoyment of not only our citizens, but of visitors from many lands who have been enabled for the first time to form some idea of the magnitude and magnificence of the Canadian Rockies.

In conclusion it gives me pleasure to acknowledge once again the loyal support which I have received from the employees under me, as well as the valuable assistance in the maintenance of law and order which has been rendered me by the Royal Northwest Mounted Police, stationed throughout the park.

I beg to direct your particular attention to the meteorological report appended hereto, which furnishes the best possible evidence of the mildness of the climate, not only in summer, but throughout the winter months.

Your obedient servant,

HOWARD DOUGLAS,

Superintendent.

CANADIAN PACIFIC RAILWAY HOTEL.

United States	2,646
Canada	2,093
England	279
Scotland	51
Australia	47
New Zealand	41
China	24
Germany	22
Ireland	22
France	14
New South Wales	13
New Jersey	13
South Africa	9
India	9
Belgium	4
Switzerland	3
Asiatic Turkey	3
Wales	3
Argentine Republic	2
West Indies	1
Isle of Man	1
Ceylon	1
Sweden	1
Spain	1
	5,303

THE SANITARIUM HOTEL.

Canada	4,336
United States	1,011
England	72
Australia	34
Scotland	17
New Zealand	9
Japan	7
China	6
France	6
Ireland	5
Africa	3
New South Wales	1
Holland	1
India	1
Bermuda	1
	5,510

THE KING EDWARD HOTEL.

Canada	2,649
United States	185
England	30
Scotland	5
Ireland	3
South Africa	2
Australia	1
Holland	1
Wales	1
	2,877

THE ALBERTA HOTEL.

Canada	2,401
United States	150
England	13
Scotland	13
New Zealand	9
South Africa	4
Ireland	2
Australia	2
France	2
Sweden	2
China	1
Wales	1
	2,600

THE GRAND VIEW HOTEL.

Canada	979
United States	64
England	54
Scotland	6
Germany	10
New Zealand	5
Australia	3
	1,121

HOT SPRINGS HYDROPATHIC HOTEL.

Canada	96
United States	20
Australia	1
	117

SUMMARY.

Canadian Pacific Railway Hotel	5,303
Sanitarium Hotel	5,510
Alberta Hotel	2,600
King Edward Hotel	2,887
Grand View Hotel	1,121
Hot Springs Hydropathic Hotel	117
Excursions not registered	1,200
Summer visitors residing in cottages and camps	1,100
	19,838

CAVE AND BASIN.

Canada	2,875
United States	2,103
England	295
Australia	110
New Zealand	86
Scotland	85
France	30
Ireland	24
New South Wales	23
China	22
Germany	21
India	19
South Africa	15
Hawaiian Islands	15
Queensland	15
Japan	9
Sweden	7
Italy	7
Isle of Man	5
Holland	5
Ceylon	5
Samoa	5
Mexico	3
Switzerland	3
Bermuda	3
Egypt	3
Spain	3
Portugal	2
Austria	2
Belgium	2
	5,802

MUSEUM REGISTER ROCKY MOUNTAINS PARK, BANFF.

Canada	4,729
United States	1,496
England	378
Scotland	88
Australia	61
New Zealand	58
Italy	54
Germany	37
Ireland	24
France	20
China	16
South Africa	8
Hawaiian Islands	8
New South Wales	8
Japan	6
Switzerland	6
India	5
South Wales	5
Channel Islands	4
Tasmania	4

Sweden	3
West Indies	3
Australia	3
Spain	3
Phillipines	3
Argentine Republic	2
Queensland	2
Straits Settlements	1
Denmark	1
Siam	1
Belgium	1
Stockholm	1
Samoa	1
South America	1
Norway	1
Borneo	1
North Wales	1
Isle of Man	1
Africa	1
	7,046

METEOROLOGICAL TABLES.

ROCKY MOUNTAINS PARK.

MAXIMUM and Minimum Temperatures and the General State of the Weather between July 1, 1904, and June 30, 1905.

Date.	Thermometer Readings. Maximum. 6 a.m.	Maximum. 6 p.m.	Minimum. 6 a.m.	Minimum. 6 p.m.	Weather.
1904.	°	°	°	°	
July 1....	69·2	80·7	48.0	49·0	Fair.
" 2....	66 6	83·0	42·2	42·4	" thunder.
" 3.. .	69·6	76·9	45·8	46·1	"
" 4....	71.6	79·5	45·8	46·5	" lightning.
" 5....	71·8	84·5	43·8	44·6	"
" 6....	78·9	84·7	45 0	46·0	"
" 7 ...	67·7	78·4	50·1	53·9	"
" 8....	63·1	70 4	48·5	48·8	" fog.
" 9....	65·7	80·2	40·3	41·0	"
" 10....	75·6	83·0	45·2	46·2	"
" 11....	78·3	85·0	42·0	42·8	" thunder and lightning.
" 12....	77·4	73·2	52·8	53·0	"
" 13...	65·5	67·4	43·8	44·9	"
" 14....	60·6	68·4	44·5	44·2	"
" 15 ..	65·1	60·4	44·4	45·5	Cloudy, rain.
" 16...	52·4	57·9	42·8	44·0	"
" 17....	52·8	59·8	40·8	41·7	"
" 18...	52·9	62·4	41·9	43·2	Fair.
" 19....	56·7	70·5	30·2	30·4	" perfect day.
" 20....	67·3	80·6	32·5	33·0	" "
" 21....	77·1	87·6	37·0	37·5	" "
" 22....	81·9	87·5	42·6	42·7	" thunder.
" 23.. .	77·9	74·1	52·3	52·0	"
" 24 ..	63·6	66·9	37·8	38·2	"
" 25....	63·8	77·0	41·0	40·9	" smoke from forest fire.
" 26 ...	68 9	84·0	37·2	37·2	" " "
" 27....	77·9	85·1	40·5	41·0	" " "
" 28....	78·6	64·4	45·4	45·2	"
" 29....	61·8	60·1	39·3	39·6	" rain.
" 30. ..	54·5	66·3	44·4	44·6	"
" 31....	61·8	75·0	43·8	44·0	"
Aug. 1....	71·1	79·3	39·3	39·5	"
" 2 ...	73·9	78·4	41·3	41·7	"
" 3....	71·9	80·8	40·9	40·8	Fair, some smoke from forest fire.
" 4....	75·9	82·4	40·2	39·4	"
" 5....	77·6	74·4	43·0	42·9	"
" 6....	67·0	75·0	40·7	40·8	" much smoke "
" 7....	70·0	62·3	43·8	45·4	Cloudy, rain.
" 8....	49·0	74·2	37·4	38·3	Fair, fog, smoke from forest fire.
" 9....	70·4	78·7	39·9	39·8	" smoke from forest fire.
" 10....	73·8	75 0	40·1	41 2	" " "
" 11....	58·7	69·9	43·0	42·3	" fog, smoke from forest fire.
" 12....	65·7	74·8	31·3	31·0	" smoke from forest fire.
" 13....	70·6	80·9	35·9	35·3	" " "
" 14....	75·2	82·4	38·4	38·3	" " "
" 15....	76·0	78·5	37·5	37·8	" much smoke from forest fire.
" 16....	72·2	69·4	42·7	42·4	" smoke from forest fire.
" 17 ..	63·6	75·4	38·7	39·0	"
" 18....	70·5	69·5	41·0	41·8	" thunder and lightning, rain.
" 19....	60·3	50·3	43·1	33·9	Cloudy, fog, rain.
" 20....	34·3	55·4	33·9	34·8	Fair.
" 21....	51·7	60·3	34·4	42·0	Cloudy.
" 22....	55·5	64·0	46·2	45·9	Fair.
" 23....	49 8	55·5	39·3	39·0	Cloudy.
" 24....	53·8	66 4	34·8	34·9	Fair.
" 25....	62·8	76·4	36·5	36·2	"
" 26....	70·8	74·4	38·3	38·2	"

Maximum and Minimum Temperatures, &c.—*Continued.*

Date.	Thermometer Readings. Maximum. 6 a.m.	6 p.m.	Minimum. 6 a.m.	6 p.m.	Weather.
1904.	°	°	°	°	
Aug. 27....	69·6	65·0	41·1	40·7	Fair, squally wind.
" 28....	52·9	64·4	43·5	43·2	"
" 29....	58·8	66·4	45·3	46·1	" lightning, rain.
" 30....	62·1	65·0	41·7	41·1	Cloudy, rain.
" 31....	54·7	54·1	43·3	43·2	" "
Sept. 1....	49·7	68·1	35·2	36·2	Fair, fog.
Sept. 2....	62·8	71·1	33·8	33·4	Fair.
" 3....	66·4	68·3	35·6	34·3	"
" 4....	64·6	67·3	37·1	36·4	" fog.
" 5....	62·4	75·2	36·3	35·9	"
" 6....	68·7	75·8	40·4	40·2	"
" 7....	71·3	74·3	63·3	64·1	"
" 8....	67·7	73·5	61·9	59·5	" rain.
" 9....	59·3	57·0	42·7	42·6	"
" 10....	52·7	56·8	26·3	26·2	"
" 11....	51·9	57·1	37·2	37·2	Cloudy.
" 12....	44·9	56·2	32·2	31·8	"
" 13....	50·7	65·5	23·7	22·8	"
" 14....	61·4	70·3	33·9	33·9	"
" 15....	62·2	67·2	32·5	31·8	"
" 16....	62·5	61·2	57·1	50·0	Cloudy ; rain.
" 17....	49·9	52·0	30·4	32·3	Fair.
" 18....	45·0	45·0	33·8	33·1	Cloudy ; fog ; rain and snow.
" 19....	43·2	51·2	32·4	32·0	Fair ; fog.
" 20....	44·2	60·3	25·1	23·5	"
" 21....	53·0	65·9	27·5	27·4	"
" 22....	57·4	46·2	33·0	32·3	Cloudy ; rain.
" 23....	43·5	37·7	33·9	33·7	" fog.
" 24....	37·7	59·9	27·0	26·4	Fair.
" 25....	54·1	62·4	30·0	30·9	"
" 26....	56·7	66·5	37·1	36·2	"
" 27....	60·2	57·7	33·5	33·8	Cloudy.
" 28....	53·2	56·7	50·8	46·3	" rain.
" 29....	48·0	58·3	41·7	42·9	Fair.
" 30....	56·4	69·3	50·2	47·8	"
Oct. 1....	62·0	70·8	46·2	47·0	"
" 2....	64·6	62·5	52·2	52·0	Cloudy.
" 3....	57·7	48·4	38·0	38·6	" thunder and lightning ; rain and snow.
" 4....	38·9	31·2	27·0	25·9	" fog.
" 5....	27·8	40·8	22·8	21·0	Fair ; fog.
" 6....	40·0	48·2	28·0	26·8	"
" 7....	39·1	37·6	28·5	27·4	Cloudy.
" 8....	35·6	52·0	30·2	29·0	Fair.
" 9....	46·7	48·2	31·2	33·7	Cloudy.
" 10....	45·4	53·4	31·2	32·3	Fair.
" 11....	49·9	58·7	39·9	39·7	Cloudy.
" 12....	55·4	57·4	41·7	39·7	Fair.
" 13....	51·2	60·0	30·7	30·8	"
" 14....	53·5	59·2	29·8	29·1	"
" 15....	49·7	57·2	26·4	25·5	"
" 16....	50·9	51·0	38·4	34·0	Cloudy ; rain and snow.
" 17....	36·6	42·0	22·0	26·0	Fair.
" 18....	38·7	45·0	35·0	36·0	"
" 19....	39·7	46·0	36·0	37·0	"
" 20....	43·7	51·1	39·0	42·2	"
" 21....	47·9	56·3	44·1	42·8	"
" 22....	47·2	57·4	27·5	28·8	"
" 23....	53·8	52·5	46·5	39·5	"
" 24....	38·7	53·0	20·1	21·0	"
" 25....	47·4	60·4	26·0	25·2	"
" 26....	50·5	61·5	32·9	33·0	"
" 27....	50·1	58·2	27·2	26·0	"
" 28....	42·9	57·2	27·8	27·5	"

MAXIMUM and Minimum Temperatures, &c.—*Continued.*

Date.	Thermometer Readings. Maximum. 6 a.m.	Maximum. 6 p.m.	Minimum. 6 a.m.	Minimum. 6 p.m.	Weather.
1904.	°	°	°	°	
" 29....	47·5	58·0	29·0	37·0	Fair.
" 30....	40·7	52·4	24·4	23·4	Cloudy.
" 31....	48·3	51·0	44·9	45·0	Fair.
Nov. 1....	45·7	53·6	38·5	39·8	"
" 2....	45·7	45·0	41·2	39·5	" squally wind.
" 3...	43·2	50·2	40·2	41·0	" " "
" 4....	48·0	53·6	27·3	27·0	"
" 5....	46·7	44·5	37·0	38·0	"
Nov. 6....	40·5	46·8	35·8	39·8	"
" 7 ...	42·8	50·3	33·2	36·3	"
" 8....	48·1	50·2	34·2	32·8	"
" 9 ...	44·7	49·5	26·8	25·5	"
" 10....	35·4	51·0	23·0	23·0	"
" 11....	42·2	49·2	31·0	30·2	"
" 12....	46·0	47·2	28·7	26·9	"
" 13....	41·7	48·7	29·5	37·7	"
" 14....	44·7	47·3	37·5	30·7	"
" 15....	43·0	48·8	28·2	41·4	Cloudy.
" 16....	43·9	41·1	37·2	35·0	"
" 17 ...	41·2	43·8	31·2	33·9	" snow flurries.
" 18....	39·1	32·6	27·2	27·2	Fair.
" 19....	28·5	34·1	19·3	20·4	" light snow.
" 20 ...	30·7	36·3	28·2	29·2	Cloudy, snow about 5¼ in. on ground.
" 21...	36·6	32·3	24·3	25·3	" bad sleighing.
" 22....	34·5	38·0	28·0	31·2	Fair, rain and snow.
" 23 ...	31·6	26·0	19·0	21·8	Cloudy.
" 24....	24·8	16·0	— 2·0	— 2·5	Fair.
" 25....	19·2	31·0	15·0	18·8	Cloudy.
" 26..	35·0	42·0	28·0	34·0	Fair.
" 27 ...	36·6	44·5	33·5	36·0	Cloudy, no sleighing.
" 28....	40·7	40·0	37·5	36·0	Fair.
" 29....	35·6	35·1	24·8	24·0	"
" 30 ..	33·8	37·8	29·5	29·9	Cloudy, ice on Bow river about 2½ inches.
Dec. 1....	36·8	29·5	27·6	14·7	" snow in patches.
" 2....	14·7	32·3	11·8	15·2	Fair.
" 3....	33·1	26·8	15·0	11·0	"
" 4...	24·3	23·7	10·6	11·2	" squally wind.
" 5....	20·4	23·1	14·6	15·5	"
" 6....	21·2	32·3	15·3	17·7	" squally wind.
" 7....	29·4	41·0	26·7	29·1	" "
" 8....	38·8	30·6	21·8	20·6	"
" 9....	27·8	26·4	9·3	10·0	Cloudy.
" 10...	26·4	34·8	25·7	24·2	Fair.
" 11....	26·9	29·2	13·3	14·2	Cloudy.
" 12....	28·7	31·6	25·8	24·8	Fair.
" 13...	27·8	27·6	21·2	18·2	"
" 14....	21·8	26·1	15·4	16·2	Cloudy, snow.
" 15...	24·2	25·7	19·9	14·4	Fair, bad sleighing.
" 16....	23·5	30·2	11·5	22·4	Cloudy, snow.
" 17....	32·2	31·3	24·7	26·2	" snow flurries.
" 18....	26·8	26·4	7·5	11·2	" "
" 19....	26·8	34·8	24·2	27·2	" "
" 20....	27·9	17·3	14·0	9·8	Fair, snow.
" 21..	14·8	20·0	13·0	12·2	Cloudy, good sleighing.
" 22....	16·0	10·3	4·5	0·3	Fair, snow.
" 23....	10·2	20·3	4·5	8·7	Fair.
" 24....	18·8	3·2	16·4	— 6·9	"
" 25....	— 1·7	1·8	— 8·8	—10·9	"
" 26....	—10·2	10·3	—19·4	—13·8	"
" 27....	8·6	17·3	0·8	4·8	Cloudy, squally wind, snow drifting.
" 28....	18·4	27·2	14·2	17·2	" " " snow.
" 29....	28·2	34·2	23·2	23·2	Cloudy.
" 30....	33·4	36·0	28·2	28·0	"
" 31....	33·3	26·8	11·2	6·8	Fair, snow.

MAXIMUM and Minimum Temperatures, &c.—*Continued.*

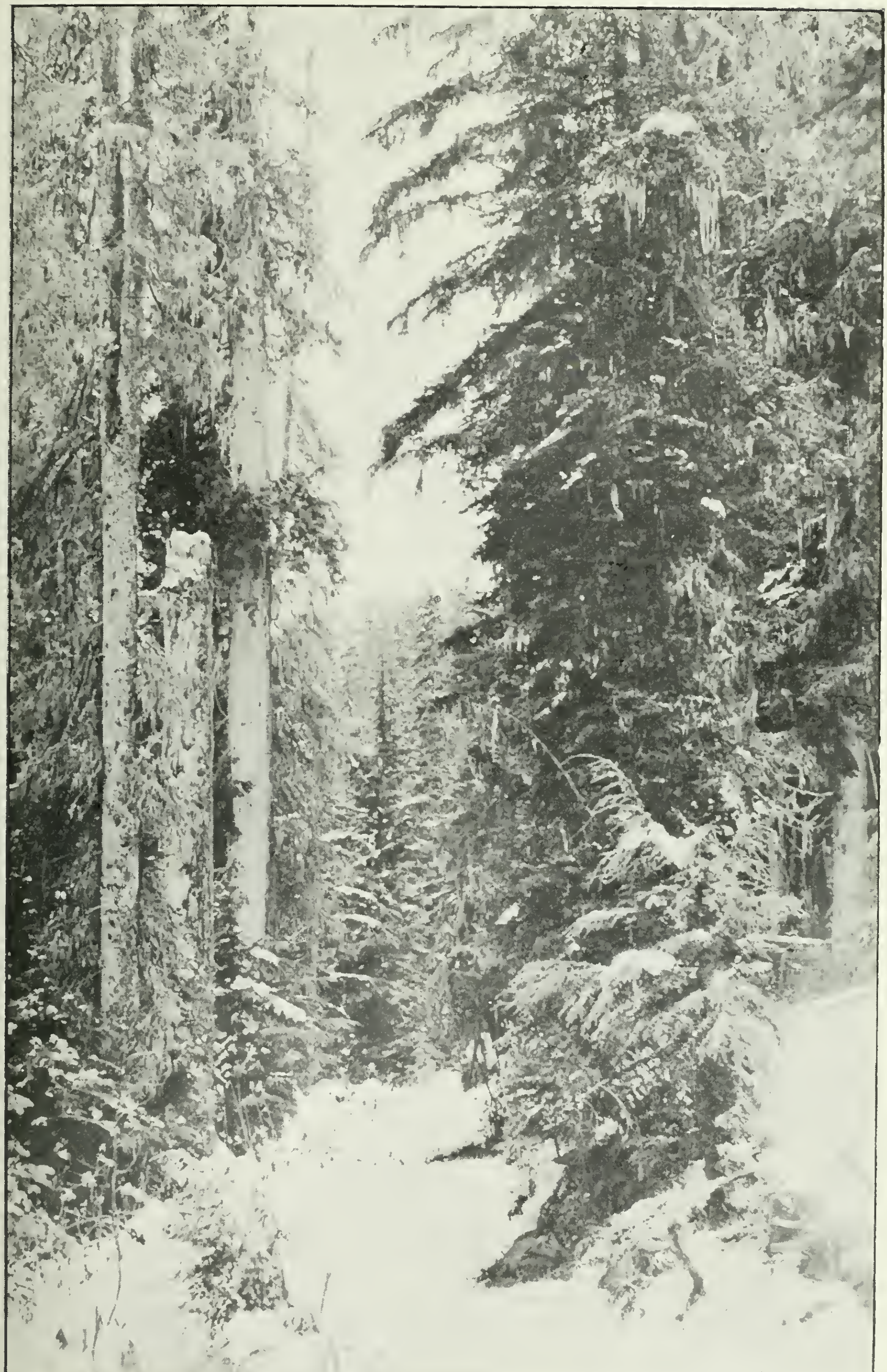
Date.	Thermometer Readings.				Weather.
	Maximum.		Minimum.		
	6 a.m.	6 p.m.	6 a.m.	6 p.m.	
1905.	°	°		°	
Jan. 1 ...	25·1	23·6	17·5	12·0	Fair.
″ 2....	26·4	33·1	20·6	25·7	Cloudy, squally wind.
″ 3....	33 2	36·9	29·2	29·9	Fair.
″ 4....	33·6	26·3	21·0	18·6	″
″ 5....	25·6	28·3	18·4	19·1	″ ice on Bow river about 9½ inches.
″ 6....	23·6	12·4	0·7	— 3·0	″
″ 7....	5·6	9·9	— 0·1	— 2·0	″
Jan. 8....	0·4	12·0	—10·4	— 3·4	Fair.
″ 9....	16·0	19·8	— 1·8	13·2	″
″ 10 ...	16·6	6·2	—14·5	—16·9	″
″ 11....	2·0	9·1	—11·0	— 9·7	Cloudy.
″ 12....	10·9	5·1	....	— 9·5	″
″ 13....	— 9·2	9·3	—26·1	—27·0	Fair.
″ 14....	—14·0	18·3	—19·5	—16·0	″
″ 15....	21·0	28·1	13 6	18·4	Cloudy.
″ 16... .	27·7	32·4	16·9	20·0	″
″ 17....	31·5	35·9	26·3	22·7	Fair.
″ 18....	29 6	26·6	15·0	15·0	″ squally wind.
″ 19....	24·6	23·8	16·3	12·7	Cloudy, snow flurries.
″ 20 ...	19·4	13 3	5·8	5·7	″
″ 21....	9·8	10·7	4 5	3·9	Fair.
″ 22....	7·9	10·6	2·0	1·8	Cloudy.
″ 23....	1·8	15·1	— 9·2	— 5·0	″
″ 24 ...	12·1	34·2	6·2	10·2	″
″ 25....	35·8	35·0	30·9	28 8	″ squally wind, snow
″ 26....	32·6	33 4	20·8	14·5	Fair.
″ 27... .	28·4	27·8	20·9	18·5	Cloudy, snow.
″ 28....	18·4	7·0	1·2	1·9	″ ″ squally wind.
″ 29....	4·5	4 3	— 7 4	—13·5	Fair.
″ 30....	— 5·2	7·3	—22·2	—23·2	″
″ 21....	— 6·1	5·6	—19·0	—23·6	″ ice on Bow river about 24 inches.
Feb. 1....	— 9 4	2·1	—30·4	—32·3	″ aurora.
″ 2....	— 8·1	4·1	—29·0	—30 9	″ ″
″ 3....	— 6·7	17·8	—19·5	—14·2	″
″ 4...	13·6	20·3	— 8·5	—11·6	″
″ 5....	9·8	22·2	—10·4	—11·0	″
″ 6....	12·7	29·1	2·1	5·2	″
″ 7....	23·6	24·8	11·7	14·0	Cloudy.
″ 8....	20·6	23·3	0·3	— 0·7	Fair.
″ 9...	19·6	— 2·7	— 5·7	—10·1	Cloudy, squally wind, snow.
″ 10....	—10·1	— 5·8	—32·9	—36·0	Fair.
″ 11..	—16·6	4·6	—36·5	—37·7	″
″ 12....	— 0·8	12·8	—12 8	— 2·7	″ squally wind.
″ 13....	9·8	19·7	1·8	2·0	″ ″
″ 14... .	17·4	25·1	7·9	4·2	″
″ 15....	23·5	32·0	12·3	9·2	″
″ 16....	25·8	29·2	— 6·4	— 7·3	″
″ 17....	26·3	30·2	6·2	1·0	″
″ 18....	26·6	34·0	4·7	2·2	″
″ 19....	30·8	41·8	28·8	29·1	Cloudy, bad sleighing.
″ 20....	39·9	41·6	35·2	36·0	″ squally wind.
″ 21....	38·7	40·8	33·4	33·3	″ rain.
″ 22....	38·7	43·0	34 3	31·8	″
″ 23....	39·7	35·0	28·5	26·7	Fair.
″ 24... .	32·4	39·9	28·0	27·7	″
″ 25 ...	38·5	45·1	32·5	34·4	Cloudy.
″ 26...	40·7	45·0	23·3	21·1	Fair.
27....	41 4	45·5	24·0	21·0	″
″ 28....	41·7	45·8	28·7	36·4	″ ice on Bow river about 24¼ inches.
Mar. 1 ...	41·0	44·7	37·0	37·4	Cloudy.
″ 2....	40·8	53·5	40·9	41·9	″
″ 3...	48·6	57·1	35·7	35·8	Fair.
″ 4....	50·9	47·2	28·5	28·0	″

MAXIMUM and Minimum Temperatures, &c.—*Continued.*

Date.	Thermometer Readings. Maximum. 6 a.m.	Maximum. 6 p.m.	Minimum. 6 a.m.	Minimum. 6 p.m.	Weather.
1905.	°	°	°	°	
Mar. 5....	42·4	48·8	26·2	27·8	" snow in patches.
" 6....	41·7	45·3	30·5	27·8	"
" 7 ...	40·9	52·4	24·7	25·8	"
" 8 ...	50·7	57·1	32·7	31·2	"
" 9....	43·5	46·8	30·8	28·9	"
" 10....	36·4	21·5	17·8	15·1	Cloudy.
" 11....	15·6	13·7	3·1	1·2	Fair.
" 12....	10·6	14·1	− 3·5	− 2·6	"
" 13....	13·2	32·8	11·2	11·9	Cloudy, snow.
" 14....	33·0	43·8	11·7	30·2	Fair.
" 15....	43·5	50·2	26·8	26·4	"
" 16....	47·0	56·2	29·7	31·2	"
" 17....	48·5	35·3	32·1	31·7	Cloudy, rain and snow.
" 18....	33·8	47·3	31·0	30·2	Cloudy.
" 19....	42·9	46·3	30·8	30·3	"
" 20....	43·5	45·2	33·8	34·2	"
" 21....	42·7	38·8	30·2	32·0	"
" 22....	36·6	41·3	30·6	30·2	Fair.
" 23...	37·8	41·4	24·7	30·3	"
" 24....	36·2	39·2	29·0	28·8	Cloudy.
" 25....	35 2	41·2	30·3	30·2	"
" 26....	37·7	35·8	23·7	23·2	"
" 27 ..	32·9	42·2	15·5	14·1	Fair.
" 28....	34·6	38·1	17·3	16·2	"
" 29 ...	34·3	42·1	16 5	16·7	"
" 30....	37·9	30·4	27·9	27·9	Cloudy, snow.
" 31...	30·3	36·2	19·9	24·9	"
April 1....	32·9	40·1	29·4	29·2	Fair.
" 2....	36·3	40·9	19·2	18·9	"
" 3....	33·2	44·9	12·4	12·0	"
" 4....	41·7	56·8	19·8	20·1	"
" 5....	52·1	59·4	27·5	27·8	"
" 6	55·7	56·2	46·3	42·8	Cloudy.
" 7....	43·4	48·3	31 2	32·4	"
" 8 ...	41·2	44·8	26·8	26·0	Fair.
" 9 ...	39·7	43·9	18·8	20·1	"
" 10...	41·5	49·0	15·2	15·2	"
" 11....	45·7	51·7	26·7	26·7	Cloudy, snow.
" 12....	46·7	28·5	28·2	20·3	"
" 13....	21·1	26·3	15·2	15·3	Cloudy.
" 14....	22·6	33·2	13·3	13·1	"
" 15....	25·6	34·2	15·9	16·2	Fair.
" 16....	30·9	43·5	19·9	19·9	"
" 17.. .	37·6	56·4	25·8	25·8	"
" 18 .	49·9	53·9	25·3	25·1	"
" 19...	49·0	49·3	28·4	28·5	Cloudy.
" 20...	47·0	53·3	32·3	32·4	"
" 21. ..	52·9	60·8	29·5	30·2	Fair.
" 22..	50·0	61·3	26·5	26·3	"
" 23....	57·2	66·9	26·8	26·9	"
" 24....	63·0	70·0	29·2	29·0	"
" 25....	65·0	68·0	28·2	28·2	"
" 26....	63 2	43·4	43·6	33·8	Cloudy, rain and snow.
" 27...	41·4	45·8	30·9	30·7	"
" 28....	35·8	49·1	30·5	31·2	Fair.
" 29....	42 3	51·7	27·2	29·0	"
" 30....	48·5	47·3	30·6	30·3	Cloudy.
May 1....	40·9	50·8	27·3	27·0	Fair
" 2....	42·9	42·8	31·4	31·8	Cloudy.
" 3....	37·7	46·1	33·2	32·9	"
" 4....	43·4	51·8	23·2	23·0	Fair.

MAXIMUM and Minimum Temperatures, &c.—*Concluded.*

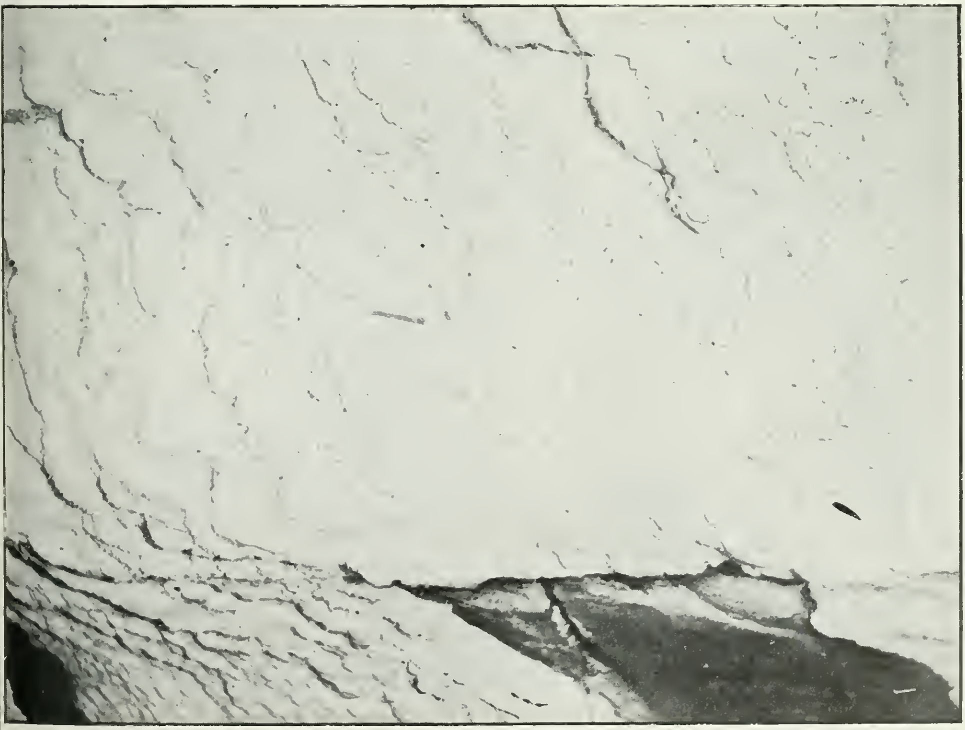
Date.	Thermometer Readings.				Weather.
	Maximum. 6 a.m.	Maximum. 6 p.m.	Minimum. 6 a.m.	Minimum. 6 p.m.	
1905.	°	°	°	°	
May 5....	48·6	54·3	25·4	27·8	Cloudy.
" 6....	51·9	63·3	27·2	27·4	Fair.
" 7...	58·8	64·9	27·3	27·8	"
" 8....	59·6	62·4	31·5	31·3	Cloudy.
" 9....	58·1	52·5	39·3	39·7	"
" 10....	43·7	53·3	28·6	31·2	Fair.
" 11....	45·5	46·7	27·2	27·1	Cloudy.
" 12....	45·0	53·3	31·0	33·2	"
" 13 ...	47·5	54·5	28·2	29·2	"
" 14....	50·1	50·1	34·1	26·4	"
" 15....	43·7	57·3	27·3	32·2	Fair.
" 16....	54·1	69·6	31·6	32·3	"
" 17....	58·9	57·3	44·3	45·2	Cloudy, rain.
" 18...	48·5	54·2	35·2	35·6	Fair.
" 19....	51·5	66·8	25·3	26·7	"
" 20...	61·4	62·0	32·2	36·2	Cloudy, rain.
" 21....	50·1	44·6	38·1	41·9	"
" 22....	42·4	46·8	32·9	33·3	Fair.
" 23....	44·9	55·8	26·2	26·8	"
" 24....	48·9	50·7	32·7	32·4	Cloudy, snow and rain.
" 25....	50·7	59·9	31·0	32·2	Fair.
" 26....	57·0	54·9	38·5	38·1	Cloudy.
" 27...	52·0	55·5	37·2	38·3	"
" 28....	48·4	53·9	33·1	32·8	"
" 29....	52·7	61·8	28·7	31·2	Fair.
" 30....	59·7	52·0	33·3	33·6	"
" 31....	66·8	77·0	33·9	34·4	"
June 1....	72·6	77·5	36·6	38·3	"
" 2....	71·9	60·8	43·2	43·8	Cloudy.
" 3....	57·0	45·7	43·3	38·8	" rain.
" 4....	43·7	64·6	41·4	43·7	Fair.
" 5....	62·9	63·8	35·3	35·3	"
" 6 ...	59·4	66·9	42·8	43·0	" rain.
" 7....	54·7	69.5	36·9	37·0	"
" 8...	66·1	58·9	43·9	44·2	Cloudy.
" 9....	56·8	66·9	30·8	31·1	Fair.
" 10 ...	66·9	74·1	35·7	35·9	"
" 11....	67·5	67·3	49·3	48·7	"
" 12...	64·6	66·8	41·2	41·8	Cloudy.
" 13 ...	53·8	56·8	42·2	43·7	" rain.
" 14....	49·0	55·4	35·0	35·5	" "
" 15 ...	42·9	53·3	33·2	35·0	" fog.
" 16....	52·9	57·8	30·2	32·2	" rain.
" 17....	49·7	53·1	34·0	35·4	" fog, rain.
" 18....	52·0	64·6	31·1	31·9	Fair.
" 19....	58·0	56·9	40·2	42·8	Cloudy, rain.
" 20 ...	49·9	63·0	38·5	39·4	Fair.
" 21 ...	60·9	60·3	37·0	38·0	Cloudy, rain.
" 22....	56·6	51·3	43·7	43·2	"
" 23....	43·3	48·8	35·5	36·8	"
" 24 ...	47·7	48·1	36·8	37·1	"
" 25....	46·7	47·7	40·2	40·3	" rain.
" 26....	43·6	44·2	37·1	35·7	" " fog.
" 27...	44·5	63·0	38·0	39·0	"
" 28....	58·7	61·1	43·9	45·8	"
" 29....	51·0	65·4	36·9	38·5	"
" 30...	59·4	68·0	35·4	35·8	"



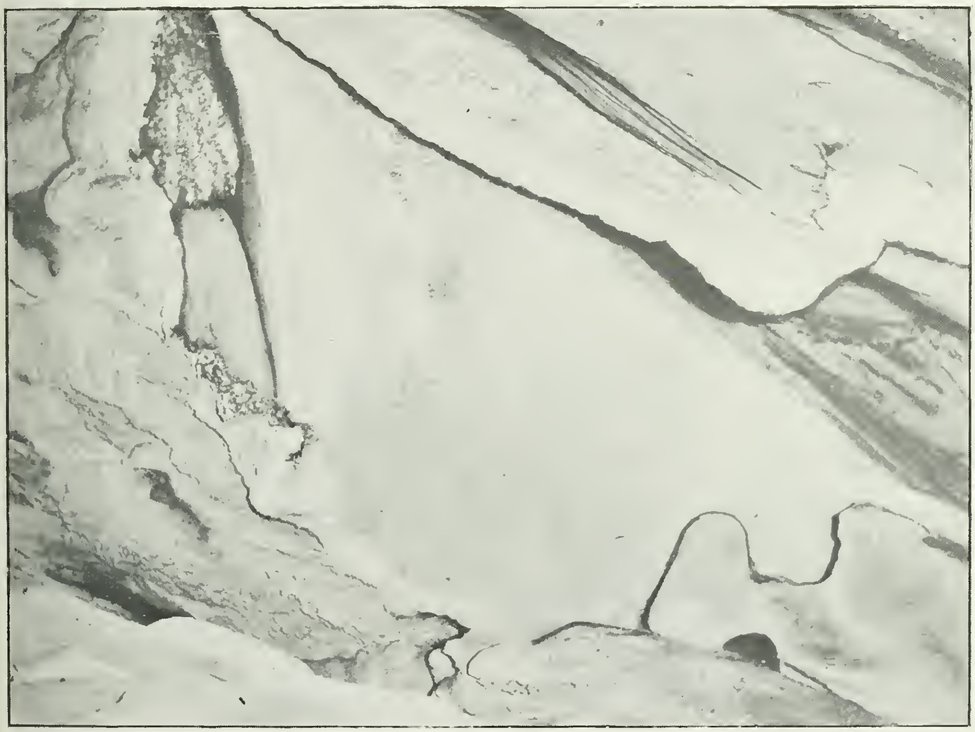
On the Trail to the Caves.

Flashlight showing the fantastic curving of the Water Channel.

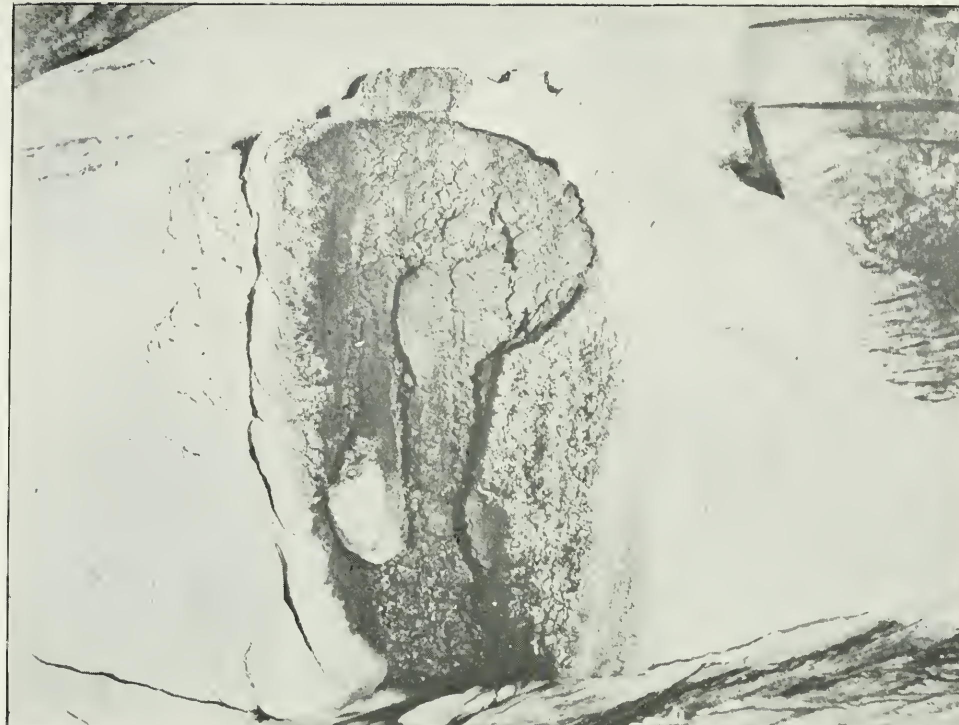
Flashlight taken in the Cone. Observe the beautiful deposits of Carbonate of Lime.



Flashlight showing a small section of roof.



Flashlight of Room named the Bridal Chamber. The decorations of Carbonate of Lime are Creamy White and very dainty.



Flashlight showing the Water Course in the centre with the Marble Walls on outerside.

View on the return home from the Caves.

Conger Mountain and the Illecilliwaet River from the Loop.

Winter Scene taken at the newly discovered Caves. Showing Mount Sir Donald and Illecillewaet Glacier in the Distance.

Balsam Firs at the Caves in their dainty snow drapery.

Douglas Falls, near the newly discovered Caves in the Glacier Park Reserve.

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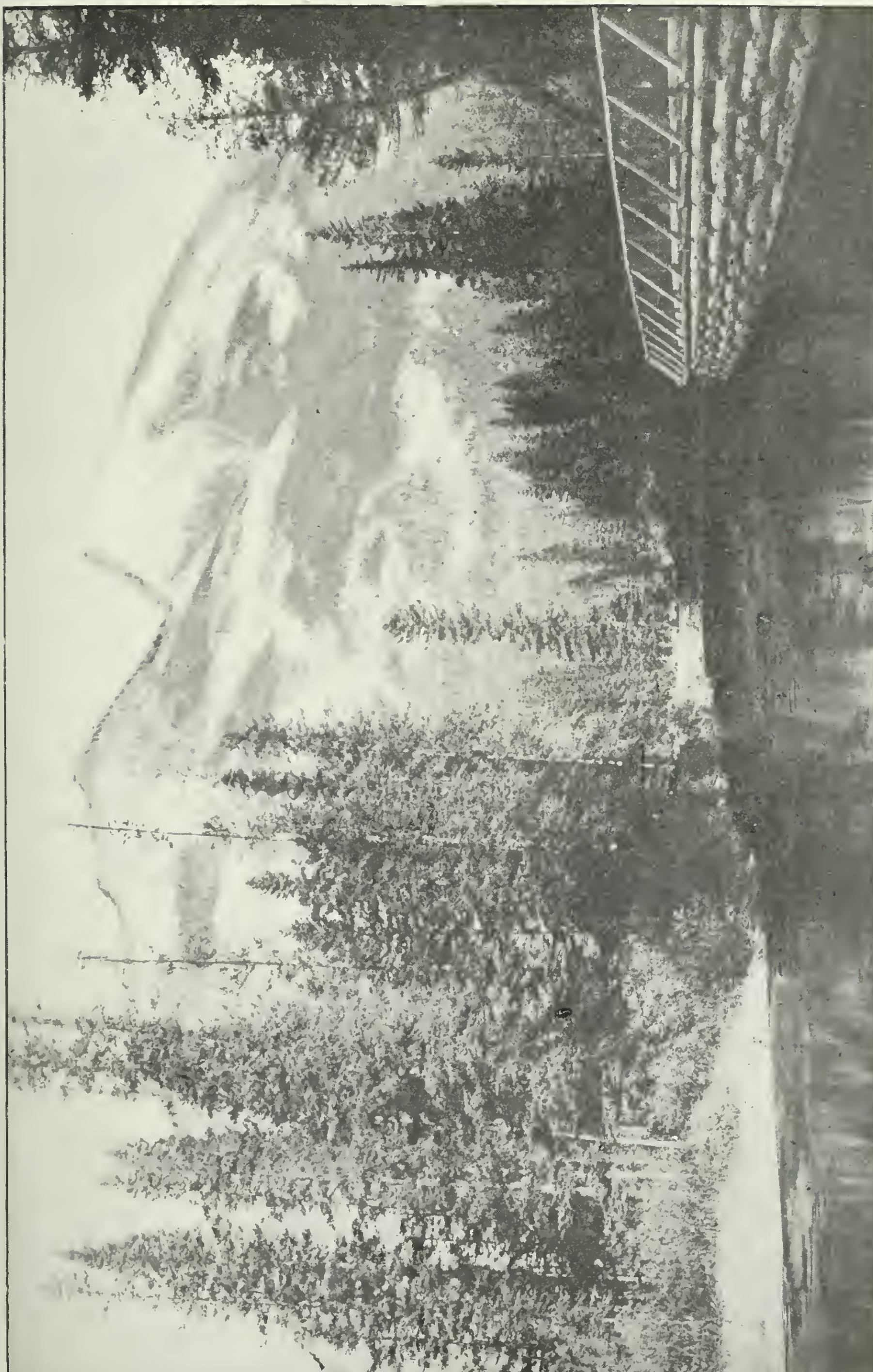


Mount Rundle, Banff.

Bath House, at Upper Hot Springs and Caretaker's Cottage.

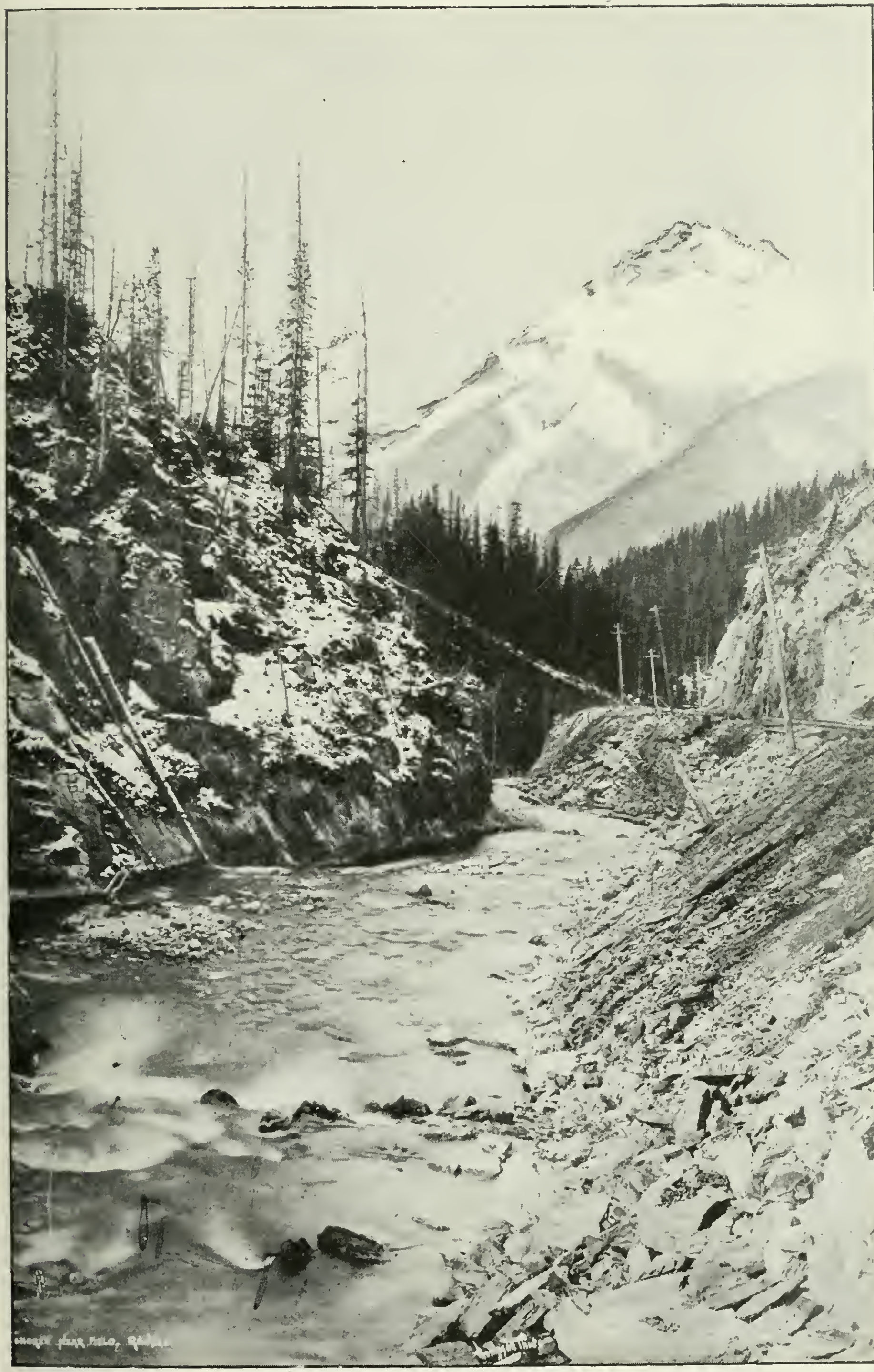
Buffalo, Banff.

Muraine Lake, Valley of the Ten Peaks.

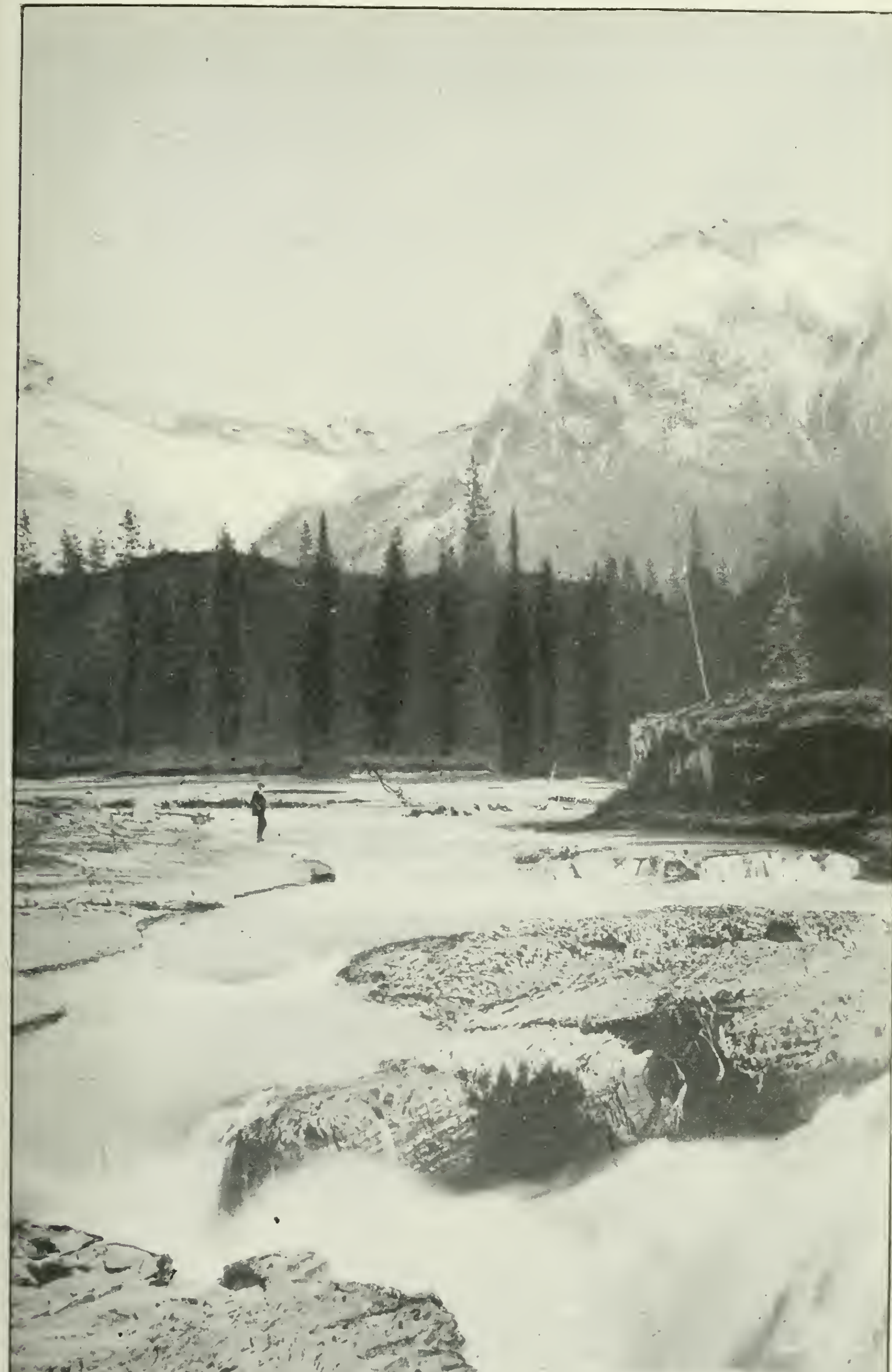
Showing Bow River and Rundle Mountain.

Buffalo Bull—34 years old.

Mount Temple and Paradise Valley.



Kickinghorse, near Field, Rockies.



Kickinghorse River, near Field, B.C.

South end of Lake Louise. Mounts Aberdeen and Lefroy in the distance.

Buffalo Cow and her Calf.

PART VI

KEEWATIN

REPORT OF HIS HONOUR THE LIEUTENANT GOVERNOR OF KEEWATIN.

GOVERNMENT HOUSE,
WINNIPEG, MAN., July 29, 1905.

The Hon. FRANK OLIVER,
Minister of the Interior,
Ottawa.

SIR,—In submitting the annual report on the district of Keewatin there are few matters of special import to be dealt with.

In October of last year reports were received to the effect that an epidemic of measles, scarlet fever and mumps had broken out amongst the Indians of Norway House reserve, which assumed somewhat serious proportions. I am pleased to say, however, that the prompt and effective measures taken by the Indian Department had very satisfactory results, and the spread of sickness was well under control before the end of the year, and ultimately entirely stamped out of the district.

The sickness preventing, in many instances, the natives from following their usual avocations of fishing and hunting, resulted in numerous cases of destitution, but relief in all deserving cases was furnished by the government.

The fishing on Lake Winnipeg continues to afford employment for large numbers of the natives and other residents, and as that avocation proves to be more remunerative, and the results less uncertain, it is gradually gaining preference over hunting as a means of obtaining a living, by the residents adjacent to the waters.

Owing to the development of the fishing industry, and consequently increased travel on Lake Winnipeg, it has been considered advisable to establish a constable at Norway House, as much for the maintenance of law and order as for prohibiting the distribution of intoxicants to the Indians, and the establishment of a patrol launch on the lake during the summer months is now being arranged, having the same objects in view. This latter will also form a connecting link in a line of communication with the police outpost already established in the northern portion of the district which now furnishes a patrol for the western shores of Hudson Bay.

The conditions already referred to affording more frequent opportunities for communication with the various parts of the district, I have, at frequent intervals during the year, received information as to the prevailing conditions, through the missionaries and officers of the Hudson's Bay Company, which I am pleased to say has been of a generally satisfactory character.

The conditions to which the Indians are naturally adapted are such that their record as successful agriculturists has not up to the present, under the most favourable circumstances, been of high order. In this 'North Land' they are not, however, afforded an opportunity of entering on agricultural pursuits under as favourable conditions as exist elsewhere, the only alternative being that of hunting and fishing, on which their race has been dependent for a living for centuries past, and to which nature appears to have specially adapted them. It is not, therefore, to be marvelled at that under existing conditions cases of destitution occur in the district, though in view of all the circumstances the number of such is comparatively small, and relief is promptly given to sufferers by the government.

When the fur-bearing animals are numerous the Indian is in affluence, and enjoys life to the full extent of his means, and when this source of revenue fails him he is in helpless poverty, largely dependent on the public for support, it being his inborn principle to 'take no thought for to-morrow.' Withal he is, as a rule, law abiding and loyal, and a feeling of sympathy must inevitably go out towards the race as we see their favourite source of earning a living becoming gradually more limited with the inroads of civilization, and their numbers on the decline.

The administration of law and order in the district during the past year has called for very little attention on my part. That a district comprising such an area as Keewatin, inhabited almost entirely by untutored Indians, should come through the entire year without the commission of any crime beyond the jurisdiction of the local magistrate is a record not easily excelled. This continued good order and absence of crime may be attributed to the good example and wholesome influence exercised by the missionaries for the several denominations, the Hudson's Bay officials and other white traders who have penetrated the district; and it also speaks volumes for the peaceable character of the Indians themselves.

My investigation has satisfied me that the Indian who is remote from white civilization is better than the Indian who resides on its borders. The Indians of the north are found to be generally men of good character, and amongst whom any offence against either the property or person is by a strong public opinion severely condemned.

The presence of the police in the various parts of the district referred to has a good moral effect amongst the natives.

The efforts of the missionaries also continue to be fruitful of apparent good results.

I have again to convey my acknowledgment for the assistance furnished by Mr. C. C. Chipman, Commissioner of the Hudson's Bay Company, and the officers under his direction, as well as to the Honourable David Laird, Indian Commissioner, and the missionaries in keeping me informed upon the prevailing conditions throughout the district.

Just before concluding this report news has reached me of the death of an Indian at Cat lake, under what the Hudson's Bay official at that point conceives to be suspicious circumstances. I at once communicated the information received to the Department of Justice at Ottawa, through the agent of the department at Winnipeg, and under instructions from that department the facts are now being investigated.

Your obedient servant,

D. H. McMILLAN,

Lieutenant Governor.

PART VII

YUKON TERRITORY

No. 1.

REPORT OF THE COMMISSIONER.

COMMISSIONER'S OFFICE,
DAWSON, Y.T., August 19, 1905.

The Hon. FRANK OLIVER,
Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the annual report of the Yukon Territory for the year ending June 30, 1905.

I was appointed to the office of Commissioner of the Yukon Territory on May 26, 1905, and arrived at Dawson on July 3, 1905. On account of my arriving after the close of the fiscal year it is obviously impossible for me to make any personal observations in this report. I must content myself, therefore, with forwarding to you herewith, the reports of the following officers:—

1. The Gold Commissioner.
2. The Assistant Gold Commissioner.
3. Crown Timber and Land Agent.
4. Comptroller.
5. Director of Surveys.

Your obedient servant,
W. W. B. McINNES,
Commissioner, Yukon Territory.

No. 2.

REPORT OF THE GOLD COMMISSIONER.

OFFICE OF THE GOLD COMMISSIONER,
DAWSON, Y. T., July 17, 1905.

The Hon. W. W. B. McINNES,
Commissioner Yukon Territory,
Dawson.

SIR,—I have the honour to submit my annual report for the year ending June 30, 1905.

During the year 137 protests have been issued in the Gold Commissioner's court. This is an increase in the number of cases over the two previous years. For the year ending June 30, 1904, 84 protests were entered, and during the previous year, 99.

All protests were heard at Dawson, with the exception of three that were heard on Duncan creek, in the month of March last.

A large proportion of the litigation is due to the scarcity of water. As time goes on the necessity for water to work the lower grade properties at a profit increases. The supply is far less than the demand, and the result is many disputes arise as to the right of priority to what water there is in the creeks and streams in the vicinity of the gold-bearing ground.

The production in future, especially on the creeks that have been worked for some time, will depend largely on the supply of water. It can be safely said, from the information we have, that these creeks still contain very large quantities of low-grade gravel, but in order to work at a profit water must be brought by gravity from the most available sources.

The expense that will be incurred in carrying out water schemes properly will be very great, and it is, in my opinion, the chief problem confronting the Territory at the present time.

Your obedient servant,
E. C. SENKLER,
Gold Commissioner.

No. 3.

REPORT OF THE ASSISTANT GOLD COMMISSIONER.

OFFICE OF THE GOLD COMMISSIONER,
DAWSON, Y.T., August 17, 1905.

The Hon. W. W. B. McINNES,
Commissioner of Yukon Territory,
Dawson, Y.T.

SIR,—I have the honour to submit herewith the annual financial report of the Gold Commissioner's office, Yukon Territory, for the fiscal year ending June 30 last, which embodies the revenue of the head office at Dawson for the fiscal year in question, and also the revenues received at this office during the last fiscal year from the offices of the mining inspectors, and from the sub-agencies throughout the Territory.

At the same time I beg to submit herewith inclosed for your information and the information of the department, a comparative statement between the fiscal year in question and the previous one, and also a statement showing the number of instruments issued in connection with the said revenues.

As you will see by the said comparative statement, the principal items where decrease of revenue is most noticeable are the following ones, viz.:—

With respect to free miners' certificates the decrease shown amounts to..	$15,889 50
With respect to placer mining grants the decrease shown amounts to..	26,765 00
With respect to renewals of placer mining claims the decrease shown amounts to..	6,875 00
With respect to relocations of placer mining claims the decrease shown amounts to..	6,140 00
With respect to registered documents (placer mining) the decrease shown amounts to..	5,868 75
With respect to payments in lieu of assessment work for placer claims, there was no payment of that kind made during the last fiscal year, owing to the regulations having been rescinded in that respect from August 1, 1903; so there is no occasion to consider the decrease in that regard..	
With respect to quartz records the decrease shown amounts to..	130 00
With respect to certificates of work (quartz mineral claims) the decrease shown amounts to..	587 50

The decrease in the revenue from mining dues paid at this office and at the several offices hereinabove mentioned is accounted for by the fact that the diggings in the Dawson mining district on Bonanza, Eldorado, Hunker, Gold Bottom, Last Chance, Bear creek, Dominion, Gold Run, Sulphur, Quartz and their tributaries, do not give at present to the individual miner the same opportunity for staking new ground or for relocating old ground as in the past, and that there has not been any new strike of placer digging of any importance in the Territory during the last fiscal year, and that as a consequence a large portion of the population of miners in this Territory left the country during the last fiscal year, for the Tanana diggings, in Alaska, and a certain proportion of the population went back to the outside.

Notwithstanding the decrease hereinabove referred to with respect to relocations and renewals of placer mining claims in that portion of the Dawson mining district hereinabove described, one should not come to the conclusion that this portion of the Territory is worked out or about to be abandoned. The creek claims are far from being worked out, and operations will be carried on on the creeks for a considerable period longer by ordinary placer mining methods, or by some other mining method. The hill and bench claims in the Bonanza and Hunker watersheds cover a very large area of ground which can be worked profitably by gravitation water, but as the supply of such water at the present time is very limited only a small portion of the claims in question has been worked so far. If, however, large conducts of water bringing a steady supply during the whole of the summer season, are constructed, the owners of those claims will be enabled to carry on mining operations for a large number of years, and to increase materially the production of gold in the Territory.

There is also a large area of ground in the same portion of the Dawson mining district which will very likely be worked by means of dredges in the near future, in view of the successful results achieved by dredging operations on Bonanza creek during the last four years, and also in view of the large dredge which is being installed at the mouth of Bear creek, and of other installations of that kind now being made.

Owing to the decrease of revenue, the Department of the Interior found it necessary last December to close up and abolish the several mining inspectors' offices on Bonanza creek, Hunker creek, Sulphur creek, Gold Run creek, upper Discovery division of Dominion creek and lower Discovery division of Dominion creek, and also the several mining recorders' offices at Forty-mile, Glacier creek, Stewart river, Selkirk and Livingtone creek, and to dispense with the services of the several men employed in connection with said offices, and to merge into the Dawson mining district the several mining istricts of Forty-mile, Sixty-mile, Stewart river and Pelly, and into the Whitehorse mining district the Hootalinqua mining district.

An arrangement was made at the same time by the Department of the Interior to the effect that the non-commissioned officers in charge of the Royal North-west Mounted Police detachments at these several places be appointed as agents to the mining recorder for the Whitehorse mining district, as regards Livingstone creek detachment, and as agents to the mining recorder for the Dawson mining district as regards the detachments at Forty-mile, Glacier creek, Stewart river, Selkirk, Bonanza, Hunker, Sulphur, Gold Run and Dominion, with power to receive moneys and documents from the miners in their locality and forward the same to the Whitehorse or the Dawson office.

Under this arrangement which took effect on February 1 last, the miners on Bonanza, Hunker, Sulphur, Gold Run, Dominion and Quartz creeks have received the same attention as they used to receive from the mining inspectors, except that the police do not issue free miners' certificates, but are only authorized to receive moneys in connection with the issue of free miners' certificates, and to forward the same to this office, where such free miners' certificates are issued from as regards the Dawson mining district. The miners in the portions of the present Dawson mining district which constituted the several mining districts of Forty-mile, Sixty-mile, Stewart river and Pelly are receiving the same attention from the police as the miners on the creeks hereinabove mentioned, situated in the Dawson mining district, and the miners in the Hootalinqua mining district, now abolished, are receiving the same attention from the police in connection with the Whitehorse mining district, except that they have not so easy access to the records as they had before the said districts were abolished.

The police, besides receiving moneys and documents as hereinabove mentioned, receive affidavits of representation in their capacity of commissioners to take affidavits under appointment from the Commissioner of the Yukon Territory, and forward the same to the Dawson or Whitehorse office whenever requested to do so.

The arrangement in question has materially increased the clerical work in the Dawson and the Whitehorse offices and specially the correspondence in this office, and since the staff of this office has been reduced by five men during the last year, the work now falling upon each individual member of the staff is larger than formerly.

The inspection work, which used to be carried on by the several mining inspectors in the Dawson mining district, prior to February 1 last, has been performed by the government mining engineer, Mr. A. J. Beaudette, since then, and he has devoted most of his time to water right matters, either by reporting on the granting of pending applications or by settling difficulties on the creeks near Dawson regarding water. But in the rest of the Dawson mining district there has been no inspection work done since the new arrangement has been in operation.

The sub-agencies where a mining recorder has been left are the following ones: Whitehorse, Kluane, Duncan and Clear. The Kluane district has been in existence since September 1 last only.

The Whitehorse district seems to be stationary, and with the exceptions of the diggings on Livingstone creek, Cotton Eva creek and other creeks tributaries of the south fork of the Big Salmon river which are now attached to the Whitehorse district, there were no placer mining operations carried on during the last fiscal year.

As regards the Kluane mining district it would appear from the returns received at this office covering the period extending to May 31 last, that a very large proportion of the placer mining claims which were staked and recorded in 1903 and 1904 has been abandoned, and that claims have been kept in good standing only on Burwash creek, Arch creek, Fourth of July creek, Virgin creek and Bullion creek, where sufficient prospecting and development work has been done to warrant the mining recorder for that district in stating, in a report received some time ago, that the future of the camp is assured in that part of the country.

The Duncan creek district has given much encouragement to the miners interested in that part of the country, specially on Highet, Ledge, Edmonton and Cascade creeks, and has attracted recently a good deal of interest during the last year.

The Clear creek mining district would appear to be on the decline, and very little interest seems to have been taken in any of the claims in that district during the last fiscal year.

With respect to the matter of hydraulic mining leases, I beg to report that two leases were issued during the last fiscal year, and two others were cancelled during the same period.

The two leases which were issued are the following ones:—

1. Lease No. 44, in favour of Messrs. Grotschier and McBride, for an hydraulic mining location situated at the mouth of the Klondike river, on its left limit, and on the right limit thereof;

2. Lease No. 47, issued in favour of Mr. William Charles Thompson, for an hydraulic mining location situated on Dublin gulch, a tributary of Haggart creek, in the Duncan mining district.

The two hydraulic mining leases which have been cancelled during the last fiscal year are the following ones:—

1. Lease No. 36, issued by the Department of the Interior on April 8, 1902, in favour of Mr. Thomas Howard, for a location situated on Indian river, which location was thrown open for occupation and entry by free miners on June 30 last;

2. Lease No. 29, issued by the Department of the Interior on September 1, 1901, to the Alaska North-west Exploration Company, for a location situated on Ten-mile creek, a tributary of the Sixty-mile river, which location was thrown open for entry and occupation by free miners on September 19 last.

Your obedient servant,

F. X. GOSSELIN,

Assistant Gold Commissioner.

FINANCIAL STATEMENT.

Gold Commissioner's Office from July 1, 1904, to June 30, 1905.

		Amount.	Totals.
	Dawson.	$ cts.	$ cts.
To	Free Miners' Certificates		25,344 00
	Placer Dawson.		
To	Grants	1,210 00	
	Renewals	37,370 00	
	Relocations	8,260 00	
	Registered Documents and Certificates of Partnership	7,944 50	
	Certificates of work	7,926 00	
	Abstracts	97 00	
	Water Grants	812 50	
	Amended Applications	15 00	
	Advance Deposit	1,937 98	
			65,572 98
	Quartz Dawson.		
To	Records	860 00	
	Certificates of Work	852 50	
	" Partnership	42 50	
	Registered Documents	442 50	
	Lieu of Assessment	200 00	
	Certificate of Improvements	40 00	
	Abstracts		
			2,437 50
	Quartz Crown Grants.		
To	Acreage	893 55	
			893 55
	Hydraulics.		
To	Registered Documents and Rental	6,097 05	
			6,097 05
	The following documents were issued between June 1, 1904, and June 30, 1905.		
	Lower Dominion.		
To	Free Miners' Certificates	950 00	
			950 00
	Upper Dominion.		
To	Free Miners' Certificates	1,610 00	
			1,610 00
	Hunker.		
To	Free Miners' Certificates	1,717 50	
	Inspection of work	2 00	
			1,719 50

FINANCIAL STATEMENT—*Continued.*

Gold Commissioner's Office from July 1, 1904, to June 30, 1905.

	—	Amount.	Totals.
		$ cts.	$ cts.
	SULPHUR.		
To	Free Miners' Certificates	1,114 00	
			1,114 00
	GRAND FORKS.		
To	Free Miners' Certificates	2,832 00	
	Inspection of work performed	5 00	
	Royalty Eldorado gusher	65 65	
			2,902 65
	GOLD RUN.		
To	Free Miners' Certificates	1,384 00	
			1,384 00
	SELKIRK.		
To	Free Miners' Certificates	202 50	
	Quartz grants	5 00	
			207 50
	STEWART RIVER.		
To	Free Miners' Certificates	375 00	
	Placer Grants	560 00	
	Renewals	460 00	
	Relocations	440 00	
	Placer Certificates of Work	72 00	
	Registered Documents	102 50	
	Water Grants	7 50	
			2,017 00
	WHITEHORSE.		
To	Free Miners' Certificates	4,457 50	
	Quartz Certificates of Work	175 00	
	" " Partnership	10 00	
	Lieu of Assessment Quartz	100 00	
	Registered Documents "	121 50	
	Records Quartz	280 00	
	Placer Grants	2,640 00	
	" Certificates of Work	356 00	
	" Renewals	280 00	
	" Registered Documents	236 50	
	" Certificates of Partnership	2 00	
			8,658 50
	HOOTALINQUA.		
To	Free Miners' Certificates	312 50	
	Relocations	200 00	
	Renewals	990 00	
	Placer Certificates of Work	196 00	
	" Registered Documents and Certificates of Partnership	122 00	
	Quartz Certificates of Work	15 00	
	" " Partnership	2 50	
	Placer Grants	140 00	
			1,978 00
	FORTY-MILE.		
To	Free Miners' Certificates	402 50	
	Relocations	90 00	
	Renewals	120 00	
	Placer Certificates of Work	34 00	
	" Grants	530 00	
	" Registered Documents	22 50	
			1,199 00

FINANCIAL STATEMENT—*Continued.*

Gold Commissioner's Office from July 1, 1904, to June 30, 1905.

	—	Amount.	Totals.
	DUNCAN.	$ cts.	$ cts.
To	Free Miners' Certificates	1,067 50	
	Placer Grants	1,910 00	
	Renewals	3,760 00	
	Placer Certificates of Work	990 00	
	" Registered Documents	517 00	
	Relocations	920 00	
	Quartz Records	35 00	
	" Certificates of Work	27 50	
	Water Grants	40 00	
	Abstracts	19 50	
	Quartz Certificates of Partnership	2 50	
	" Registered Documents	2 50	
			9,291 50
	CLEAR CREEK.		
To	Free Miners' Certificates	537 50	
	Renewals	1,550 00	
	Placer Certificates of Work	402 00	
	" Registered Documents	166 00	
	Relocations	280 00	
	Placer Grants	50 00	
	Water "	2 50	
	Placer Certificates of Partnership	2 00	
			2,990 00
	SIXTY-MILE.		
To	Free Miners' Certificates	905 00	
	Relocations	560 00	
	Renewals	940 00	
	Certificates of Work, Placer	188 00	
	Registered Documents and Certificates of Partnership	348 00	
	Abstracts	10 50	
	Placer Grants	60 00	
	Water "	2 00	
	Inspection of Work Performed	20 00	
			3,033 50
	KLUANE.		
To	Free Miners' Certificates	840 50	
	Placer Grants	750 00	
	Renewals	3,330 00	
	Relocations	590 00	
	Registered Documents Placer and Certificates of Partnership	386 00	
	Certificates of Work	724 00	
	Quartz Records	10 00	
			6,630 50
	CREDITS.		$146,030 73
By	Receiver General Account	143,876 00	
	Balance Account	2,024 23	
	Gold Commissioner Suspense Accounts	130 50	
			$146,030 73

FINANCIAL STATEMENT of the Gold Commissioner's

RECAPITU

Offices.	Free Miners' Licences.	Placer Grants.	Renewals.	Re-locations.	Placer—Registered Documents.	Certificates of Work.	Abstracts.	Amended Applications.	Water grants.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.	$ cts.	$ cts.
Dawson	25,344 00	1,210 00	37,370 00	8,260 00	7,944 50	7,926 00	97 00	15 00	812 50
L. Dominion	950 00								
U. "	1,610 00								
Hunker	1,717 50								
Sulphur	1,114 00								
Grand Forks	2,832 00								
Gold Run	1,384 00								
Selkirk	202 50								
Stewart	375 00	560 00	460 00	440 00	102 50	72 00			7 50
Whitehorse	4,457 50	2,640 00	280 00		238 50	356 00			
Hootalinqua	312 50	140 00	990 00	200 00	122 00	196 00			
Forty-mile	402 50	530 00	120 00	90 00	22 50	34 00			
Duncan	1,067 50	1,910 00	3,760 00	920 00	517 00	990 00	19 50		40 00
Clear	537 50	50 00	1,550 00	280 00	168 00	402 00			2 50
Sixty-mile	905 00	60 00	940 00	560 00	348 00	188 00	10 50		2 00
Kluane	840 50	750 00	3,330 00	590 00	386 00	724 00			
	44,052 00	7,850 00	48,800 00	11,340 00	9,849 00	10,888 00	127 00	15 00	864 50

Office, for year ending June 30, 1905.

LATION

Quartz Records.	Quartz—Certificates of Work.	Quartz—Certificates of partnership.	Quartz—Registered documents.	Quartz—Lieu of Assessments	Quartz—Certificate of improvem't.	Quartz—Acreage.	Hydraulics.	Advance Deposit.	Inspection Work.	Eldorado Gushers.	Grand Total.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
860 00	852 50	42 50	442 50	200 60	40 25	893 55	6,097 05	1,937 98	....	....	
....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	2 00	....	
....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	5 00	65 65	
....	....	....	....	....	....	....	....	....	....	....	
5 00	....	....	....	....	....	....	....	....	....		
....	....	....	....	....	....	....	....	....	....	....	
280 00	175 00	10 00	121 50	100 00	....	....	....	....	....	....	
....	15 00	2 50	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	
35 00	27 50	2 50	2 50	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	
10 00	....	....	....	....	....	....	....	....	20 00	....	
10 00	....	....	....	....	....	....	....	....	....	....	
1,190 00	1,070 00	57 50	566 50	300 00	40 25	893 55	6,097 05	1,937 98	27 00	65 65	146,030 73

T. M. McKAY,
Accountant.

Comparative Statement, Returns Gold Commisioner's Office.

—	Year ending June 30, 1904.	Year ending June 30, 1905.	1905. — Increase.	1905. — Decrease.
	$ cts.	$ cts.	$ cts.	$ cts.
Free miners' certificates	59,941 50	44,052 00	....	15,889 50
Placer grants	34,615 00	7,850 00	....	26,765 00
Renewals	55,675 00	48,800 00	....	6,875 00
Re-locations	17,480 00	11,340 00	....	6,140 00
Registered documents—placer	15,717 75	9,849 00	....	5,868 75
Certificates of work—placer	11,232 00	10,888 00	....	344 00
Lieu of assessment "	4,550 00	....	....	4,550 00
Abstracts	294 00	127 00	....	167 00
Water grants	980 00	864 50	....	115 50
Amended applications	15 00	15 00	....	....
Quartz records	1,360 00	1,190 00	....	170 00
" registered documents	623 30	566 50	....	56 80
" certificate of partnership	122 50	57 50	....	65 00
" " work	1,780 00	1,070 00	....	710 00
" lieu of assessment	1,300 00	300 00	....	1,000 00
" crown grants	387 47	40 00	....	347 47
" " acreage	311 07	893 55	582 48	....
" abstracts	7 50	....	....	7 50
Hydraulics	8,244 95	6,097 05	....	2,147 90
Inspection work	32 50	27 00	....	5 50
Advance deposit	2,024 23	1,937 98	....	86 25
Gusher—royalty	139 75	65 65	....	74 10
Totals	216,833 52	146,030 73	582 48	71,385 27

T. M. McKAY,
Accountant.

INSTRUMENTS issued during the fiscal year ending June 30, 1905.

—	Free Miners' Certificates.	Placer Grants.	Renewals.	Re-locations.	Placer—Registered Documents.	Placer—Certificates of work.	Abstracts.	Amended Applications.	Water Grants.	Quartz Grants.	Quartz—Certificates of work.	Quartz—Certificates of Partnership.	Quartz—Registered Documents.	Quartz—Lieu of Assessment.	Quartz—Abstracts.	Quartz—Certificates of Improvements	Quartz Acreage.	Hydraulics.	Inspection of work.
Dawson	2,824	121	3,737	826	3,199	3,963	15	13	123	166	341	17	153	2	......	16	36	13	....
Dominion, U	194																		
" L	116																		
Hunker	211																		1
Sulphur	142																		1
Grand Forks	351																		
Selkirk	27									1									
Stewart	45	55	46	44	46	27			2										
Whitehorse	507	264	28		81	78				56	70	4	37						
Hootalinqua	35	14	72	20	42	71					6	1							
Forty-mile	53	53	7	9	7	11													
Duncan	131	191	375	92	236	475	3		7	7	11	1	1						
Clear	66	5	155	28	61	201			1										
Sixty-mile	77	4	81	31	79	60	1		1										
Kluane	120	88	333	65	170	382				2									
Gold Run	170																		
Total	5,069	795	4,834	1,115	3,921	5,368	19	13	134	232	428	23	191	2	......	16	36	13	2

Certified true and correct,

L. G. BURNET.

No. 4.

REPORT OF THE DIRECTOR OF SURVEYS.

SURVEY OFFICE,
DAWSON, Y.T., July 19, 1905.

The Hon. W. W. B. McINNES,
Commissioner of Yukon Territory,
Dawson, Y.T.

SIR,—I have the honour to submit the annual report of the operations of the survey office for the year ending June 30, 1905, as follows:—

From June 30, 1904, until about the middle of March, 1905, the staff of this office consisted of director of surveys, three surveyors and three draughtsmen, when it was reduced to director of surveys, one surveyor and one draughtsman. The surveyors were James Gibbon, A. J. McPherson and myself.

Mr. Gibbon was employed during last season in surveying base lines on Flat creek, Cariboo creek and 'Auction' claims on Dominion creek and its tributaries. In the months of March and April of this year he surveyed 25 miles of base line on Clear creek. Altogether Mr. Gibbon surveyed during the last year 32·35 miles of base line, and 40 'Auction' claims.

Mr. A. J. McPherson surveyed base lines on Highet creek, Edmonton creek, Ledge creek, Cascade creek and Steep creek, all in the Duncan district; a total of 23 miles.

I surveyed the 'Dawson-Whitehorse' road from Yukon crossing to Whitehorse, a distance of 148·6 miles.

Plans of the following surveys were filed in this office during the year, and include the surveys made by surveyors in private practice in the Territory:—

Group lots (including 25 mineral claims, 5 copper claims, and 1 right of way)	48
Placer claims for advertisement under the regulations	19
Base lines	8
Road plans	11
Hydraulic concessions	1
Subdivisions	2
Reference traverses	6

In addition to examining, filing, copying, compiling, &c., of the above survey returns, the following office work was performed for the general public, for which charges were made:—

Blue prints	23
Tracings	2
Sketches	12

Mr. H. G. Dickson, D.L.S., surveyed under contract for the department, 8 miles of base line on Bullion creek in the Kluane district and an Indian reserve at Carcross.

Your obedient servant,

C. W. MACPHERSON,
Director of Surveys Y. T.

No. 5.

REPORT OF THE CROWN TIMBER AND LAND AGENT.

OFFICE OF THE CROWN TIMBER AND LAND AGENT,
DAWSON, Y. T., August 4, 1905.

The Hon. W. W. B. McInnes,
Commissioner of Yukon Territory,
Dawson, Y.T.

SIR,—I have the honour to submit my report for the year ending June 30, 1905.

Attached hereto please find:—

1. Statement of receipts on account of Crown timber, hay permits, grazing land, royalty on coal.
2. Statement showing revenue derived from the Dominion Lands branch.
3. Statement showing timber permits issued.
4. Statement showing hay permits issued.
5. Statement showing the proportion in which this office and the sub-agencies contributed to the general revenue.

The revenue has decreased $26,878.36.

In the Crown Timber branch..	$15,632 55
In Dominion Lands branch..	11,245 81
	$26,878 36

This report does not include collections made at Whitehorse, as heretofore. Last year's collections at that office amounted to $9,483.56. This partially accounts for the reduction in the revenue of this office.

Only one timber berth of one square mile was disposed of during the past year, the revenue therefor being $250, as against $5,750 collected from this source during the year ended June 30, 1904.

Royalty on timber has increased slightly; due to the fact that greater quantities of wood were cut on timber berths rather than to the increase of sales of lumber, 11,330 cords of wood having been sold from timber berths. This partially accounts for the reduction in revenue obtained from wood permits. Another cause for this reduction is found in the fact that over 5,000 tons of coal were consumed during the year just finished, while less than 1,000 tons were consumed during the previous year. There are now only four or five steamers on the upper river run which utilize wood as their only fuel. The others combine coal and wood.

I consider the reduction in seizures as an improvement in the actions of mill-men and wood-cutters generally. Less operations have been carried on in trespass during the year just ended than during any year since the opening of this office. This is due principally, I think, to the heavy penalty imposed on persons cutting logs on Dominion lands without authority. It is practically an impossibility for any one now to carry on operations with a view to disposing of their product in Dawson without being detected, and detection means financial loss to the operator.

Royalty has been paid on 699 3-10 tons of coal. In addition to this 2,807 tons were mined which were not subject to royalty, the coal in question having been mined on coal lands purchased at a higher rate per acre, under regulations which made no provision for the payment of royalty, and there are 1,700 tons on which royalty is now due.

In connection with the coal industry, I take great pleasure in quoting the following from Crown Timber Inspector Sugrue's report to me:—

'Coal at Tantalus is being worked by C. E. Miller. He has a contract with the B.Y.N.Co. for 3,000 tons, partly filled. There are employed at the mines an average of 14 men. The output is 35 cars per day, about 5 cars per man actually working drift. Tunnels—two have been run into the seam a distance of 450 feet each, and cross-cuts opened for these. Coal is run out in cars on wooden railway and then elevated by means of hoist to screener. The seam dips at a sharp angle up stream and runs laterally at almost right angles to the river on the left bank. As yet no trace of corresponding seam has been discovered on the opposite side of the river. The coal is bituminous, intermingled with stringers of rock, and, unfortunately, very dirty. As the tunnels go back the coal becomes purer and less shattered. The screen works satisfactorily, but owing to the softness of the coal, the fall into the hopper refractures the larger lumps and causes much dust. The tests made by the steamers prior to the erection of screen were very unsatisfactory. Since the screening, results have not as yet been made public. In the event of the coal proving a success the wood-cutting on the river will be seriously affected. The company estimate that by use of coal their fuel bill will be cut in two.'

The Coal Creek Coal Company are also large operators. Their operations have been carried on on Coal creek, on coal lands purchased and leased by them.

The sales of Dominion lands were very small, in fact, $7,234.76 less than last year, and rentals have also decreased $4,775.55. The cause of the reduction in rentals is the abandonment by lessees of portions of waterfront opposite Dawson, and also the purchase of lands for agricultural purposes which were previously leased.

Fifty-seven applications were received during the year to purchase Dominion lands, covering a total of 2,818·23 acres, made up as follows:—

	Acres.
Sold (23 applications)	506·59
Cancelled (6 applications)	303·33
In abeyance (27 applications)	1,994·31
R.N.W.M.P. (1 application)	14·
	2,818·23

The work of this office has naturally decreased in accordance with the amount of the revenue received. While I had an accountant, stenographer, and three inspectors a year ago, now I have a stenographer and two inspectors, one of the inspectors doing office work when not required to do inspection work.

The staff as at present composed is very efficient.

Your obedient servant,

H. M. MARTIN,

Crown Timber and Land Agent.

REVENUE received from Timber, Hay, Grazing and Coal Lands, during Year ending June 30, 1905.

Month.	Bonus.	Royalty.	Timber Permits.	Seizures.	Inspectors' Fees.	Hay Permits.	Grazing Land.	Coal Royalty.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	....	1,409 99	1,065 00	164 71	....	88 00	....	....	2,727 70
August	250 00	1,495 14	555 00	406 70	....	84 00	....	....	2,790 84
September	....	1,277 80	995 88	4 00	....	5 00	....	28 30	2,310 98
October	....	1,209 78	904 50	21 75	....	5 00	....	15 60	2,156 63
November	....	850 41	760 75	470 36	....	....	....	....	2,081 52
December	....	203 06	301 00	5 00	....	....	....	5 10	514 16
1905.									
January	....	798 47	131 50	146 00	....	....	4 95	7 50	1,088 42
February	....	175 38	30 00	108 92	....	....	....	0 70	315 00
March	....	427 37	360 00	141 50	....	....	....	7 00	935 87
April	....	1,820 85	486 00	75 00	....	....	....	....	2,381 85
May	....	4,937 84	87 50	111 00	....	71 00	....	5 73	5,213 07
June	....	788 81	962 50	31 00	....	30 00	....	....	1,812 31
Total	250 00	15,394 90	6,639 63	1,685 94	....	283 00	4 95	69 93	24,328 35

SHOWING how Different Offices Contributed to above Revenue.

Month.	Dawson.	Selkirk.	Stewart.	Forty-mile.	Total.
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July	2,177 70	430 00	120 00	....	2,727 70
August	2,321 84	290 00	74 00	105 00	2,790 84
September	1,627 98	*338 00	265 00	80 00	2,310 98
October	2,001 03	20 60	135 00	....	2,156 63
November	1,119 02	635 00	147 50	180 00	2,081 52
December	514 16	....	....	....	514 16
1905.					
January	980 92	107 50	....	....	1,088 42
February	276 50	8 50	....	30 00	315 00
March	935 87	....	....	....	935 87
April	2,381 85	....	....	....	2,381 85
May	5,213 07	....	....	....	5,213 07
June	1,812 31	....	....	....	1,812 31
Total	21,362 25	1,829 60	741 50	395 00	24,328 35

* $4.97 rent grazing lease not included. Amount reported in Dominion Lands Return.

H. M. MARTIN,
Crown Timber and Land Agent.

STATEMENT showing Revenue derived from Dominion Lands for the Year ending June 30, 1905.

Month.	General Sales.	Rentals.	Registration Fees.	Patent Fees.	Survey Fees.	Total.	Remarks.	
1904.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.
July	305 66	590 94	4 50	10 00	100 00	1,011 10		
August	163 65	1,353 03	14 00			1,530 68		
September	232 69	* 321 65	6 00			560 34		
October	363 10	942 18	4 00			1,309 28		
November	116 58	100 29	2 00			218 87		
December	731 92					731 92	Dawson	20,719 31
1905.							Selkirk	83 51
January	495 32	1 50				496 82	Forty-mile	243 12
February	77 76					77 76		21,045 94
March	700 57					700 57		
April	220 32	4,500 00	11 00			4,731 32		
May	1,018 23	7,048 98	12 00			8,079 21		
June	711 24	875 83	11 00			1,598 07		
Totals	5,137 04	15,734 40	64 50	10 00	100 00	21,045 54		

* This amount includes $4.97 rent grazing lease.

H. M. MARTIN,
Crown Timber and Land Agent.

PERMITS issued for Timber for Year ending June 30, 1905.

Agency.	No.	Wood.	House Logs.	Logs.
		Cords.	Lin. Ft.	Ft. B.M.
Dawson	80	7,565¾	2,000	20,000
Selkirk	10	1,111	.....	.....
Forty-mile	6	540	500	15,000
Stewart	8	1,105	.....	.....
Total	104	10,321¾	2,500	35,000

H. M. MARTIN,
Crown Timber and Land Agent.

HAY Permits issued during Year ending June 30, 1905.

Agency.	No.	Tons.
Dawson	31	172
Selkirk	3	9
Forty-mile	None.	.....
Stewart	3	23
Total	37	204

H. M. MARTIN,
Crown Timber and Land Agent.

STATEMENT showing Revenue of Agencies and Sub-agencies for year ending June 30, 1905.

	$ cts.
Dawson—	
Crown Timber	21,362 25
Dominion Lands	20,719 31
Total	42,081 56
Selkirk—	
Crown Timber	1,829 60
Dominion Lands	83 51
Total	1,913 11
Stewart—	
Crown Timber	741 50
Dominion Lands	None.
Total	741 50
Forty-mile—	
Crown Timber	395 00
Dominion Lands	243 12
Total	638 12
Grand total	45,374 29

H. M. MARTIN,
Crown Timber and Land Agent.

No. 6.

REPORT OF THE COMPTROLLER.

COMPTROLLER'S OFFICE,
DAWSON, Y.T., August 4, 1905.

The Hon. W. W. B. McINNES,
Commissioner of Yukon Territory,
Dawson, Y.T.

SIR,—I have the honour to submit my seventh annual report, for the year ending June 30, 1905.

The expenditure under the vote, Administration of the Yukon Territory, through the Department of the Interior, was $217,078.63, which also includes the cost of surveys. Statements and vouchers are forwarded to the Department of the Interior each month.

The local revenue and expenditure of the Yukon Territory administered through my office was, revenue $429,860; expenditure $454,360.52. Herewith is attached a copy of my annual report.

The expenditure under the letter of credit of the Department of Justice was $30,570.26, payments for salaries, witness and jury fees being made and returns forwarded monthly.

The disbursements for the Department of Indian Affairs amounted to $6,129.35 for the care of sick and destitute Indians; quarterly returns are made.

The expenditure by letter of credit for the Department of Public Works was $87,896.31; credits are established in the names of the Superintendent of Public Works and myself, accounts being certified to and cheques countersigned by me.

On account of the Department of Public Works, river improvement vote, the sum of $5,225.13 was expended, credits being established in the names of the Commissioner and myself, and statements forwarded to the department as the expenditure proceeds.

The sum of $19,782.07 was paid on account of election expenses of a member to the parliament of the Dominion of Canada, held on December 2 last. Credits for these payments are made from the Auditor General direct to myself, and statements and vouchers forwarded to his office.

The total royalty collected in the Territory for the year ending June 30, 1905, was $205,522.46, as follows:—

Dawson	$203,656 52
Whitehorse	1,744 15
Forty-mile	91 79

The Dawson collections are made through my office, the agents at Forty-mile and Whitehorse making monthly returns, and statements are forwarded to the Department of the Interior as heretofore.

The total number of certificates issued in Dawson was 1,015.

There were also issued 508 free certificates, from which fees were collected amounting to $452; all of which was transferred to the Receiver General in due course.

The revenue from stamps for the Yukon Territorial Court was $8,297.50; Gold Commissioner's Court, $1,237. Returns are made to the Department of Inland Revenue at the end of each month.

The returns from the Gold Commissioner's and Crown Timber and Land Agent's offices are audited each month, and forwarded to the department.

The charter of the City of Dawson was surrendered on September 16 last, and the business of the unincorporated City of Dawson has since been managed through my office, which adds very considerably to the work.

Your obedient servant,

J. T. LITHGOW,

Comptroller.

PART VIII

SUPERINTENDENT OF MINES

REPORT OF THE SUPERINTENDENT OF MINES.

DEPARTMENT OF THE INTERIOR,
OTTAWA, October 19, 1905.

The Honourable FRANK OLIVER,
Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit herewith the annual report upon the conduct of the Mines Branch for the fiscal year ended June 30, 1905.

FIELD WORK.

1st. Preliminary investigation of the raw materials, manufacture and uses of hydraulic cements in Manitoba.

Need of such report: All grades of wooden building materials in Manitoba are expensive, running from $23 to $40 per thousand, board measure, and are imported from British Columbia, western Ontario and western United States, and owing to the high cost of production and long hauls on the railways the selling price of lumber in Manitoba is likely to rise rather than be reduced.

There are about 50 brick-making plants in Manitoba supplying local demands, but owing to high fuel costs the brick is expensive, averaging $10 per thousand, so that they cannot be used on the farm except for houses.

The quarry stone industry is also well developed, as the three limestone quarries near Tyndal produce a cheap, handsome and durable building stone, supplying the demand in the city of Winnipeg and more western points.

The limestone quarries around Stonewall furnish an abundant supply of cheap footings, rubble, &c., for the Winnipeg market. The limestone quarry at the Narrows, Lake Winnipeg, furnishes a fairly good grade of building stone, footings and rubble, supplying the demand in the western part of the province.

Cement concrete is now in the ascendency as a building material, and there is a wide field in Manitoba for the use of cement concrete, since deposits of sand, gravel, boulders and limestone fit for rubble are numerous, so that the matter of an increasing use of cement concrete rests entirely on the production within the province of cheap and high grade hydraulic cement.

The natural raw materials for the manufacture of hydraulic cements are clays, shales, limestones, marls, chalk and coal. Natural deposits of these materials have been reported by the Geological Survey Department. No systematic attempt has been made to prove the industrial value of these deposits for the manufacture of hydraulic cement. Mr. J. Walter Wells was, therefore, instructed to make a preliminary survey of the raw cement-making materials in Manitoba.

Field Work.—Mr. Wells spent the months of June, July and August in the field, going as far north as Lake Winnipegosis and Jackhead in Lake Winnipeg. No examination was made of the country east of Lake Winnipeg, as this district is largely Laurentian.

Mr. Wells reports that 'many exposures of limestone were seen in the central portion of Manitoba and the country between Lakes Manitoba and Winnipeg seems to be underlaid by beds of limestone, which also may be seen about six feet below the surface at the Tyndal quarries. Altogether thirty-two deposits or rather surface exposures of limestone were inspected and sampled. There are numerous exposures on Lake Winnipegosis and the northern end of Lake Winnipeg which were not examined, as being too far from fuel and clay and the market to be of industrial value for cement-making in Manitoba. The limestones in Manitoba all carry magnesia, which is an objectionable constituent according to the present methods of making artificial or Portland cement. Accordingly, examination was made for pure limestone in western Ontario, along the Canadian Pacific Railway as far east as Wabigoon, and along the Canadian Northern Railway as far east as Atikokan.

'Lime of a quality apparently suitable for Portland cement may be obtained from Kelly island, near Duluth, Minnesota, from the quarries near Minneapolis, and from the quarries west of Calgary on the Canadian Pacific Railway. Hence, the supply of pure lime is assured. The lower portions of Manitoba, at one time the beds of large lakes, appear to have beds of clay at various depths and of different grades of purity.

'All the beds of clay were not examined, but twenty-six deposits near railway facilities were examined and sampled, and a few found of sufficient purity. Shale beds show on the hills and mountains in Manitoba, especially the Pembina hills, Riding mountains, and along the shores of the Pembina, Assiniboine and Saskatchewan rivers.

'All of the shale beds convenient to railway shipping facilities were examined and sampled. Seven beds of shale are known to be of fairly good grade, which, with the addition of pure limestone, should make Portland cement of satisfactory quality.'

Uses of Cement in Manitoba.—'An inquiry was also made into the application of cement in Manitoba in the building of all classes of structures, such as foundations, floors, walls, piers, abutments, reservoirs, grain elevators, water tanks, fence posts, telegraph posts, railway ties, culverts, drains, artificial stone, building blocks, chimneys, &c. It was found that cement concrete can be used in Manitoba in almost every way as wood, and if the price of Portland cement be lowered to $1.50 per barrel the result would be an enormous expansion of the use of cement concrete.

'Data were also collected for a report on the "Clay and Clay Industries of Manitoba," to show the uses of clays and shales in the manufacture of brick, sewer pipe, terra cotta, drain tile, roofing tile, stoneware, &c., and material gathered for a report on the "Limestones and Lime Industries of Manitoba," showing the importance of these building materials.

'Photographs of the natural raw materials as found in place and of structures built of cement concrete were taken.'

The results of the investigations made by Mr. Wells have been published in the following three reports:—

1st. Preliminary report on the raw materials, manufacture and uses of hydraulic cements in Manitoba.

2nd Preliminary report on the industrial value of the clays and shales of Manitoba.

3rd. Preliminary report on the limestones and the lime industry of Manitoba.

2nd. Examination of Pembina valley for lignite coal deposits.

Representations having been made to the Department of the Interior of the occurrence of coal in the hills of the Pembina district near Snowflake, with a request that an officer of the department be sent out to make an examination of the district for coal and report thereon, Mr. J. Walter Wells, who was in Manitoba at the time, engaged in the investigation of the limestone, shale and clay deposits, was instructed to interrupt the work he was engaged in for a sufficient length of time to enable him to proceed to Snowflake and make the examination requested. The following is Mr. Wells' report on this subject, and as a result of his investigations he concludes that the evidence collected points to the absence of lignite coal beds of workable size in the Pembina valley from La Rivière to Mowbray:—

'Four days were spent by the writer and one assistant traversing the Pembina valley from La Rivière to Mowbray, one day with a rig and three on foot, looking for lignite coal deposits, with the following results:—

'*Evidence of Settlers.*—Inquiry was made of the oldest settlers in the valley, and the evidence collected is conflicting. One settler stated that he found one piece of coal on the western slope of the valley on his farm, but never found more than one piece. Another settler claimed that some twenty years ago a fire was burning in the valley for two years more or less steadily, and he thought the fire was due to coal beds. Most of the settlers in the valley stated that they had never heard of nor seen any coal in the hills or in the valley.

'*Personal Evidence.*—The only way to thoroughly prospect the hillsides and the valley for coal is by using drills. The hillsides are composed of gray decomposed shale, capped by black soil carrying decomposed vegetable matter. The western hillside is quite heavily timbered with poplar, balm of Gilead and scrub oak. A heavy growth of grass, weeds, &c., completely covers the soil except on the steep cliffs and the river banks.

'The steep cliffs show decomposed shale covering the stratified shale, which shows the same character along the valley from La Rivière to Mowbray. Most of the exposed shale along the western hillsides was examined but no traces of coal seams were seen. Samples of the shale have been forwarded. It is claimed that it is heavily charged with bituminous matter—as much as 20 per cent.

'The eastern side of the valley has a scant growth of timber, possibly due to being exposed to winter blasts and to the hot afternoon sun. The eastern hillsides are more rounded and rolling, showing more action of weathering agents—winds, water and sun.

' A heavy growth of vegetation covers the soil which shows only at rabbit and gopher holes, and seems to be gray decomposed shale capped by the black surface soil. Few bluffs of exposed shale beds were noted on the eastern slope, and no evidence of coal.

'The Pembina river threads its tortuous course through the valley and on both sides are plateaus more or less cultivated for wheat growing. From the river to the top of the hills in a perpendicular line is about 300 feet. Sometimes there are three plateaus on each side of the river, but more often only two, and where the valley narrows the plateaus are absent. The valley extends from one to three miles wide from hill-top to hill-top. From La Rivière to Snowflake by the travelled road the distance is about seventeen miles, but following the river down it is about twenty-five miles.

'The writer also examined the hillsides of the Pembina valley some sixteen miles south of Morden along the international boundary. Abundance of shale was noted, but no evidence of coal on the exposed cliffs. The Pierre shales in northern Dakota, about thirty miles south of the Pembina river from Milton along the Tongue river valley, were also examined and shale practically of the same character as in the Pembina valley was noted, but no evidence of coal.

'*Drilling Records.*—Wells have been sunk at different points in the valley and on the hillsides and on the plateau above the valley, but no reports of coal being found were elicited. The Manitoba Cement Company recently put down drill holes for 900 feet in the Pembina valley near the cement deposits (township 1, range 6, west), but, according to reports no coal was found. The La Rivière Pressed Brick Company also put down drill holes for 900 feet in the Pembina valley in search of oil. Reports state that shale beds were found through the 900 feet, but no traces of coal. The official records of these drill tests are not at present available, but would be a valuable addition to the geological records of Manitoba.

'*Geological Evidence.*—The lignite coal beds in Manitoba and Assiniboia seem to be found in the formation known to geologists as the Laramie, which is the latest stage of the Cretaceous series. The Laramie formations consist of clays, sands, lignite, thin bands of reddish iron oxides and shales more or less calcareous. The clays and shales are in mostly horizontal beds.

'About three-fourths of the entire series seem to be composed of clays, most of them comparatively pure sand, organic and calcareous matter being the common impurities. The clays, rich in bituminous or carbonaceous matter, seem to pass by degrees into beds of lignite that are pure enough for fuel. The lignite beds are well shown at Roche Percê and Estevan in Assiniboia, and the farthest eastern deposit already reported is found in the Turtle mountains, which the writer has examined.

'*Conclusion.*—All the evidence so far collected points to the absence of lignite coal beds of workable size in the Pembina valley from La Rivière to Mowbray.'

3rd. Reports on the economic minerals of Canada—

The Mines Branch has undertaken the publication of a series of reports on the economic minerals of Canada, to bring the mineral wealth of Canada prominently before the investing public, and thus aid in bringing capital into the country necessary for the development of its resources.

While due consideration will be given in these publications to the geological features of the occurrences of the different economic minerals, special attention will be paid to those topics which are of interest to the mining engineer, and to those commercially interested.

A commencement has been made by gathering material for reports on mica and asbestos, and Mr. Fritz Cirkel, M.E., has, on account of his familiarity with the occurrence, exploitation and uses of mica and asbestos, been entrusted with the work of furnishing reports on these two minerals.

The scope of and the topics covered by these two reports, now in the hands of the printer, are shown from the following letter of instructions to Mr. Cirkel regarding the report on Mica:—

Fritz Cirkel, Esq., M.E.,
80 Stanley Street, Montreal, Que.

Sir,—You are instructed to proceed to the productive mica fields of the Dominion and collect all data and general information regarding the occurrence, mining and preparation for the market of the mineral 'mica.'

These data shall cover the following subjects:—

Physical and chemical qualities.

General topographic and geological features of the mica areas.

Mode of occurrence of the commercially useful deposits.

A concise description of all the mica mines and prospects of value.

Status of the Canadian mica industry, its present condition and future prospects.

Statistics of production and exports.

Commercial application.

Occurrence of the mineral in foreign countries, especially India.

Appendix.—Abstract of the laws governing the acquisition of mining properties and the mining of mica in the different provinces.

This report shall be accompanied by cuts through the deposits, illustrations and photographs pertaining strictly to the occurrence, the mining and preparation of mica.

Special attention shall be given to the commercial aspect of all the subjects above enumerated.

(Signed) EUGENE HAANEL,
Superintendent of Mines.

4th. Magnetic Surveys—

(*a*) Iron ore property of Mr. C. V. Wetmore, Charlotte County, N.B.

Request having been made to the department for the services of Mr. Nystrom, to verify conclusions of a magnetic survey made of the iron ore deposit in Charlotte County, N.B., the property of Mr. C. V. Wetmore, instructions were received that the request be complied with, and Mr. Nystrom was accordingly sent out to New Brunswick on this duty. Regarding the results of Mr. Nystrom's examination of this property, he reports in part as follows:—

'The rock formation running nearly in an east and westerly direction through Charlotte County, N.B., consists largely of schistose rock, such as hornblende and chlorite schists. The dip is to the south at a high angle.

'Taken from a geological standpoint this formation is very favourable for the occurrence of iron ores, and at several places there are outcroppings of small veins of magnetite. The detailed and accurate magnetic survey made by Mr. A. Anderberg shows, however, that any large deposit of magnetite is not to be expected close to the surface.

'In view of the development work done on the property, I would strongly recommend additional diamond drilling to a depth of 600 feet, cross-cutting the formation at a depth of about 500 feet from the surface.

'Since the formation has great extent in length, an ore body, if encountered of sufficient thickness, would probably also be greatly extended in length.'

(*b*) Calabogie mine on east half of lot 16, concession IX., in Bagot township, Renfrew County, Ontario.

The following is Mr. Nystrom's report on this property:—

Dr. Eugene Haanel,
Superintendent of Mines, Interior Department,
Ottawa.

Sir,—In accordance with your instructions, I made a magnetic survey in July, 1904, of the Calabogie mine, located on the east half of lot 16, concession IX., in Bagot township, Renfrew county, Ontario.

Some work has been done on this property by the Hamilton Steel and Iron Company, this work, however, being of little account and merely consisting of shallow surface pits and stripping.

The ore, which is magnetic, occurs in schistose rocks, largely consisting of mica and hornblende schist, no limestone occurring in the immediate vicinity.

The strike of the formation is E.N.E. W.S.W., and the dip S.S.E. at an angle of 45° to 50° at the surface.

A base line was cut out, starting at the post at the S.E. corner of the lot, and from this line cross lines were run at right angles every 30 feet, dividing the field into squares 30 feet on the side. At each corner of these squares magnetic observations were taken, both of the horizontal and vertical intensity. From these observations the accompanying map is drawn, on a scale of 1 inch = 60 feet.

On account of the limited time at my disposal I did not carry out the survey west of this lot, although the indications of ore still continued, and it is quite probable that this formation continues to the Bluff Point Mine, located on lot 16, concession XI.

To judge from the survey, a break in the formation occurs about 450 feet west of the westerly lot line. The ore taken out from the Tommy R. pit shows also a different structure from the ore mined in other parts of the lot, being much interbanded with thin layers of rock, and consequently of lower grade.

East of this break the formation increases in width, and in the centre of the lot the width is about 300 feet. The ore occurs here in layers of clean ore of varying thickness, interbanded with rock. Taken as a whole, the length of this centre deposit is about 1,000 feet, but the individual ore layers are in places narrow, or possibly pinch out altogether, giving the deposits the form of lenses.

The most promising indications are those of the ore body or ore bodies located at the hanging wall of the formation, and it will be noted that the positive vertical intensity (coloured blue on the map) is decreasing very slowly in the direction in which the formation dips. In case the ore body had little extension in depth, the influence of the lower pole would soon make itself manifest in producing an area of negative intensity on this side. This is not the case, however, and may be taken as a good indication that the ore body has considerable depth. Three pits or small shafts, known as the Holden pits, have been sunk in this ore body, which at the surface had a width of about 10 feet, and were said to have increased to 12 feet at 75 feet depth, when work was suspended.

The ore on the south-eastern part of the lot occurs in irregular pockets, and the ore formation is there quite narrow.

The mine is well situated for shipping, being within a mile of the spur track laid down from the Kingston and Pembroke Railroad to the Bluff Point Mine.

At the Madawaska river, within 1½ miles from the mine, ample water-power can also be obtained.

Analysis of the Ore, made by Mr. M. F. Connor.

	I.	II.	III.	IV.
Silica, SiO^2	1 50	10 62	9 35	3 05
Alumina, Al^2O^3	5 44	2 73	4 40	6 21
Sesquioxide of Iron, Fe^2O^3	54 78	45 46	49 68	50 72
Protoxide of Iron, FeO	25 38	22 09	24 90	27 76
Oxide of Titanium, TiO^2	0 29	0 13	0 26	0 12
Oxide of Manganese, MnO	0 09	0 08	0 09	0 12
Lime, CaO	3 57	4 97	1 34	2 68
Magnesia, MgO	3 02	7 97	5 90	4 00
Pentoxide of Phosphorus, P^2O^5	0 27	0 11	0 48	1 10
Sulphur, S	0 01	0 01	0 015	0 56
Carbon Dioxide, Moisture and undetermined	5 65	5 83	3 585	3 68
	100 00	100 00	100 00	100 00
Phosphorus, P	0 12	0 05	0 21	0 48
Iron, Fe	58 08	49 00	54 14	57 29

I. Sample from Jeanette Pit.
II. Sample from Tommy R. Pitt.
III. Sample from T. B. Pit.
IV. Sample from Holden Pit No. 2.

The sample taken from the Holden pit contained small seams of iron pyrites. According to reports, however, this occurrence of iron pyrites is confined to certain portions of the ore body close to the walls, and can be easily picked out.

The following analysis is furnished by the owner, Mr. T. B. Caldwell, of Lanark, Ont.:—

Hamilton, Ont., July 3, 1899.

Analysis of seven carloads magnetic iron ore from the Boyd Caldwell Iron Mine, Calabogie, Ontario.

Metallic iron	58·30
Silica	5·47
Alumina	3·68
Lime	2·03
Magnesia	3·70
Sulphur	trace.
Phosphorus	0·137
Manganese	0·15

This is practically a dry ore, carrying less than one per cent of moisture.

(Signed) THE HAMILTON BLAST FURNACE CO.

Deseronto, Ont., April 12, 1899.

Analysis of two carloads magnetic iron ore taken from the Boyd Caldwell Iron Mine, Calabogie, Ont.

Metallic iron	59·48
Silica	7·63
Phosphorus	0·105
Manganese	0·193
Alumina	2·99
Lime	1·21
Magnesia	2·19
Sulphur	0·166
Titanium	none.

Your obedient servant,

ERIK NYSTROM.

(*c*) Wilbur Mine, Lavant township, Lanark county, Ont.

A base line was cut out and the ore field divided into squares of 30 feet on the side, preparatory to the taking of magnetic observations, but the season was so far advanced that this part of the magnetic survey had to be postponed for another year.

(*d*) Magnetic ore deposit, lot 7a, range V., township of Leeds, Que.

The following is a preliminary report of the magnetic survey made of this property:—

Dr. Eugene Haanel,
Superintendent of Mines,
Ottawa.

Ottawa, June 28, 1905.

Sir,—In accordance with your instructions, I made a magnetic survey of lot 7a, range V., township of Leeds, Que.

A base line was cut out in the approximate direction of the strike of the ore formation and cross lines dividing the field into squares 30 feet on the side were run from this as the principal line.

Magnetic measurements of the vertical as well as of the horizontal intensity were taken at each corner of the squares and measurements at intermediate stations were taken whenever necessary.

The accompanying map* shows the direction of the strike of the formation to be very nearly N.E.-S.W., with a dip to the north-west of about 45°.

The ore, which is magnetite, occurs in schistose rock and serpentine, and on this lot the ore occurs in pockets. The most promising of these is especially marked on the map and is the only one where further prospecting will be of any value. The indications are, however, not strong enough to warrant any great expenditure of money.

A diamond drill hole put down according to the directions on the map will intersect the ore body at a vertical depth of about 150 feet, and prove the real value of the deposit.

The ore formation continues in the next lot, which is lot 7b, range V., but, according to your instructions, the survey was confined only to lot 7a.

I spent about one day in taking measurements on lots 1 and 3, range X., but found no indications of iron ore other than several visible boulders.

Your obedient servant,

B. F. HAANEL.

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*The map referred to in this report is a sketch map. A full report on this property and charts of vertical and horizontal magnetic intensity will appear in the next Annual Report.

OFFICE WORK.

The following constitutes the office work, in addition to the voluminous correspondence of this year:—

Electric Smelting.—Most of the time between May and October was employed in preparing drawings for and getting out the English edition of the report of the commission appointed to investigate the different electro-thermic processes for the smelting of iron ores and the making of steel, in operation in Europe. Applications for the report have been received from France, England, Germany, Spain, Sweden, Italy, Austria, Russia, India, Australia, Tasmania, Africa, Honolulu, the United States and Canada. About 3,000 copies have so far been distributed.

As directed, a French edition of the report has been prepared for distribution.

Magnetite Deposits.—Charts were made of the horizontal and vertical intensity of the magnetic iron ore field of the Calabogie mine.

Reports on Mica and Asbestos.—Drawings for the illustration of these reports were made by Mr. Nystrom.

Much time was consumed in editing and proof-reading of the different reports issued by the Mines Branch during the fiscal year ended June 30, 1905.

DOMINION OF CANADA ASSAY OFFICE.

Amount of Business Done.

During the fiscal year ending June 30, 1905, 29,673·73 ounces of bullion, valued at $462,939.75, representing 443 deposits, were received and assayed. These deposits were derived from the following sources:—

Source.	Deposits.	Weights. Before Melt.	Weights. After Melt.	Value.
	No.	Oz.	Oz.	$ cts.
Yukon	64	5,891 10	5,755 09	93,934 43
British Columbia	351	22,608 09	22,073 06	349,727 89
North-west Territories	3	23 95	22 79	376 92
Ontario	19	1,023 96	1,005 33	17,017 48
Alaska	1	13 56	13 32	217 91
Cape Horn	1	6 38	6 17	107 43
United States	2	91 91	91 43	1,301 94
Australia	1	5 60	5 11	90 78
Unclassified	1	9 18	9 14	164 96
Total	443	29,673 73	28,981 44	462,939 75

	Ounces.
Weight before melting	29,673·73
Weight after melting	28,981·44
Loss by melting	692·29

Loss percentage by melting, 2·3330.

From this table it is seen that 79·2 per cent of all the deposits were obtained from British Columbia and 14·4 per cent from the Yukon.

The following table shows the business done by the assay office since its establishment:—

Fiscal Year.	Deposits.	Weights.	Value.
	No.	Oz.	$ Cts
1901-1902	671	69,925 67	1,153,014 50
1902-1903	509	36,295 69	568,888 19
1903-1904	381	24,516 36	385.152 00
1904-1905	443	29,673 73	462,939 75

The total amount due the bank on account of commission at the rate of 17 cents per $100 on $462,939.75, extra assay charges paid by bank and express on bars from Seattle to San Francisco was $2,301.41, which leaves $322.34 as the amount paid to the Canadian Bank of Commerce for the year ended June 30, 1905.

The following is a statement of difference in value of assays between Seattle assay office and Dominion of Canada assay office, Vancouver, from July 1, 1904, to June 30, 1905:—

Value bars, Seattle assay office	$464,135 65
Clippings	783 17
	$464,918 82
Value bars and clippings, Dominion of Canada assay office	462,939 75
Extra assay charges	1,480 67
	$464,420 42
Total value bars and clippings, Seattle	464,918 82
Total value bars and clippings and extra assay charges, Dominion of Canada assay office	464,420 42
Balance in favour of Dominion of Canada assay office, Vancouver	$498 40

Statement of indebtedness of government of Canada to Canadian Bank of Commerce, for the fiscal year ended June 30, 1905:—

Received by Bank.		
Extra assay charges	$1,480 67	
Cheque No. 667, February 2, 1905, amount due bank *re* purchase of gold to December 31, 1904	329 79	
Difference, Seattle and Vancouver assays (see statement)	498 40	
		$2,308 86
Due to Bank.		
Extra assay charges	$1,480 67	
Express on bars to San Francisco	33 75	
Commission on $462,939.75, at 17 cents per $100	786 99	
		2,301 41
Amount due by bank, June 30, 1905		7 45
By cheque received from bank, June 30, 1905	7 45	
	$ 7 45	$ 7 45

The accumulations of three years of slag, old crucibles and furnace linings, some six barrels, were treated for the gold contents. The slag was run through our crusher and panned. The remainder, together with the old crucibles and furnace linings, was shipped to Jos. Mayer & Bros., Seattle, Wash., for treatment. The total amount recovered during the fiscal year ending June 30, 1905, was $1,163.46.

Statement of Earnings and Expenditure.

Deposits of Gold			$462,939 75
Earnings—			
Extra assay charges placed to credit of Receiver General		$1,480 67	
Value of sweeps	$559 05		
Recovery of grains	604 41	$1,163 46	
			2,644 13
Expenditure			10,129 12

Percentage of net expenses to deposits, 1·6168.

STATEMENT of extra assay charges received by Dominion of Canada assay office, Vancouver, B. C., from July 1, 1904, to June 30, 1905.

From.	To.	Bar No. From	Bar No. To	Amount. $ Cts.
1904.				
July 1	July 31	1	36	269 37
August 1	August 31	37	84	178 00
September 1	September 30	85	130	206 17
October 1	October 31	131	214	162 74
November 1	November 30	215	275	139 71
December 1	December 31	276	306	81 37
1905.				
January 1	January 31	307	323	51 91
February 1	February 28	324	339	53 83
March 1	March 31	340	357	54 69
April 1	April 30	358	380	67 40
May 1	May 31	381	410	94 47
June 1	June 30	411	443	121 01
	Total			1,480 67

STATEMENT of Expenditure made by Dominion of Canada Assay Office, Vancouver, B.C., from July 1, 1904, to June 30, 1905.

Rent	$1,200 00
Power and light	195 58
Gas and fixtures	357 53
Chemicals	6 83
Repairs and alterations	414 40
Water taxes	14 40
Postage	14 50
Stationery and printing	28 89
Assayers' materials	54 92
Melters' supplies	23 83
Freight and express	40 42
Telegrams	7 75
Telephone	67 90
Office supplies	23 90
Hardware	53 46
Machinery	128 86
Expenses, Seattle	66 50
Premium on bond	80 00
Consular certificates	5 00
Commission on gold to December 31, 1904	329 79
Thomas McCaffry	2,500 00
J. B. Farquhar	1,500 00
G. Middleton	1,475 00
D. Robinson	900 00
Miss Tierney	639 66
Total	$10,129 12

The following is a statement of money received and expended by the Dominion of Canada assay office, Vancouver, B.C., to June 30, 1905, and shows the unexpended balance of the appropriation to be $4,041.79:—

Appropriation	$13,000 00
Value of sweepings and recovery of grains	1,163 46
Difference value Vancouver and Seattle assays, from January 1, to June 30, 1905	7 45
Total	$14,170 91
Expenditure to June 30, 1905	10,129 12
Balance	$4,041 79

CHANGES AND IMPROVEMENTS IN INTERNAL ARRANGEMENT OF ASSAY OFFICE.

It was found that the blower and motor, which had been removed upstairs, when in operation were noisy and caused the building to tremble. It became, therefore, necessary to build a brick addition to the main building in the rear of the assayers' laboratory in which to place motor and blower. The result of this change has been entirely satisfactory.

THE AMERICAN MINING CONGRESS.

In accordance with the request of the Secretary of the American Mining Congress, addressed to His Excellency the Governor General, that representatives of the Dominion of Canada be sent to the seventh annual session of the congress, held in the city of Portland, Oregon, on August 22-27, inclusive, 1904, the Honourable the Minister of the Interior was pleased to appoint as delegates the undersigned and Alfred E. Barlow, D.Sc., Economic Geologist, who in accordance with instructions received attended the sessions of the congress.

The following is a brief statement of the objects to be attained by the congress and the most important question which came up for consideration by the members of the mining congress, namely: The preparation and discussion of a resolution petitioning the Congress of the United States to create a Department of Mines and Mining.

OBJECTS TO BE ATTAINED BY THE CONGRESS.

The American Mining Congress was organized for the purpose of advancing the mining and metallurgical industries in all their various branches within the United States.

To assist in bringing about a more perfect co-operation between the government of the United States and the development of mining and metallurgy; to encourage education in practical and scientific mining and metallurgy, and the dissemination of scientific information in relation to mining, metallurgy and their allied industries; to acquire and disseminate trustworthy information bearing upon the development of the metallic and non-metallic mining resources of the United States; to promote a more co-operative tendency in the evolution of agriculture, mining, manufacturing, transportation and commerce; and for the particular purpose of bringing the mining men of the United States into closer relation with one another, and of promoting a friendly feeling for one another through social intercourse and the discussion of mutual interests.

The seventh annual session was called to order in the Armoury at Portland, Oregon, at 10 a.m., on August 22, 1904, by President Richards. The attendance, consisting of members and delegates, was reported by the secretary to number 1,003. The following are the numbers of delegates appointed by the President of the United States; by the Department of Interior, U.S.A.; the Department of Interior of Canada; the governors of the different states and mayors of different cities, U.S.A.:—

President, U.S.	3	Governor, State Minnesota	21
Department of Interior, U.S.	3	" " Utah	15
" " Canada	2	Mayor of City Henderson, Kentucky	3
Governor, State Washington	7	" Salt Lake City, Utah	3
" " Montana	4	" Evanston, Wyoming	5
" " Indiana	21	" Spokane, Wash.	3
" " Wyoming	10	" Rarena, Ohio	3
" " Nebraska	16	" Johnstown, N.Y.	3
" " Maine	13	" Seattle, Wash.	2
" " Colorado	16	" Massillon, Ohio	3
" " Oregon	16	" Birmingham, Ala.	3
" " North Carolina	12	" Atlanta, Ga.	1
" " Michigan	14	" Lancaster, Pa.	3
" " Pennsylvania	15	" Allertown, Pa.	3
" " Illinois	25	" Salem, Oregon	3
" " Iowa	14	" Fort Wayne, Ind.	3
" " Maryland	5	" Mansfield, Ohio	3
" " Missouri	16	" St. Joseph, Mo.	4
" " New Mexico	20	" Superior, Wis.	3
" " Ohio	16	" Claxington, Ohio	3

In addition to this a number of boards of trade and scientific clubs have sent delegates to attend the meeting.

This list is given to show the importance attached to the proceedings of the mining congress by the different governors of the states and mayors of cities more or less depending on the mining industry.

RESOLUTION PETITIONING UNITED STATES CONGRESS TO CREATE A DEPARTMENT OF MINES AND MINING.

History.—For a number of years the mining congress has been agitating for the creation of a Department of Mines and Mining by the government of the United States. In the winter of 1902 the executive committee of the mining congress presented a memorial to Congress with reference to the importance of purely industrial departments in modern administration, and in his presidential address at the meeting of the mining congress in September, 1903, Judge Richards, the president of the congress, made the following remarks regarding the industrial departments of national administration and reasons for the establishment of a Department of Mines and Mining:

'Raw material in its primitive form is the working capital with which the God of nature has endowed the human race and, according to the dictates of natural justice, the fish in the sea, the timber in the forest, the iron ore under the surface and the fertile soil above it constitute a natural bounty, in which each of the children of men has an indefeasible inheritance. On abstract grounds possibly there is even more justification for governmental supervision and protection of mining than there is for governmental supervision and protection of agriculture, because those disposed to greed and armed with power can monopolize the production of coal or copper, but they cannot monopolize the production of corn. Again, there is only a fixed and limited quantity of the ore in existence from which the useful metals are produced.

'The logic of events, the irresistible force of a controlling tendency in human progress, must ultimately compel the proper recognition of the mining industry at the hands of this government, as one of the necessities of governmental organization. The leading European nations already have their departments of mines and mining, by which their governments are placed in close touch with this great and important source of production and thereby enabled to intelligently carry out plans for its development and protection.

'Now it is common knowledge what the Department of Agriculture has done for the farmer, how it has broadened his markets by the systematic work of its agents in foreign countries, how it has diffused and popularized much needed information concerning crops, soils and tillage, how effectively it has assisted the cultivator in fighting the pests that destroy his crops. It has invested agriculture with a new dignity and helped to make it a scientific occupation. We say that the mining prospector has just as good a right to scientific information from the government concerning mineral formations, the character of various ores and their proper treatment, for he too is a producer of the raw material that is a condition of all resultant production, and this co-operation on the part of the government may give him just the industrial chance that he needs. The farmer can get a bulletin from the agricultural department that will tell him how to supply lacking ingredients in his soil, and we assert that the average working miner, the man who is trying to make the most of his industrial chances, the intelligent producer and good citizen that we all know has an equally just claim to a bulletin from a Department of Mines and Mining supplying him with the technical information in his industrial field that may be vital to his success.

'I do not decry the enterprise of private capital; it is worthy of its reward, but I simply ask: why should not these researches in the field of mining, as well as in agriculture and horticulture, be prosecuted at the public expense, by the people and for the people, and the results achieved be made free to the people forever? Therefore, once more, I repeat, the people must be educated up to a better understanding of the importance of properly developing all our raw material as a public use, and the profound effect which such a policy may have on the commercial and political fortunes of the nation.

'Our government owes it to the people whom it serves to be in such close touch with industrial conditions, through its industrial departments, that it may be thoroughly informed as to those conditions, that its political policies based on this information may be both stable and farsighted, that its laws affecting commerce and industry may constitute one harmonious whole, and that no industry may be built up by governmental favouritism at the expense of another equally entitled to consideration.'

The resolution presented by President Richards in reference to the creation of a Department of Mines and Mining at the recent meeting of the congress in Portland, Oregon, was unanimously passed without discussion and copies ordered to be sent to the President, Vice-President, of the United States, the members of Senate and members of Congress.

The following is the text of the resolution:—

'Whereas, the settlement of our vast public domain under the direction of the Department of the Interior has of itself more than justified the creation of this department of our government; and

'Whereas, the benefits already received by the people of the United States through the influence of the Department of Agriculture demonstrate the wisdom of establishing this department as one of the great executive branches of our government; and

'Whereas, the Department of Commerce and Labour is constantly presenting conclusive evidence of the usefulness of such a department in wisely directing the great interests coming within its jurisdiction; and

'Whereas, the successive establishment of these departments of our government (at the different stages of economic development of the United States) has fully demonstrated the usefulness of this manner of co-operation by our government in meeting the ever expanding industrial needs of the people; and

'Whereas, the mining development of this country if wisely directed will add a much needed element of permanency and stability to present industrial progress;

'Therefore, be it resolved that the American Mining Congress in annual session assembled, believing that the time has arrived when a Department of Mines and Mining would be the means of placing the mining industry on a plane commensurate with its importance to all industrial progress, urges the Congress of the United States to at once create a Department of Mines and Mining as one of the great executive branches of our government.'

I insert the above statement of the proceedings of the congress as being of some interest in showing the trend of thought upon this subject in the United States at the present time.

REQUESTS FOR INFORMATION.

Numerous requests were made during the year for information relating to mining and metallurgical matters, the occurrence of economic minerals, the mining laws of Canada, and requests for annual reports of the mining industries of Canada.

THE YUKON.

A report by the Government Mining Engineer, A. J. Beaudette, of Dawson, Y.T., relating to mining matters in the Yukon Territory, covering the following subjects: alluvial deposits; mining methods; machinery; coal deposits; population; assay offices and quartz mill, is appended. The report of Mr. Beaudette includes an interesting report by Mr. Robert Smart, government assayer at Whitehorse, Y.T., 'of the transactions of the Whitehorse government assay office, together with a short summary of the mining conditions' of his district.

I have the honour to be, sir,

Your obedient servant,

EUGENE HAANEL,

Superintendent of Mines.

REPORT OF A. J. BEAUDETTE, GOVERNMENT MINING ENGINEER.

DAWSON, Y.T., September 28, 1905.

EUGENE HAANEL, Esq., Ph. D.,
Superintendent of Mines,
Ottawa.

SIR,—I beg to submit herewith my annual report for the fiscal year ending June 30, 1905, under the following heads:—

1. Alluvial deposits.
2. Mining methods—Placer mining, hydraulicking, dredging, steam shovel.
3. Machinery.
4. Coal deposits.
5. Population.
6. Assay offices.
7. Quartz mill.

ALLUVIAL DEPOSITS.

The exact superficial area of the auriferous gravels in the Territory is, at present, unknown. If we sum up the areas within which auriferous gravels have been found of sufficient value for placer mining, I would put it at 2,000 square miles.

The auriferous gravels best known and of the greatest importance are situated in the immediate vicinity of Dawson in what is known as the Dawson district. This district, which contains 800 square miles of the richest gravels in the world, is comprised of the following creeks and their tributaries:—

Bonanza creek.—Its gold-bearing tributaries are: Eldorado, Victoria Gulch, Big Skookum, Little Skookum, Adams creek, Fox Gulch, American Gulch, Magnet Gulch, Trail Gulch and Lovett Gulch.

The gold-bearing tributaries of Eldorado are as follows: French Gulch, Nugget Gulch, Ora Grande and Chief Gulch.

The gold-bearing tributary of Victory Gulch is No. 7 Pup.

Hunker creek.—Its gold-bearing tributaries are as follows: Henry Gulch, Last Chance creek, Dago Gulch, Hattie Gulch, Independence Gulch, Hester Gulch, Gold Bottom creek and Mint Gulch.

Bear creek.—Lindow creek is the gold-bearing tributary.

Dominion creek.—Its gold-bearing tributaries are as follows: Lombard creek, Caribou creek, Gold Run creek and Sulphur creek. Sulphur creek has one small gold-bearing tributary known as Green Gulch.

Indian river.—Its gold-bearing tributaries are as follows: Eureka creek, with its two forks, one of which has a tributary known as the 18 Pup: Quartz creek, with its gold-bearing tributaries: Claffy Pup, Little Blanche, the latter has a tributary known as Canyon.

The gold-bearing rocks belong to either the Cambrian or Silurian age, and are composed of quartzite mica schists. No fossils have been found to determine the age of the rocks in the vicinity of the mica schists, although a Swede a few days ago brought me a Brachiopod, well preserved, which he had found in the White Channel gravels at a depth of 75 feet below the surface, and which appears to be Orthis Lynx, one of the Silurian fossils.

This fossil cannot belong to the mica schists, but there is a possibility that it came from the top rocks and lodged into cracks below in the lower strata and then was mixed with the gravels at the time of their deposition.

The mica schists, which are so prominent within all the gold-bearing areas, contain an unusual amount of quartz. This quartz, in the form of stringers of 2 or 3 feet thickness follows the contortion of the schists.

The stringers above mentioned run in different directions and form a net work which is, undoubtedly, the origin of the placer gold. There are many dikes cutting the schists which are perhaps responsible for the concentration of the gold in these small stringers.

I have seen quartz 'in situ,' in small stringers, showing native gold adhering to its sides associated with iron pyrites, in cubical crystals, which upon assay, after the removal of the iron and the gold visible to the naked eye proved to contain only traces of gold.

It appears that the gold is situated between the quartz and the mica schists in a native state or associated with iron, but not contained in the quartz itself.

I have assayed many of these iron pyrites crystals, and found them all, without exception, gold-bearing. It is a common occurrence to see small specks of gold in the iron pyrites crystals which have been decomposed into oxides.

According to Messrs. McConnell and Tyrrell the gravel deposits of this Territory are sea deposits belonging to the Pliocene and Post-pliocene age.

The presence of gold in the gravels is due to the erosion of the rocks and sericite schists, containing many gold-bearing stringers, situated on the side hills in the form of a net-work.

The gravels are composed of quartz pebbles, diorite, granite, and pieces of mica schists deposited very irregularly.

It appears that after these gravels were deposited in the valleys, an elevation took place which diverted the waters to its present channels. The water cut through the gravels and rocks, at places, as much as 350 feet in depth. The gravels in the creek bed are much younger than those at higher levels where they were originally deposited.

Some time after these gravels were deposited the country was subjected to severe cold which froze, with but very few exceptions, both the top and lower gravels.

The different creeks contain different clâsses of gravel, and should be studied separately, but in this report only a general description of them can be given, as the summer months, during which time the gravels should be studied, are taken up with other work in connection with my duties, and there is no time for one man to do both.

The most important creek in the Territory for its bench and creek gravels is Bonanza creek. This creek is about 22 miles long, 7 miles of which do not contain gravels of sufficient value to warrant placer mining.

The average depth of the bench gravels is from 20 to 125 feet. At the lower end of the creek these gravels attain a depth of over 300 feet, 160 feet of which belong to the Klondike river deposit, which appears to be much more recent.

The bench gravels start at No. 20 above Discovery, and continue on the right limit of the creek for a distance of half a mile, thence from Gold hill on the left limit down to No. 49 below Discovery, thence from No. 60 below Discovery to the Klondike river. The pay in these gravels is not evenly distributed, most of it lies on bed rock, and its width also varies. I here give a cross section of these bench gravels as follows:—

1. The top is covered by a little moss of a few inches thick, under which there is a depth of 2 feet of very fine silt composed of a little organic matter, sand and some decomposed mica schists.

2. The next layer is composed of pieces of country rock, diorite and quartz pebbles not over 6 inches in diameter. This has a depth of from 10 to 50 feet and contains a few colours of gold, it is, however, not suitable for placer mining.

3. The next layer has a depth of from 20 to 50 feet and contains the heavy deposit of quartz pebbles and boulders. The lower 4 feet of this layer is called the bed rock and contain the best pay. This bed rock is rather rough and forms a good riffle for the gold. At places on Gold and Cheechaco hills it was exceptionally rich. I am informed by many that the bed rock pay averaged $50 per cubic yard.

In the vicinity of Trail Gulch, a distance of about 4 miles above the mouth of the creek, the White Channel gravels have a depth of nearly 200 feet, on top of which there is a fine deposit of sand which appears to have been mixed with iron solution.

On top of this there are about 160 feet of Klondike gravels which are barren and easily distinguished from the gold-bearing gravels of the White Channel.

Something very important to know in connection with the bed rock of all hills is that it is lower than the rim of the hill. To this my attention was called by Mr. Tyrrell, who observed it on many of the hills of the White Channel. He states that this 'sagging' of the hill under the gravels is due to the weight to which it is subjected while the rim is not subjected to such pressure. This is very important, for if hills are prospected by means of tunnels they must be driven some distance below the rim in order to arrive at the bed rock pay and to have sufficient grade to wheel out the dirt.

The depth of bed rock in the creek bed varies from 15 feet to 40 feet. A cross-section of the creek gravels is as follows:—

1. The surface is covered by a thick bed of moss under which there is a layer of 'muck' varying from 3 feet to 15 feet in depth.

2. The next layer is composed of heavy gravel varying from 3 feet to 8 feet in depth. In this there are a few colours of gold, but not considered rich enough to work.

3. The next layer is called the bed rock, which is from 2 to 4 feet in depth and contains the best pay. On Eldorado creek this layer was very rich. I am informed by many who worked on No. 16 and 17 that pans worth $1,000 were taken on bed rock.

The pay gravels in Bonanza creek bed start at No. 43 above discovery and extend down to the mouth of the creek, it being a distance of about 15 miles. The gold in the creek bed is, with but very few exceptions, concentrated on bed rock.

The gold in the upper end of the creek viz.: from No. 43 above Discovery to No. 7 above Discovery is of a higher quality than that found at the lower end. We find the gold very coarse at the head of the pay, and it gradually gets finer as we come down stream, and at a point where Eldorado meets Bonanza it is rather fine and considered of a lower grade.

Below the junction of Eldorado and Bonanza creeks we find the gold coarse again, but gradually gets finer as we go down stream. I find that there are two different kinds of gold in the Bonanza creek bed below its junction with Eldorado, and this gold is of a lower quality than that of the upper Bonanza.

The mixture is due to the Eldorado pay. I here give the fineness of the gold found on Eldorado and Bonanza creeks:—

Upper Bonanza creek	825·
Eldorado creek	765·
White Channel, hillsides	787·
French Gulch (Eldorado)	674·
Lower Bonanza creek	787·5

The next important creek valuable for its creek and bench gravels is Hunker creek.

This creek is about 18 miles long, 2 miles of which have not been found gold-bearing. It has two important tributaries: Last Chance and Gold Bottom creeks, both being on the left limit of the creek, the former entering it at a point about 10 miles above its mouth and the latter 4 miles above its mouth.

The same conditions prevail on this creek as on Bonanza and Eldorado creeks, viz.: An elevation took place which diverted the water to its present channel which has cut through the gravels and rocks leaving the gravels behind which are to-day at a higher level than the present creek bed. All the gravels are frozen.

There are less bench gravels on this creek than on Bonanza.

As near as I can calculate I find that there are 125 million cubic yards of gravels on this creek which are gold-bearing.

The deposition of the gravels on this creek is the same as on Bonanza creek. The most interesting part of the Hunker bench gravels is in the vicinity of Last Chance creek, where they are mixed up with cretaceous clay which renders them very difficult to wash. This difficulty has been overcome by the invention of new appliances to wash the gold therefrom. In this vicinity the bed rock is composed of quartz porphyry and cretaceous shale, the latter forms a good riffle for the gold.

On the lower part of Hunker creek we find the sericite schists to contain considerable quantities of graphite which gives the gravels a black appearance, the gold is coated with a film of oxide of iron, and together with the graphite it renders the gold difficult to recognize.

The pay in the creek bed appears to start at No. 41 above Discovery, and continues uninterrupted down stream to its mouth.

The width of the pay is not at all regular, at places it is 40 feet and at others it reaches 250 feet. Where there is no pay on the hillside the creek claim opposite contains more pay than is usually the case with the other creek claims situated opposite hillsides that contain pay gravels.

The pay on the hillsides start at No. 4 on the right limit, and continues on the same limit as far as No. 13 below Discovery, then it crosses the creek to the left limit at No. 23 below Discovery, and continues on the same limit down to a point opposite No. 35 below Discovery. Below this there are very little auriferous gravels until we get to a point opposite No. 50 below Discovery on the left limit, it then continues down to a point opposite No. 82 below Discovery known as Last Chance creek. From this place down to the mouth of the creek there are numerous interruptions.

The pay in the gravels on the right limit of the creek has not yet been proven except at one place, viz.: Hattie Gulch.

I here give the fineness of the gold on Hunker creek and its tributaries, from which the difference of quality between the Hunker creek gold and the Last Chance gold will be noted. The principal impurity being silver, viz.:—

Upper Hunker creek	809·
Middle Hunker creek	834·
Lower Hunker creek	844· to 792·
Last Chance creek	689·
Gold Bottom creek	804·
Henry Gulch	839·
Mint Gulch	808·
Mouth of Hunker creek	715·5
Bear creek	718·

Dominion creek heads at the dome just on the other side of the divide of Hunker creek, and is generally described as being tributary to Indian river. A more correct description of it would be to call it a continuation of Indian river, and not a tributary of it. The mouth of Dominion creek is taken to be at a point where it joins Sulphur creek, below this point it is called Indian river. If we take the latter description as correct Dominion creek is 30 miles long.

This creek is different from the others in that it was not elevated, therefore the deposit in the creek bed is at the same level as it was at the time it was deposited.

There are no gravel benches on this creek except at the mouth of Caribou creek a tributary at No. 27 below upper Discovery.

The creek gravels are different from those on Bonanza and Hunker creeks in that they contain a larger amount of quartz pebbles. A cross-section of the creek gravels is as follows:—

1. The top is covered by a little moss under which there is muck or soil of from 2 to 20 feet in depth.

2. Gravels composed of sericite schist, quartz pebbles and diorite from 2 to 9 feet, which contain a certain amount of gold, part of which is suitable for placer mining.

3. This layer is called the bed rock, and it is from 1 to 3 feet of very soft material composed of small grains of quartz and sericite schist reduced to a powder, together with some iron-stained material. Large quantities of black sand (magnetic iron) and cassiterite are found in this layer.

The pay on this creek starts at a point about one mile from the dome and continues down stream to a point at No. 90 below lower Discovery, or about a distance of 12 miles. Here we have an interruption of 10 miles where the pay is rather poor, and it does not appear that these gravels can be, at present, worked by the placer method with profit.

At the end of these 10 miles, or at a distance of 22 miles from the head of the creek, the pay starts again and continues down to the mouth of Sulphur creek, and is of sufficient richness to warrant placer mining. There has not been sufficient prospecting below this point to determine the value of the gravels. At the mouth of Gold Run creek the pay extends over a very wide area, in fact at one place I know of it being 500 feet in width, but it is rather low grade. The gold at this point is mixed with the Gold Run gold, as will be seen from the fineness hereunder given:—

Upper Dominion creek	801·
Middle Dominion creek	828·5
Lower Dominion creek	861·5
Gold Run creek	861·
Caribou creek	825·
Sulphur creek	808·

Many fossils have been found imbedded in the gravels and muck on almost all the gold-bearing creeks except Bonanza and Eldorado creeks. On these last two mentioned creeks it does not appear that any fossils or organic matter of any kind have been found.

PLACER MINING.

Placer mining is the removal of auriferous alluvial deposits mostly by hand labour. The gold is extracted from the gravels by means of water in sufficient quantity to effect a complete disintegration of the gravel material which is carried away by the water, and the gold on account of its higher specific gravity is left behind. The water used for this purpose must have sufficient elevation for the disposal of the tailings. This water is either pumped up from the stream into the sluice boxes or diverted from the stream at a distant point from the workings and conducted there by means of a ditch or a flume. The length of the conducts of water depends on the supply and on the elevation required for the disposal of the tailings.

The frozen state of the auriferous gravels and the shortness of the seasons are difficulties met with in Yukon mining operations. Still the frozen condition of the gravel has certain advantages. Deep placer diggings would have to be very rich to bear the expense of placer mining if they were not frozen. It would require timber of the best quality available, which is very expensive here, and the necessity of installing pumps to control the water at that depth. This is particularly noticeable on Duncan creek, a tributary of the Stewart river, where at places the bed rock is 105 feet deep, and the bottom gravels are not frozen. A certain amount of pay was found which would have warranted continued operations had they not been troubled with water at that depth which could be controlled only by large pumps at a considerable expense.

I consider the frozen condition of the gravels an advantage in deep diggings, but an objection in shallow ones.

Within the last three years a new method of mining called the 'open-cut' method has been introduced to work shallow diggings. It consists of removing the overburden down to the pay gravels and then the pay is either hoisted or shovelled into sluice boxes. In removing the overburden the frost is a great draw back. It necessitates the thawing of the muck either by steam or its exposure to the sun after the moss is removed. The next layer below which is immediately below the muck and above the pay streak must be exposed to the sun for a certain length of time before it can be removed by the scraper. I consider that the frost is objectionable whenever this method is employed.

Another hardship experienced with frozen gravels is in connection with the dredging operation, which is the coming industry, as it appears to be the most successful method to work flats and valleys which contain low grade material.

It is impossible to wash frozen material with the expectation of recovering gold therefrom, it requires to be thawed before it is excavated. Stagnant water in a dredge sump-hole will have a tendency to thaw the gravel, but the amount of thawing is so small that it should not be taken into consideration, and from an operative standpoint should not be recommended.

The only three successful methods of thawing which have been already introduced, and will hereafter be described, are: open wood fires, steam or exposure to the sun.

In the early days of this camp only the most primitive methods of placer mining were used. It consisted of thawing with wood fires and then the thawed material would be hoisted to the surface and dumped into a heap and left there until the spring time to be washed. The hoisting was done by hand with a windlass and a bucket containing from 5 to 8 pans of dirt. The amount of dirt that can be hoisted by one man with a windlass depends entirely on the depth of the shaft and the size of the bucket. A good man can hoist 200 buckets of 6 pans each up a shaft 30 feet in depth in one day. The average is a little below this.

To wash this material in the spring time sluice boxes were set up having a total length of 48 feet, giving a grade of from 9 to 10 inches to each box length of 12 feet. These boxes are situated at the required elevation for the disposal of the tailings.

These boxes, provided with riffles to catch the gold, were set up along the side of the dump and the material was shovelled into them. The riffles are made of small poles from 1 to 3 inches in diameter and from 4 to 5 feet in length, placed side by side into the sluice box, leaving a space of from 1 to 2 inches between them. The poles are held together by means of a small piece of board nailed at each end to keep them in position, as well as to facilitate their removal at the time of the clean up.

When a clean up is made all the riffles are removed except the last at the end of the box, then we have nothing else left but the gold and the fine material caught by the riffles.

The water is then turned onto this in small quantities at a time while one of the men shovels the material towards the head of the box and thereby concentrates this residue until there is only the gold left in the box. The gold is then put into a pan, dried, cleaned from the black sand, and then weighed. This process is then repeated until the whole dump is washed.

The black sand above mentioned which remains in the sluices with the gold cannot be avoided on account of its high specific gravity. It is nothing else than magnetic iron.

Of late years this method has been greatly improved in many different ways. The sluices are now set up and covered with small battons before the dump is started. The material is dumped into the boxes so that in the spring time the dirt is pushed into them in greater quantity than if they had been set up along side of the dump. Care must be taken not to thaw too much of the dump at a time, as there is danger of the dirt being too heavy for the boxes, which would render them useless for sluicing.

Steam-thawing.—A new era has been created in mining by steam-thawing the gravels and hoisting them with self-dumper buckets. This has proven a more economic method applicable to the working at a profit lower grade dirt than heretofore.

Thawing with steam was introduced here for the first time shortly after the discovery of this camp. The apparatus employed consists of a long iron pipe called 'point,' about $5\frac{1}{2}$ feet in length, one end of which is drawn out into a point. The other end is connected with the steam from the boiler. The steam from the boiler is transmitted by means of an inch iron pipe which is stationery. The connection of this iron pipe and the point is made with a small rubber pipe in order to enable the operator to move the point to the required position without having the rigidity of an iron pipe to contend with. One boiler will furnish many points with steam. It is considered that one-half a cord of wood in a good boiler will furnish 16 points with steam for 10 hours, which is equal to one and a half horse-power per point.

The self-dumper is the greatest labour saving device we have, and it is considered indispensable. This device has already been described by you in the appendix to your annual report for the year 1902, to which the reader is referred.

The points and self-dumper above mentioned are adapted to both deep and shallow diggings. It is considered deep when it is over 25 feet to bed rock *i.e.* it must be worked by means of a shaft and drift. The success of working deep placers depends a great deal on the use of the apparatus above mentioned. In shallow diggings a new method has been introduced of late years called the 'open-cut' method, and proves to be very successful. This method of mining cannot be resorted to when it is deeper than 20 feet to bed rock, as there is too much overburden to remove.

This method consists of removing the moss and the muck and the remainder thawed by steam or left exposed to the sun for some time. This latter layer, except the lower 3 or 4 feet, is called the waste, and it is not suitable for placer mining as it will not pay to handle under present conditions.

After the waste is removed the remainder is either hoisted or shovelled into the sluice boxes and washed in the ordinary way.

The output of a man's work is on an average $4\frac{1}{2}$ cubic yards per 10-hour day, and the wages are $4.50 and board. Counting the expenditure of the plant and other incidentals it is impossible to work ground worth less than $2 a cubic yard by the placer mining method.

Fuel.—The only fuel used on the creeks, with one exception, is wood. Wood is very expensive here, and it is responsible for the many failures we have already had. Its price at any particular point on the creeks depends entirely on the source of supply of the particular locality in which the work is going on.

I here give you the price of wood on each creek as follows:—

Lower Bonanza creek	$10	per cord.
Grand Forks	12	"
Upper Bonanza creek	12	"
Eldorado creek	$12 00 to 17	"
Hunker creek	7 50 to 11	"
Sulphur creek	8 00 to 11	"
Upper Dominion creek	12 00 to 13	"
Lower Dominion creek	7 00 to 8	"
Gold Run creek	8	"

Coal is used for fuel only at one place on the creeks, and that is at Mr. Andrews' pumping plant.

The price paid in Dawson for coal is $10 per ton, and a charge of $6 per ton is made for the freight from Dawson to the plant which is situated on No. 6 below Discovery on Bonanza creek, a distance of $10\frac{1}{2}$ miles from Dawson.

An experiment was made here at the electric plant to determine the comparative efficiency of wood and coal to generate steam. As a result of this it appears that the proportion is $1\frac{1}{3}$ cords of wood to one ton of coal. I might here mention that the coal was a lignite containing 44 per cent of fixed carbon, with a large percentage of ash and moisture, while the wood was soft and not to be compared with hard wood.

While in California I investigated the price and the efficiency of oil as a fuel agent in order to compare its cost with wood and coal.. I find that the success of using oil in the Territory as a fuel agent depends entirely on the transportation. Taking 6 barrels of oil to a ton, duty at 5 cents a gallon, and the transportation at $40 per ton, a barrel of oil will cost $9.61. The ratio of efficiency of these fuel agents is as follows:—

Two cords of wood (hard) will generate as much steam as one ton of good Wellington coal or 4½ barrels of oil of 17½ gravity.

Our native wood and coal are much inferior to the outside wood and coal, and therefore a larger quantity will be required of our material to equal 4½ barrels of oil than in California. After taking everything into consideration I still believe that the wood is the cheapest fuel at present.

Hydraulicking.—In 1902-3-4 the territory experienced a transition period which has had a tendency to decrease the output.

The best claims were being worked out, and the rich spots together with the lower grade material left in the vicinity necessitated a change of method from the old and primitive methods of placer mining to more modern ones like pumping, hydraulicking, hydraulicking with gravity water, steam shovel and dredging.

Some of these methods require some necessary conditions to be successful. While these methods are being considered it is needless to say that much ground is left idle from which there is no output. These are the conditions that are responsible, in greater part, for the decrease of the output, and not because there is no more gold in the ground.

This country is exceptionally dry in the summer months, and without a proper water supply many of the hydraulic companies have had to shut down their operations and wait for rains. These conditions affect the benches and hillsides, while in the creek there is always enough water to avoid a complete stop.

The first experiment that was made to overcome these conditions and to work low grade material on a large scale was by pumping hydraulicking. This method consists in installing the plant in the creek bed and pumping the water into a reservoir on the hillside, from there the water would be conducted to the gravel pit in pipes. The efficiency of the water is very high, but the cost of the fuel is so great that it has not been a success. There are still three plants of this kind in operation, but I am not informed regarding their success.

Many have learned, partly through the mistakes of others and partly through the advanced knowledge of the existing conditions here, that there are two feasible methods to work low grade gravels at a profit, and these are: hydraulicking with gravity water and dredging or steam shovel. These methods require different conditions for their success.

Hydraulicking requires a constant water supply, good grade to conduct the tailings and dumping ground for the disposal of the same. When there is not sufficient grade for the tailings an elevator is used for the purpose.

One of these elevators is installed on a hydraulic leasehold situated on Miller creek which I have not yet witnessed, and I cannot, therefore, offer an opinion as to its success. It is a very unfortunate thing when one is compelled to use an elevator, as much of the water must be used to operate the elevator which would otherwise be used in the giants. The proportion of water used in the giants to the amount used in the elevator is one to two.

Water at 100 feet pressure will elevate the tailings 10 feet high. There has not been enough work of this nature to give an opinion as to the cost of such operations.

The difficulty of furnishing an adequate supply of water for hydraulicking entails the heaviest item of expense in connection with this method of gold extraction. It is particularly costly when deep and large ravines have to be crossed, as it necessitates the installation of many thousand feet of piping and trestling to convey the water across. Of the many ditches constructed in this Territory for hydraulicking purposes I here mention the principal ones as follows:—

Company.	Length. Miles.	Capacity. Inches.	Company.	Length. Miles.	Capacity. Inches.
Anglo-Klondike Co..	7	500	Delhie, Hunker Creek..	5	250
Fuller Norwood Co..	9	1,000	Lyonnaise Synd..	4½	800
White Channel Hyd. Co..	5½	1,000	Acklen Co..	9	2,000
O. R. Brener..	6	250	O R. Brener, Hunker Creek.. ..	7	500
N. A. T. & T. Co..	7½	2,200	Dolen et al, Last Chance..	4	200
Bonanza Mining Co..	5	600			

There are many small ditches of one and two miles in length and from 50 to 100 inches in capacity that are too numerous to mention here.

The Anglo-Klondike Company have an inverted syphon across Boulder creek, a distance of 1,900 feet. The difference in elevation between the intake and the outlet of the pipe is 67 feet. The Fuller Norwood Company have an excellent ditch having its intake at No. 57 above Discovery on Bonanza creek, and its outlet at No. 19 below Discovery. On account of bad ground encountered it was considered necessary to construct a flume part of the way. As the conducts of water are on the right limit of the creek and the property to be worked is on the left limit it was necessary to instal an inverted syphon across Bonanza creek of 3,000 feet long.

The White Channel Hyd. Ltd., are operating on Gold Hill, on the left limit of Bonanza creek, at the junction of Eldorado and Bonanza creeks. Their point of intake is at No. 51 above Discovery on Bonanza creek. The water is conducted to a point opposite Gold hill, then piped across through pipes of 24 and 26 inches in diameter. The head is 150 feet above the rim.

O. R. Brener who is operating on French hill is at present in the best position to make use of the water at all times during the year. He has constructed a dam at a point on French Gulch about 2½ miles above the mouth to conserve the water during the dry season. The water is conducted to a reservoir back of the claims then piped to the gravel pit through pipes of 10 and 12 inches in diameter affording 100 feet head. Mr. Brener constructed another from Eldorado to increase the supply.

The N.A.T. & T. Co., operating on Miller creek, have a splendid ditch with intake on Bed Rock creek, a tributary of Sixty-mile river. This water is conducted to a point on Miller creek about 420 feet above the bed of the creek bed. It is then conducted down to the creek bed through pipes to supply the giants and the elevator to elevate the tailings.

The Bonanza Creek Mining Company, operating on the Matson and Doyle leaseholds, Bonanza creek, have constructed in the neighbourhood of 5 miles of flume and ditch with intake at No. 25 Adams creek. In order to assure a good water supply during the dry season the company are constructing a dam in the creek at No. 37 Adams creek, a small distance above the intake of the flume. This dam, when finished, will be 50 feet high, 4 foot crest and 120 feet toe, and will hold 60 million gallons of water. It is constructed as follows:—

Excavation for the foundation of the dam was made to bed rock upon which, across the creek, rest grooved boards in a vertical position to serve as a core. These boards are hammered to the bed rock until they conform to it, to prevent any possibility of leakage. On both sides of this core fine material is shovelled in and puddled, then finished with rock to the top. Very little cement was used on account of its expense and the difficulty of obtaining the desired quality. This dam will be finished this year, in order to impound the waters of the freshets of the spring.

As we have frost to contend with every precaution must be taken in selecting ground that will stand running water. It has been the practice in this country to construct ditches on the sunny side of the stream. When the moss is removed and the excavated material exposed to the sun it will thaw rapidly and settle, if it is built on the side of the stream where the sun shines very little it will thaw very slowly and the material will move continuously. This experience was no doubt gained in building the many miles of roads in the country.

The length of time required to build ditches here is much longer for the same distance than it is on the outside or in any country where there is no frost to contend with. The seasons are very short, and a great deal of preparatory work must be done, to cope with the conditions, which is necessary in a frozen country. The main delay is in connection with the removal of the moss, which has to be done to expose the material to the sun for a certain length of time to thaw. A ditch of over 10 miles long cannot be constructed in less than two seasons, in taking the magnitude of the ditch and the existing conditions into consideration. The time of the year during which the excavation can be done is between May 15 and October 15 of each year, provided the preparatory work has already been done the previous fall.

No definite length of time can be set within which ditches should be constructed. As the conditions on one creek differ much from those of another, the time within which the construction should be completed fluctuates. The size and length of the ditch as well as the difficulty of the project must be considered.

The extreme cold of the winter and the great heat of the summer have very little effect on ditches and flumes. This is not the case with iron or steel pipes. I find that when pipes are installed to convey water across deep depressions in the shape of inverted syphons the extreme cold of the winter will not affect the pipes very much, and they do not, therefore, require to be disconnected, but it is advisable to cover them with a thick sod to prevent expansion during the summer months. When a pipe is laid horizontally on the ground it has to be disconnected in the winter in order to avoid the joints from breaking, which is due to the contraction of the iron.

As all the hydraulic operations are conducted on benches and hillsides there is no difficulty in finding enough grade for the disposal of the tailings. The general grade given is between 8 per cent and 10 per cent, regulated by the amount of water and the size of the boxes used.

It is to be regretted that there are no undercurrents installed at any of the hydraulic plants which would, no doubt, collect a great deal of gold which at present is lost for the lack of such appliances. The riffles used in the boxes are made of wooden blocks and have been found very satisfactory.

The average duty of a miner's inch cannot be given with accuracy on account of the fluctuation of the water supply.

We have in this country two seasons, viz.: the summer and the winter season. The summer season starts about May 1 and lasts until October 1, the winter season being the balance of the year. During the summer season we have the dry and the wet season. The wet season is from May 1 to June 15, then it starts again on August 15 and lasts until the close of the season. The water supply in the early part of the season is dependent on the snow waters, while the latter part is dependent on rains. The dry season is from June 15 to August 15.

All the creeks within the Dawson district are dependent altogether on rains for their water supply.

To increase the water supply small dams have been constructed at the head of the streams to conserve the waters of the freshets to be used during the dry season. Two very large ones have already been constructed, and one under construction.

From these considerations it will be apparent that it is difficult to give the average duty of a miner's inch with accuracy. During the wet season it has been found to be 5 cubic yards, although I have heard of a duty of 8 cubic yards, which I think, however, too high. Under the present conditions and taking into account the amount of water available every year between the months of May and October, the duty is very much reduced.

One inch of water is 1-12 of the amount of water going through an orifice 2 inches high, 6 inches wide under a head of 6¼ inches pressure, measured above the centre of the orifice. The amount of water that will go through this orifice is 1·5 cubic feet of water in one minute.

When we speak of a miner's inch it is generally understood to be a certain amount of water flowing past a certain point in one minute unless otherwise specified.

The cost of hydraulicking in the Territory varies every year, as it fluctuates with the amount of water at hand.

A fair way of averaging the operating cost per cubic yard would be to divide the working season into two parts, viz.: The wet season and the dry season. This will show the necessity of looking for a water supply proportionate to the life of the property to be acquired.

The data I have at my command here are from the most reliable company operating on Bonanza creek. This cost might look high to some of the hydraulic companies operating on the outside, but it is considered low here.

The operating cost to hydraulic, per cubic yard, the White Channel gravels with 240 inches of water under 165 feet head, and the duty of a miner's inch taken at 6·5 cubic yards is 14½ cents.

During the dry season, which lasts 8 weeks, only a couple of hours run can be had out of the 24. In this case the operating expenses per cubic yard are high.

We have the most favourable conditions for hydraulicking such as small gravels with no boulders, banks not too high, good grade and dumping ground and very high values. The only thing lacking is the water, which is the great drawback to the country.

Dredging.—We have at present three dredges in operation, viz.: Two on Bonanza creek and one in construction, and one on the Klondike river at the mouth of Bear creek. Those operating on Bonanza creek have been very successful, particularly the one on discovery. The latter is the first that was brought to this country by the Lewis River Mining Company, who first operated in 1901 on No. 42 below Discovery on Bonanza creek before they moved to their present position. It is a Risdon dredge of the old type of 3½ feet capacity, operated with steam. It is not operated with full efficiency on account of the frost in the gravel which is being thawed ahead of the machine. Two 50 horse-power boilers have been installed to run 80 points to thaw this gravel. The expense in connection with the thawing is just as great as the operating expenses of the dredge itself.

Bonanza creek, or any of the gold-bearing creeks in this district are not an ideal dredging proposition as the bed rock is hard and uneven and there is also frost to contend with, but the gravel is of such high quality that it is a paying proposition where it can not be worked in any other way at a profit.

All the ground available in Bonanza creek for dredging is that which did not contain sufficient values to be worked by the placer mining method. Taking the costs of placer mining operations at $2 a cubic yard, it is reasonable to think that what is left must contain values from a few cents to $1.75 a cubic yard plus the fine gold carried away by the tailings of the placer mining operations, which is considerable.

Another dredge is operating near the mouth of Bonanza creek by Messrs. Segbers and Moncrieff. This dredge was installed on the property this year and is operating now with great success, but I am unable to give the operating costs. A part of this dredge was manufactured by the Risdon Iron Works, of San Francisco, while the other part was constructed here with native material. It has a capacity of 2½ cubic feet and is operated with steam.

By far the finest dredge in the Territory and equal to any operating in the Oroville gold fields in California, is the one belonging to the Canadian Klondike Mining Company operating on the Klondike river at the mouth of Bear creek.

This dredge has a bucket capacity of 7 cubic feet, close buckets and can dig 65 feet below the hull. This dredge was manufactured by the Marion people of Ohio, and differs very little in principle from other dredges now in operation. Taking its construction, mode of operation, ladder and stacker it resembles the Bucyrus type of dredges more than any other. It is operated with electric power generated in the vicinity by means of a steam turbine which can develop 600 horse-power. This machine has only been in operation for the last sixteen days, and I cannot give correct figures regarding its efficiency. Sister dredges in California have an output of 80,000 cubic yards a month.

The company is prospecting the ground in the vicinity and if enough pay gravels can be found to warrant the installation of another dredge the manager informed me of his intention to order one at once.

The dredge is operating at the mouth of Bear creek where it has been found very rich, as it has been worked by the placer method for many years. It appears at present that another run of gold has been found of a higher quality to that which had been found heretofore. As this spot is situated at about two miles below the mouth of Hunker creek, and the gold found is of the same quality as Hunker creek, I believe it tc be the same gold. If this proves correct it is of the greatest importance, as it increases the area to be worked. The company did not anticipate that new run of gold, but only low grade dirt, representing the refuse of the gold-bearing streams.

There is another dredge under construction at the mouth of Bonanza creek which will be ready to operate next season. This dredge is manufactured by the Allis, Chalmers people of Chicago. It has a theoretical daily capacity of 3,600 cubic yards.

Steam Shovels.—Other machinery to work alluvials on a large scale is represented by the steam shovel. Of these there are two working on Eldorado creek and another on No. 60 below Discovery on Bonanza creek.

Those operating on Eldorado creek are owned by Mr. Phiscator, who has been operating them for the last two years with great success. The method of working these shovels is different from those operating on other creeks in that no special washing plant is used, only a common sluice box such as is used in common placer methods. The shovels are ⅝ cubic yard capacity. The gravel is delivered directly into the sluice box.

The steam shovel is especially applicable to the treatment of deposit with hard and uneven bed rock over which the pay is distributed. In using a shovel there is no chance of losing any gold which might be secreted in the cracks of the bed rock and which could not be recovered by dredging operations. By means of the steam shovel the bed rock can be cleaned as effectively as in the open cut method. The dredge people contend that there is as much gold recovered from the waste which is thrown away by the shovel to repay for all that is lost in the cracks of the bed rock which cannot be recovered by the dredge.

The following instance which came under my observation confirms this. On a certain claim on Eldorado it was proposed to work by open cut and in order to do that it was necessary to remove the old waste and tailings which accumulated in the early days of the camp. It was found to be just as cheap to sluice the waste and tailings as to remove them with a horse and scraper, as the water would carry the material to the desired place. This material was sluiced up, and out of 300 cubic yards 118 ounces of gold were recovered which would otherwise have been lost. For that reason I believe that much is lost by removing too much of the overburden, and if worked by a dredge would more than compensate for what it loses in the cracks of the bed rock.

The Marion shovel operating on Bonanza creek is used to excavate the material which is dumped into a large bucket to be hoisted and dumped into a hopper, after which it is washed in a rotating screen on each side of which the gold saving tables are situated. This arrangement is known as the Ledgewood machine.

POPULATION.

This year has experienced a great decrease in the population of the Territory. This decrease is due to the recent discoveries of the Tanana and Fairbanks districts, situated on the American side of the line.

It appears that this camp was discovered about two years ago, but the rush from this Territory did not start until last fall. A new field is always inviting to a stampeder or a prospector, as he always expects to be there the first one and stake a claim to contain a little better values than the claim he is leaving. There is no doubt that many were disappointed and were left worse off than they were when they started from here.

Taking all the districts in the Yukon Territory in consideration, regardless of the floating population, I would estimate the population at not more than 10,000.

I might say that the population in the winter months is less than in the summer as many of the operators and their families go outside for the winter and return in the springtime, during the months of March and April, in order to be ready for the spring operations.

DEVELOPMENT OF LOCAL DEPOSITS.

Some progress has been made in the development of the coal deposits of the Territory. This is of great importance since the timber is being cut away very rapidly, and it is a matter of only a few years when coal will have to be used altogether.

A new and very promising coal deposit is situated near Tantalus. Upon assay it is found to contain 66 per cent of fixed carbon.

The Five Fingers coal mines are being prospected thoroughly with the government diamond drill.

The most of the White Pass steamers are using Tantalus coal with great success, and it has been found to be very much cheaper than wood, as the steamers do not have to stop so often to wood up.

THE QUARTZ MILL.

The mill was not in operation at any time during the year and therefore there are no returns to be made in this regard.

The contract entered into between the government and Mr. Matheson expires on December 11 next, and I would recommend that the same be not renewed, as I believe it is at present a useless expense as there is not enough work to justify the maintenance of the same.

THE ASSAY OFFICES.

During the year there were 200 assays made, of which 169 were for gold and silver, 17 for copper, 5 for lead and 4 for tin. You will find here attached a statement of all the assays made during the year at the Dawson assay office.*

The office is still situated alongside of the mill, but it has been proposed to move it to the administration building, and have it under government control altogether, where it will be more satisfactory to me and more convenient to the public.

A copy of the report of the assayer in charge at Whitehorse is also appended.

The number of assays made at the Whitehorse assay office during the fiscal year was 363, of which there were 270 for gold and silver, 68 for copper, 4 for tin, 16 for lead, 1 for antimony, 2 for platinum and 2 for carbon.

Mr. Robert Smart, the assayer in charge of the assay office at Whitehorse, has proven himself to be a very competent officer, his work being favourably commented on by many of the smelting establishments.

Your obedient servant,

A. J. BEAUDETTE,

Government Mining Engineer.

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*Only those assays of the statement referred to, which on account of valuable contents are of interest, are published in this report. E. H., Supt. of Mines.

REPORT OF ROBERT SMART, GOVERNMENT ASSAYER.

WHITEHORSE, Y.T., July 1, 1905.

A. J. BEAUDETTE, Esq.,
Government Mining Engineer,
Dawson, Y.T.

SIR,—I have the honour herewith to submit my report of the transactions of the Whitehorse government assay office for the year ending June 30, together with a short summary of the mining conditions of this district.

During the year a total number of 363 assays were made, a detailed statement whereof is appended to my report.*

In addition to the assays made, a great number of tests have been made for the quantitative determination of metals.

It will be seen that the number of assays made during the month of June is very largely in excess of any other month of the year, this is in consequence of quartz measures being opened up in the southern part of this district, to which reference will be made hereafter, and to the inquiries of outside capitalists respecting the copper properties directly adjacent to Whitehorse. The samples of ore assayed and treated in the office have been received from an area of territory bounded on the north by Selkirk, on the south by the province of British Columbia, on the east by the Nisutlin river and on the west by the White river.

In the Mounteagle range west of Tantalus an interesting and valuable discovery has been made of gold-bearing chalcopyrite carrying as high as $20 per ton in gold, 24 ounces of silver, together with 18 per cent of copper. The ore body is said to be of considerable extent, and from the continuity of formation is thought to be a continuation of the Bornite deposits of the Whitehorse copper belt. Contiguous to the discovery extensive deposits of coal have been located, bituminous in character, containing 80·23 per cent carbon, and which by satisfactory tests produces a first-class quality of ore.

Owing to the distance of this recent discovery from the Yukon river (about 40 miles westerly), only prospect work of a superficial character has yet been done, but it is reasonable to suppose that as development guarantees expenditure, facilities for transporting supplies will be improved, and this very promising discovery will fully justify the expectations of the locators.

Bodies of auriferous copper ore have also been found on the divide between the Donjek and White river, but further than the receipt of samples at this office, nothing definite can be stated in this report. With the improvement of facilities for getting in supplies, however, this district promises some rich discoveries.

In the Kluahne placer district from 150 to 350 men have been working during the past year, and considerable sluicing has been done, reports are exceedingly satisfactory from Burwash, Sheep and Fourth of July creeks. Considering this extensive placer area as a whole, however, it is safe to say that the deposit of gold is spotted, and that the method for successfully extracting the auriferous deposit must be by hydraulicking.

The Bullion creek hydraulic company have adopted this method on Bullion creek, and have completed a plant at a cost of upwards of $130,000, their operations will cover some 82 claims on that creek, and they report that their considerable expenditure is fully justified by the excellent showing they have had. They expect to begin operations about July 15.

In the mountainous district which lies between Lake Tagish and Lake Bennett, contiguous to the British Columbia boundary line, discoveries of rich silver ore and

* This detailed statement has not been received. E. H., Supt. of Mines.

argentiferous galena have been made during the last year. Active development has recently determined the great richness of this area, and in consequence the prospectors are locating new ground, and from the satisfactory assay results obtained from the new locations, the area is much greater than was at first supposed.

During the past three months the Conrad and Singer Company have been carrying on extensive prospect work on the Pelly and Pooley groups consisting of 16 claims in the locality, the results are considered exceedingly satisfactory, samples of ore assayed at this office give as high as 2,000 ounces silver per ton.

The purely silver ores contain only small quantities of gold, the argentiferous galena carries values up to 200 ounces of silver, 45 per cent of lead, and as high as $75 per ton in gold.

The various ore bodies ranging in width from 16 inches down have been traced throughout the entire group of claims, at a depth of 80 feet, a rich vein of 6 feet in width was struck.

The owners of the property are so elated with the prospects that they have contracted for the erection of an aerial tramway from the mines to Windy Arm, and a railway from its terminus to connect with the White Pass and Yukon Railway at Carcross.

Within the last ten days several applications for placer claims have been made on Willow creek, a tributary of the Nisutlin river. The discoverer brought at the same time $280 in gold taken by him from his claim, and applications for 84 entries, this has caused the usual stampede of prospectors and miners, and it is reported by the discoverer that several locators were actively at work, whip-sawing lumber and making vigorous preparations for active work. The gold shown is very bright and appears to be of good quality. It is distinguished from other placer gold found in the Territory in that the larger nuggets shown have associated with them as a gangue, magnetite instead of quartz. This new district is easily reached from Whitehorse by steamers up the Houtalinqua river to Lake Teslin, thence about 25 miles from the easterly shore. I am personally acquainted with the vicinity of this new discovery, having spent some four months in the neighbourhood four years ago, and I was very favourably impressed with the possibilities of the country. The formation is slate and mica schist, and it was then my opinion that the contact between the granite of the Big Salmon and the slate of the Teslin countries was in the vicinity of the Nisutlin.

In the Big Salmon district, Livingston creek is a good producer of placer gold, more claims are being worked than in any previous year. A new pay streak was found during the past winter on the left limit of the creek, having an advantage over the previous workings in that it was free from the enormous granite boulders which so impeded work in the creek proper. Other creeks in the same locality are being worked this season, but reports from them have not yet reached this office. Some work has been done on a body of auriferous copper ore found near the head of Fish river, a tributary of the Big Salmon, but as in many other cases, owing to the lack of transportation facilities and the consequent enhanced cost of getting supplies to the required points it is impossible for the prospector to do more than to locate and thereafter keep his claim alive by complying with the mining regulations.

Float Cinnabar assaying 32·90 per cent of mercury has been found on Livingston creek, many efforts have been made to locate the lead but without success.

Very little development has been done in the Whitehorse copper belt since January last, owing principally to the lack of capital, but I am informed that negotiations are now pending which will in all probability result in the introduction of a large amount of capital from the outside for the purpose of working some of the claims actively. Many claims upon which development work has been done give smelter returns very high in copper and carrying percentage of gold and silver.

In conclusion I beg respectfully to submit that in my opinion the outlook for the near future for the southern Yukon as a producing district of great value is exceedingly bright, and that the intelligent working of the extensive placer areas will determine that they are of a richness and extent that will warrant the introduction of hydraulicking machinery with a profitable result.

Your obedient servant,

ROBERT SMART,

Government Assayer.

Returns of the Assay Office at Dawson for the Year ending June 30, 1905.

Number	Description of Rock.	Nature of Assays.	Metal.	Per Ton. Gold.	Per Ton. Silver.	Per Ton. Total value.	Location.
			%	Oz.	Oz.	$ cts.	
457	Quartz and porphyry			·40	Traces.	8 26	Klondike River.
458	Quartz with iron pyrites			·69	"	14 26	Bonanza Creek.
459	Quartz and porphyry			·61	"	12 60	"
462	Honey comb quartz	Au. & Ag.		·32	"	6.61	Hunker Creek.
462A	" "	"		·20	"	4 13	"
463	Conglomerate	"		·30	"	6 20	12 Mile River.
470A	Talcum and clay	"		·30	"	6 20	Klondike River.
470B	Galena	"		·21	36·00	22 34	"
470B*	"	Pb.	41·00			41 00	"
470C	"	Au. & Ag.		·6	39·00	20 74	"
470C*	"	Pb.	43·00			43 00	"
470E	Porphyritic quartz	Au. & Ag.		·35	Traces.	7 25	"
472	Galena	"		·10	38·00	21 06	Rock Creek (left fork).
472*	"	Pb.	40·00			40 00	" "
472A	Galena with pyrites of iron	Au. & Ag.		·28	19·3	15 45	" "
472A*	Galena with pyrites of iron	Pb.	23·00			23 00	" "
445	Yellow pyrites of copper	Au. & Ag.		1·4	12·4	35 13	White Horse (District).
475*	" "	Cu.	29·95			51 90	" "
479A	Pyrites of iron	Au. & Ag.		1·4	Traces.	28 93	40 Mile River.
481	" "	"		·32	"	6 61	Portland Creek.
481B	" "	"		·27	·20	5 68	"
481D	Sugar quartz	"		·27	Traces.	5 16	"
482	Gray quartz with iron pyrites	"		2·6	·30	53 89	White River.
484	Pyrites of iron	"		·40	Traces.	8 26	Duncan Creek.
484A	"	"		·20	"	4 13	"
489	Pyrites of iron with copper satin	"		2·4	"	49 60	White River (Sam Pete Creek).
490	White quartz	"		·40	"	8 26	Duncan Creek.
491A	Quartz with oxide of iron	"		·39	"	8 06	Bear Creek.
492A	Yellow ore of copper	"		·27	9·8	10 48	White Horse (District).
492B	" "	"	18·34			36 68	" "
493	White quartz with free gold	Cu.		62·5	Str. Tra's.	1,291 87	Last Chance Creek.
494	Quartz with free gold	Au. & Ag.		1·7	Str. traces	35 13	21 A Bonanza.
496	Pyrites of iron	Au. & Ag		3·1	Traces.	64 07	White River.
497	White Quartz with oxide of iron	"		·41	"	8 47	Bear Creek.
498	Rose Quartz	"		·45	"	9 30	Gold Run Creek.
498A	White Quartz with Muscovite	"		·90	"	18 60	" "
499	Galena	"		·10	58.00	31 06	White River
499A*	Galena	Pb.	66·66			53 33	"

RETURN of the Assay Office at Dawson for the Year ending June 30, 1905.

Number	Description of Rock.	Nature of Assay.	Metal.	Per Ton. Gold.	Per Ton. Silver.	Total Value.	Location.
			%	Oz.	Oz.	$ cts.	
500	Quartz with mica schist	Au. & Ag.		·20	Traces.	4 13	Klondike River
602	Quartz with pyrites of iron	"		·20	"	6 20	Forty Mile River.
602 B	" "	"		·60	"	12 10	" "
602 C	" "	"		·40	"	8 26	" "
604 C	Quartz with oxide of iron	"		·80	·30	16 68	Eldorado Creek.
605 A	Quartz with Hematite of iron	"		·20	Trace.	4 13	Forty Mile River.
606	Quartz with pyrites of iron	"		1 1	Traces.	22 73	" "
607	Crushed sample (pulp)	"		10·1	St. traces.	208 76	Head of Klondike River.
608	Pyrites of copper	"		·20	1·5	4 88	Yukon River, (near Cassiar.)
608 A*	" "	Cu.	12·20			21 40	" "
609	Quartz with graphitic schist	Au. & Ag.		·37	Traces.	7 64	Hunker Creek.
611	Gray Quartz and pyrites of iron	"		·90	"	18 60	Head of Klondike River.
617 D	Pyrites of copper	Cu.	5·16			10 32	White River.
617 E	"	Au. & Ag.		·95	·20	19 75	"
618	Granitic quartz and galena	Pb.	22·00			17 60	Little 12 Mile River.
618 A	" "	Au. & Ag.		Traces	29·00	14 50	" "
618 B	Pyrites of iron and galena	Pb.	6·80			5 44	" "
618 C	Limestone and galena	Pb.	12·90			10 32	" "
618 D	" "	Au. & Ag.		·14	8·9	7 34	" "
618 E	Quartzite and galena	"		·10	16·2	10 16	" "
618 G	Porphyry and galena	"		·60	6·3	15 55	12 Mile River.
621	White Quartz	"		·60	Traces.	12 40	Yukon River 36 Miles up.
621 B	Pyrites of copper	Cu.	4·65			9 30	" "
625 C	Black sand	Au. & Ag.		·40	Traces.	8 26	Sixty Mile River.
625 D	" "	"		·60	"	12 40	" "
625 E	" "	"		·90	"	18 60	" "
626	Quartz with iron pyrites	"		·20	"	4 13	Lindow Creek.
626 A	" "	"		·19	"	3 94	"
628	Quartz with oxide of iron	"		·20	Traces.	4 13	Hunker Creek.
628 D	Clayish matter	"		·35	None.	7 23	"
629 B	White quartz (honey comb	"		·70	Traces.	14 47	Skookum Gulch.
631	Quartz with iron pyrites and oxide	"		·92	"	19 01	Green Gulch.
632 B	Pyrites of copper	Cu.	2·80			5 60	White River.
632 C	"	Cu.	3·20			7 40	"
637 A	Quartz with oxide of iron	Au. & Ag.		·28	Traces.	5 78	Bonanza Creek.
638	" "	"		·38	"	7 85	Dominion Creek.
639	Quartz with free gold	"		5·7	·30	117 96	Bonanza Creek.
642 A	White quartz with taleum	"		·26	Traces.	5 37	Sixty Mile River.
643	White quartz with mica schist	"		·30	"	6 20	Klondike River.

PART X

FORESTRY

REPORT OF THE SUPERINTENDENT OF FORESTRY.

DEPARTMENT OF THE INTERIOR, FORESTRY BRANCH,
OTTAWA, September 26, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the annual report on forestry, for the fiscal year ending June 30, 1905, being the seventh annual report from this office.

Reports from the assistant superintendent, the inspectors of tree planting and others employed in forest protection and propagation will be found in the appendix.

With a view of studying on the ground the forestry methods at present in practice in certain European countries, I made a visit to them during the early summer. In addition to visiting the forests of Germany and France I also had the privilege of seeing the forest school at Cooper's Hill, in England, of Nancy in France and of Munich in Bavaria. The conclusion I formed was that the conditions in these older countries were so different from those existing in Canada that while we can gain very valuable information from them it would be impracticable and unwise for us, at present at least, to adopt their methods. The conditions existing in Canada differ so much from those of any other country, especially from those I have mentioned, that I am decidedly of the opinion that we will have to work out a system essentially our own. We have already made a start and to a certain extent laid the foundation of a service which I believe can be developed to very great advantage to the country in the future. It is, however, necessary for us to have skilfully trained men, and at present as we have no forestry schools in Canada we are compelled to engage those who have been educated in other countries. I believe the day has now come when a number of practical foresters would find employment in Canada if they had an opportunity of gaining a technical knowledge in a home forestry school and a practical knowledge by spending their winter vacations in our lumber camps. In addition to those who would obtain employment by the governments of the Dominion and the provinces, the lumbermen of the country would probably find it to their advantage to employ such men to examine their timber limits and make recommendations regarding the cutting of them and in many cases to superintend the work. The establishment of a forestry school, combining theoretical and practical instruction, should be the next step in our educational advancement.

Before dealing with the details of the work of the branch, it may be well at this stage, when we are endeavouring to develop a forestry policy, to consider what should be the aims for the future of those entrusted with this work. Whatever is done to-day should be on a plan capable of development in the future. We have only made a commencement in a vast field.

The existing forests under control of the Dominion are of immense extent, covering nearly a million square miles of territory, three-fourths of which is not adapted for agriculture and consequently should be left for the growth of timber. The vast northern forests of spruce, extending as a zone from ocean to ocean, if properly protected and utilized, will be the world's main supply for timber in the time of scarcity, which is not far distant. The nations of Europe are busy growing this tree from seed, and a period of a hundred years or more has to elapse before the time for cutting arrives, while here we have great areas of full grown trees ready for the axe; as well as others in every stage of growth, which with care in their protection and a proper system of harvesting will afford a perpetual supply. The white pine has hitherto been king in our Canadian forests, but the original white pine never extended over one-tenth of the area covered by the spruce, and it has now been so depleted by the axe and by fire as to render the future supply of that timber entirely insufficient for the demand. The spruce, while perhaps somewhat inferior for general use, is for building purposes one of the nearest substitutes we have to offer, and is now largely used in its place.

It is unfortunate that this tree is so easily killed by fire and that the conditions prevailing in our northern country owing to the thin soil covering and the growth of moss on the rocks render fires when once started there very destructive. These forest fires originate in various ways. In some cases they are caused by lightning, but much more frequently from carelessness on the part of those travelling through the country. The appropriation granted for forestry purposes has enabled the department to employ a limited number of forest fire rangers during the past few years, and the results have been very encouraging. A good example of this is afforded in the railway belt in British Columbia. This belt consists of a tract of land about 500 miles long by 40 miles wide, 20 miles on each side of the main line of the Canadian Pacific Railway, so situated as to be more liable to fire than perhaps any other part of the province of equal area. Five years ago this territory was divided into a number of districts and every season since rangers have been employed during the dry summer and autumn months, one ranger having charge of each of the districts. Prior to the introduction of this system scarcely a season passed without the destruction of millions of feet of valuable timber within the belt, whereas since the establishment of the service, notwithstanding that we have had a number of very dry seasons, practically no loss has been sustained within the belt, while outside of it very great destruction has taken place.

Various estimates have been made of the quantity of merchantable timber on land under the control of the Dominion government, but the information at present is so meagre that any calculations on the subject can only be regarded as mere estimates drawn from very limited data, but there can be no question that the total quantity is enormous, and though the quality in some cases may be inferior for lumber purposes it is well adapted for pulp. When we remember that the whole country abounds in streams affording excellent water-power, there seems little doubt that the great wilderness lying north of our fertile land which may appropriately be termed Canada's wood lot will yet furnish through its forests alone employment for a considerable population, and with proper management should continue to be a permanent source of wealth to the country.

Though the climatic conditions of our far northern regions, as above stated, render them unsuited for the labours of the husbandman, the example afforded by the Yukon teaches us that products of the mineral kingdom are not confined to southern latitudes, and it is impossible to foretell the stores of mineral wealth that may yet be found in those regions; and one of the great requisites in mining is timber. Dr. David T. Day, of the United States Geological Survey, stated in a paper read before the American Forest Congress last January that a fair estimate of the whole quantity of timber used in mining in the United States would be 400,000,000 cubic feet a year. Another essential in successful mining, especially in gold mining, is a continuous supply of water, but we are here touching on a subject of very wide application, namely, the forest as a conservator of water supply. As I have said elsewhere, if we permit the destruction of this forest by fire or otherwise the results will be disastrous in many ways. To say nothing of the evil effects on the climate of the fertile lands farther south that would result from the destruction of this barrier against the northern air currents, the severe winter of those high northern latitudes will be made almost intolerable by the winds that will blow uninterruptedly over the denuded land; the streams bereft of the present natural reservoirs which the forest covering at their sources affords will then be torrents in the spring time and dry in the summer and winter months, causing destruction to the fish and to navigation; the fur-bearing animals and game will practically disappear, and instead of having a land with many possibilities we will have an arctic desert.

Second only in importance to protection from fire is a proper system of cutting.

The practice of setting aside and reserving certain tracts for timber purposes, known as timber reserves, has been in force for some time, but the object of intelligent forestry is not simply to preserve the forest, but to utilize it so as to produce the greatest benefit to the public. There is no more reason for refusing to cut and use the full grown tree when there is a demand for it and when, thereafter, it would only deteriorate in value, than in refusing to cut and use any other product of the vegetable kingdom. A great work for forestry in Canada, in addition to forest protection, will be forest utilization; in directing the way so that the public will receive the fullest benefit that can be derived from the use of the product. A very important work too is in gaining information and setting aside certain timber tracts as timber reserves. Any timbered districts unfit for agriculture should be so set aside. As soon as possible these reserves should be carefully examined and an inventory taken of the different varieties of timber growing on each reserve, and also of the dead timber. Regulations should then be made to suit each individual case and carried out under the supervision of the Forestry Branch. A commencement has been made in this direction this season in the Turtle Mountain timber reserve. The work is being done under the supervision of Inspector Craig of this branch, and Mr. H. R. McMillan, with an assistant, is doing the work in the field. When the field work is completed a plan will be prepared variously coloured to show the timber on each section. In addition to this we will have tables showing quantities and varieties of wood, rate of growth, &c., and also the estimated quantity of dead timber. With this information we will be able to determine what portions will bear further thinning without permanent damage to the reserve as a timber producing district. Encouragement will be given to settlers to remove the dead and decaying timber rather than as heretofore cutting the young growing trees. In other words the object aimed at will be to make this tract of land of the greatest possible utility in the growing of timber for the use of the settlers on the surrounding prairie. It is expected that this work will be completed in time to make a beginning on the Moose Mountain reserve before winter sets in, the work there to be continued next season.

FOREST TREE PLANTING.

The system of co-operation between the department and the settlers on the plains of Manitoba and the North-west Territories in the growing of forest trees, which was started in 1901, is now assuming large proportions. The reports of the Assistant Superintendent and the inspectors employed in this work will be read with interest as showing the gratifying results that have followed the carrying out of this plan. These plantations not only benefit the individual and the people living in the neighbourhood where the work is done, but in addition they afford object lessons in tree cultivation to the settlers in all parts of the prairie region.

There have been distributed from the nurseries to the settlers this season 1,860,000 seedling trees and cuttings. This makes a total distribution since this work was started in 1901, of 5,102,750. Besides this a considerable quantity of seed has been given out during the same time. The applicants to be visited this season number about 2,900. Of these 1,400 reside in Manitoba and 1,500 in the Territories.

FOREST NURSERY STATION.

The Assistant Superintendent's report gives details of the year's work at our new nursery station at Indian Head. In a year or two more the whole work of growing stock for distribution will be centralized at this station. In addition to the growing of this nursery stock it is proposed that different varieties of trees will be raised here in small plantations under forest conditions from which valuable data will be obtained for the use of settlers who are engaging in tree culture in the country.

PLANTING IN THE SAND HILLS ON THE SPRUCE WOODS TIMBER RESERVE.

Last year between nine and ten thousand seedling Scotch pine were planted in the sand hills on the Spruce Woods timber reserve. Owing to the very dry weather last season more than half of these died, but this spring some thirteen thousand more were planted under more favourable conditions, and as the weather has not been nearly so dry as it was last season much better results have been realized. A recent examination shows that over 90 per cent of these are now living and appear hardy. A more detailed account of this work will be found in the report of the Assistant Superintendent.

LECTURES.

As heretofore this branch has endeavoured to comply with frequent requests made for lectures on forestry. During the past year the Farmers' Institute meetings in the west have usually been attended by an official from this branch, and I have addressed meetings in Winnipeg, Toronto and several other places on the subject.

CANADIAN FORESTRY ASSOCIATION.

This association continues to gain steadily in membership and influence. It is exceedingly gratifying to the promoters and to the friends of forestry throughout the country to witness the increasing interest from year to year that is manifested in the great forestry problem in this country. At the beginning of the year a forward step was made by the association in starting a forestry quarterly which is already doing excellent work, and probably it will not be very long till the directors will feel warranted in changing it to a monthly publication.

FOREST FIRES.

So far this season no serious forest fires have been reported. In Manitoba and the territories there has been considerable rain at intervals which has resulted in fewer fires than usual. In British Columbia, however, very little rain fell up to the middle of August, and it was only through the efforts of the rangers that disastrous fires in Dominion timber were prevented.

Your obedient servant,

E. STEWART,

Superintendent.

APPENDIX No. 1.

REPORT OF NORMAN M. ROSS, ASSISTANT SUPERINTENDENT.

INDIAN HEAD, ASSA.,
August 19, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit my fifth annual report of work carried out under your direction, dating from September 25, of last season.

On October 5 we commenced at the nursery to dig up the young ash seedlings, which were counted, tied in bundles of 25 each and heeled in ready for distribution the following spring. A start was made at the maples on the 11th, these being treated in the same manner; some 400,000 being dug up; 75,000 cottonwoods were purchased from North Dakota and heeled in at the same time. Besides those from Brandon a total of about 990,000 seedlings were then ready for shipping early this season.

The fall of 1904 was a most exceptional one, the weather remaining open much later than usual, so that it was possible to work on the land as late as November 18. This permitted us to accomplish a great deal of work on the new nursery which otherwise would have been delayed for another year. After sowing 9·09 acres to ash seed and two acres to maple, work was commenced on gravelling the drives and putting in necessary culverts. About 200 loads of gravel were put on the roads, and the work just completed before the freeze up.

On December 2, according to your instructions, I went to Banff and then to New Westminster to arrange for a collection of British Columbia timbers to be used as a forestry exhibit to be set up in the museum at the former place. After arranging with Mr. Leamy for the timbers to be sent up I returned to Indian Head, and on December 15 started for Ottawa, where I remained in your office during the winter. On March 18 I returned to Indian Head in order to get everything at the nursery arranged for spring work. The latter part of the winter in the west was very open and comparatively mild with no snow on the ground. Consequently the seedlings which had been heeled in last fall became almost dried out, so that it was necessary to thoroughly soak them with several tanks of water. This was done on March 25. During this month about 75 pounds of maple and 75 pounds of ash seed were distributed to settlers, in two-pound lots.

On April 3 we commenced shipping out the seedlings; last year we did not commence till the 22nd. The distribution was completed on the 24th, when the regular work of planting and sowing seed was commenced.

The tree planting inspectors started work early in June; Messrs. Craig, Wallin and Stevenson working in Manitoba, and Messrs. Caldwell, MacIntosh and Mitchell in the Territories. Mr. Caldwell this season will inspect the main line of the Canadian Pacific Railway from Fleming to Regina, the Kirkella extension and the Arcola extension from Regina east to the Manitoba boundary. Mr. MacIntosh covers the main line from Regina west to Caron, the Prince Albert branch, and the Soo line running south-east from Moose Jaw. Mr. Mitchell will take everything west of Caron.

The trees sent out from Indian Head this spring were distributed among 458 settlers in Assiniboia, Saskatchewan and Alberta. About 75,000 additional seedlings were sent to the Alberta Railway and Irrigation Company, at Lethbridge. These trees were to be planted on lands in the district irrigated by the company's ditches, the company guaranteeing that the trees would be properly planted and well looked after. In all about 1,000,000 seedlings and cuttings were sent out from the Indian Head nursery, and about 860,000 from Brandon. The varieties consist as in the past of, approximately, 75 per cent maple and ash, the remaining 25 per cent being made up of Dakota cottonwoods, Russian poplars, willows and a few elms.

The reports already received from the inspectors as to the progress of the plantations are most satisfactory. The trees sent out this spring have done exceptionally well, the season so far having been most favourable. The older plantations came through the winter without the least damage; even the cottonwoods, which almost invariably kill back at the tips, were uninjured. It seems strange that this should have been the case as, during the winter, there was practically no snow, the ground being almost bare with the exception of one month; the trees consequently had no protection whatever, and it appeared that conditions were very favourable for winter killing. However, everything started in the spring without sign of injury, due, I think, largely to the exceptionally moist condition of the soil last fall before the freeze up.

This summer, as before stated, growth has been very rapid, the ash having shown up exceptionally well. I am very glad to report that this tree now seems to be coming into more general favour with planters. Formerly the impression held by most people here was that the ash is such a slow grower that it is hardly worth while to plant it; consequently there has been some difficulty experienced in the past in inducing the settlers to put them in the plantations. Although not by any means such a fast grower as the cottonwood or willow, still the ash forms a very fair-sized tree in a comparatively short time, and as the wood is hard and capable of being put to many uses it is one which should be largely planted on the prairies.

On the list sent up from Ottawa this spring there were 1,500 names of applicants to be visited in the Territories during the summer, as compared to 1,009 last season. The larger number of fresh applications seem to be coming in from the Prince Albert branch, south of Saskatoon, the new Arcola extension and the newly settled part of the main line between Caron and Swift Current. These districts are practically just opening up, and it is very encouraging to see such an interest being taken by the new settlers in this work. Though many applications are also received from the older districts the same general interest in tree-planting does not seem to exist. I feel confident, however, that as soon as the plantations now being set out prove successful the demand for trees will, in these districts, be largely increased.

PLANTATION IN SPRUCE WOODS TIMBER RESERVE.

As stated in my last report, a few thousand seedlings of one and two year old Scotch pine and a few pounds of seed were planted in a very rough manner on the reserve at a point a few miles south-east of Sewell. The one-year old seedlings proved to be too small, only a very small percentage coming through. The two-year olds, however, did better and showed that under fairly favourable conditions good results may be expected by using plants of this size. Last season the planting was not done until too late, and immediately following there was a spell of very hot dry weather, so that the seedlings did not have a very good chance.

This year an additional 13,000 two-year old seedlings were set out, the manner of planting being somewhat different from that employed last spring. Furrows running east and west about four inches deep and twelve wide were ploughed out of the sod. These furrows were opened out about every four feet. The planting this year was commenced on May 2, and the soil was very moist and in good condition to receive the seedlings. The young plants were set immediately the sod had been turned; a hole being made with a planting iron by one man, followed by two others who put the seedlings in the ground. The plants were set as close to the south side of the furrow as possible, as it was found last year that those seedlings which had the advantage of some slight shade had done much the best. According to the progress made at this planting a gang of three men after the furrows had been drawn out should easily plant 3,000 seedlings in 10 hours. If planting should be undertaken on a large scale with a large and well organized gang, planting could be done in this manner at a cost of less than $8 per acre. After planting there was considerable wet weather and since that time the season has been very favourable. I have not yet had an opportunity of revisiting this plantation, so unfortunately cannot, at present, make a report as to the result.

EXHIBIT AT BRANDON.

As usual an exhibit of native timbers, pressed leaves, seed, seedlings growing in boxes, and photographs of plantations was prepared for the annual fair held at Brandon during the early part of August. This year I was able to secure half a cord of excellent native maple wood which had been grown from seed planted thirteen years ago. The wood was as large and of as good quality as that usually used for fuel in this country, and showed beyond doubt that trees may be planted with some certainty of a profit being returned before the end of one's lifetime. During the fair it was suggested by one of the officers of the exhibition that the Forestry Branch should make use of a small portion of the grounds upon which a practical demonstration of the growth of our hardy varieties could be made, and possibly also show on a small scale the methods used in the nursery for raising the seedlings. If some such arrangement could be made with the management of the fair an exhibition of this nature would undoubtedly afford much interest and information to the public.

NURSERY WORK.

No stock is being grown this season at the Brandon Experimental Farm. All this work in the future will be carried on at Indian Head. We are still making use of the sixteen acres on the experimental farm here, which was kindly put at the disposal of the Forestry Branch four years ago. Next year will probably be the last one in which it will be necessary for us to use this ground, as by that time it is hoped to have ample land in a suitable state of cultivation on the new nursery station, and also a fair degree of shelter.

This summer we have 32·95 acres under broad leaf seedlings; and probably an acre more devoted to conifers. The above total is made up as follows:—

	Acres.	Acres.
Maple 2 year seedlings	5·65	
" 1 "	8·57	
		14·22
Ash 2 "	6·89	
" 1 "	9·09	
		15·98
Elm 1 "		2·75
Total		32·95

Up to the present it has not been possible, owing to the rapid growth of weeds, to find time to make an accurate estimate of the stock in the nurseries. This is usually done by counting the seedlings in several rows in each plot. An average is then struck upon which an estimate can be based. Judging from the appearance of the stand and the yield per acre that has been obtained in past seasons an approximate estimate is as follows:—

Maples large enough for distribution	1,215,000	
Ash large enough for distribution	800,000	
Russian poplar large enough for distribution	5,000	
White birch large enough for distribution	5,000	
Elm large enough for distribution	15,000	
		2,030,000
Ash too small for distribution	900,000	
Elm too small for distribution	100,000	
Birch too small for distribution	15,000	
		1,015,000
European larch—		
2 year transplants	3,500	
1 " "	20,000	
2 " seedlings	30,000	
		53,500
Scotch pine—		
2 year transplants	15,000	
1 " "	15,000	
2 " seedlings	40,000	
1 " "	50,000	
		120,000
Jack pine—		
2 year seedlings	13,000	
1 " "	15,000	
		28,000
Pinus Montana, 1 year transplants		3,000
Pinus flexilis, 1 year seedlings		2,000
Pinus ponderosa, 1 year seedlings		2,000
Pinus excelsa, 1 year seedlings		200
Pinus cembra, 1 year seedlings		200
White spruce—		
2 year transplants	2,600	
2 " seedlings	2,000	
1 " "	4,000	
		8,600
Picea pungens, 2 year seedlings		32,000
Picea excelsa, 1 year seedlings		10,000
Picea excelsa septentrionalis		20,000
Abies balsamea		4,000
Total estimated stock		3,328,500

Referring to your own report of last year, page 5, it will be seen that the estimate for last year was given as 4,229,557, which would make it appear as though the stock last season was larger than this year. The estimate on the trees large enough for distribution was only a rough guess sent down to you early in the season, the maples and ash being greatly overestimated. On page 12 of my own report a more accurate estimate is given, based on a fairly careful count, but even this was almost 100,000 too much. The estimate given above of this year's stock is, I think, rather below than above the actual number. In the past it seems that the tendency has been to overestimate, due chiefly to the fact that when the first count is made everything is put down; but when the seedlings are pulled up many of the small ones are left in the ground. The bundles also, which in the actual count are considered to contain 25 each, really are made up of from 27 to 30, so that there may be no danger of any of them being short. For reasons such as these an absolutely accurate estimate of the seedlings growing on 30 acres is almost an impossibility. As the work progresses, however, we shall in a few years be able to estimate more closely as the yield of past years can then be averaged up and should give a better idea as to the amount of stock growing on a given area.

NEW NURSERY STATION.

Permanent Plantations.—As stated in last report, a belt of 5 rows of trees, consisting of maple, willow and cottonwood, was planted in 1904 along the east and part of the north boundary of the nursery, a total length of about three-quarters of a mile. Besides these a plantation of native spruce and tamarac three-quarters of an acre in size was also set out. All of these trees have done exceptionally well; there has been no winter killing, and fully 95 per cent of the plants set out are now alive. The growth has been most vigorous, the outside belt now averaging 5 feet in height. The spruce and tamarac plantation, though on new land and absolutely without protection, has made most satisfactory progress, the growth on the tamarac being in many cases over 2 feet this season.

This spring planting was continued; an acre of native tamarac, spruce and Scotch pine was set out, the trees being 3 feet apart each way, the arrangement being: every alternate row tamarac, the remaining rows alternately Scotch pine and white spruce. The Scotch pine were three years old and obtained from France, where they are grown in very large quantities and at a very small expense. Should these plants prove hardy in the west it will be cheaper to import them than to raise them from seed here, manual labour being so high in this country. At present this plantation looks very well, very few failures being apparent at this date. About five acres of mixed plantation of maple, elm, cottonwood and European larch, 3 by 4 feet apart, were set out to fill up odd corners and side slopes which could not be utilized to better advantage. A large number of willow and cottonwood and caragana from seed have also been planted in single rows for shelter and hedges, where a quick growth is desired.

Next season planting will be continued on the main belt round the boundaries of the nursery which it is at present proposed to plant altogether with conifers, principally Scotch pine and white spruce. It is also the intention to set out several sample plots of the broad leaf varieties from which reliable data may be obtained in the future. The area which can be devoted to permanent plantation cannot, however, be very large at present, as the greater part of the land now under cultivation must be devoted to the raising of nursery stock.

Sixteen acres are this summer under nursery, and considering that the land is quite unprotected the stand of seedlings and the growth they have made is remarkably good. About four acres of maple sown late in the spring of 1904, which last season only made a growth of about 6 inches, are now considerably over 3 feet high; they are splendid plants, but rather too large for handling economically. The two-year ash average 2 feet high, one-year maples about 14 inches, making very good stock for distribution. The one-year ash are about 7 inches high, and will of course remain in the nursery for another season. The land in future devoted to nursery purposes will be divided up into acre plots in the shape of narrow strips running north and south, separated by hedges of caragana which will not be allowed to grow more than 6 feet high. The seed of the caragana was sown in the permanent position last fall at the same time as the tree seeds were put in. The young plants are now nearly a foot high, and should next season make a growth of 2 feet, so that two years from now we should have some very well sheltered plots. An additional eleven acres has been well cultivated this summer on land that last year grew a crop of oats. This will be divided up into plots and sown to tree seed in the fall.

Buildings, drives and ornamental grounds at present occupy about ten acres. In the spring about 6,000 hardy shrubs grown in French nurseries, were planted along the drives and borders of the lawns. The varieties consist largely of Siberian dog wood, lilacs, hardy spireas, rugosa roses, dwarf mountain pines, junipers and some others. These shrubs arrived after being over six weeks on the road, and seemed to be very badly dried out and moulded; however, soon after planting we had some very heavy rains and cool weather, making the conditions as favourable as possible, so that nearly all of the young plants have survived and made good growth, the percentage of losses being very small. Some two acres were seeded down to lawn grass, which is now covered by a thick sod, the borders of the lawn being planted with perennial plants and shrubs. Some hundreds of cottonwoods and maples 8 to 10 feet high were planted irregularly among the shrubs and around the buildings and already make a very good effect. These trees were grown from seedlings in our own nurseries, having been kept continually pruned to a good shape. The ornamental grounds should be made as attractive as possible, as already many people drive up to see the place, and in a very short time we shall undoubtedly have a large number of visitors. When it can be seen what great changes may be effected, even in a single season, by a small amount of planting, at comparatively little expense, a great deal of encouragement will be afforded to many who might otherwise be sceptical as to the results of such work. At present it is somewhat difficult to get the settlers here to see the practicability of planting trees for profit; but most are anxious to improve the appearance of their farms, and could be more easily induced to plant for that purpose. It matters little, however, what the incentive for planting; once the trees are set out under fairly favourable conditions they are bound to grow, and in a few years the planter and his neighbours must realize that it does not really take such a long time after all to produce wood large enough for fuel and other purposes. In a country where wood is a comparatively scarce article this knowledge must have the effect of increasing the numbers of plantations.

During the summer thirty more acres have been broken and backset, and the land is now being worked up for cropping next season. Seventeen acres of oats sown this spring on last year's breaking have yielded a very heavy crop which will supply all the grain that will be necessary to keep the horses for the next twelve months. This land will be summer fallowed next season, divided up into plots and sown to tree seeds in the fall. Eight acres are now under rye grass, six of which were sown this spring. Sufficient hay has been put up from this land to last until next summer; during the winter months the horses are fed on oat straw entirely, with the addition of a little grain. There still remain unbroken forty-five acres, fifteen under fence for pasture; the remaining thirty to be broken up as soon as possible.

Conifers.—Conifers have only been grown on a comparatively small scale up to the present chiefly owing to a lack of suitable soil, facilities for shading the seed beds and the comparative difficulty of obtaining the seeds. I do not know of any place in the west where conifers have been raised from seed in any numbers, with the exception of Mr. A. P. Stevenson's nursery at Nelson, Manitoba, where Scotch pine have been grown very successfully. Many of the nurserymen and other authorities on tree growing seemed sceptical as to the possibility of raising these trees from seed in this climate, so that it was thought best to go slowly before trying to raise evergreens in any large numbers. Our experiments so far prove that there are many varieties which can be raised most easily. We now have in the nurseries three year old Scotch pine, European larch and native spruce which are just as strong, healthy plants as I have ever seen raised elsewhere. Our three-year old Scotch pine are certainly much better and stronger than those obtained from the French nurseries, though as stated before, they cost us far more to raise. The Colorado blue spruce (*P. pungens*), now two years old, has grown splendidly in a very heavy stand, and will be a good size for transplanting next spring. The native Banksiana and Murryana pines have also done very well. This spring some pinus flexilis, pinus ponderosa, pinus cembra and pinus excelsa were sown in small quantities. The Norway spruce has been planted in the west in several places with, up to the present, small success; however, there are some good specimens growing in different parts of the country, and at both experimental farms. Thinking that possibly seedlings raised in the west might prove more suitable for prairie planting, a few pounds of the common picea excelsa and also a few pounds of a variety supposed to be more hardy, picea excelsa septentrionalis, collected in north Finland, were sown, and have produced a splendid catch of seedlings. Nothing definite can be reported as to these for a few years. The Scotch pine, white spruce, Colorado blue spruce and native tamarac may, I think, be said to be perfectly hardy and adapted to western conditions. Careless handling of the young plants before being set out is, I am sure, the cause for nearly all the failures in planting conifers of the above named varieties, in this country. Another cause for failure is using plants that are too large. Four years old should be the limit, although trees of a much greater age can be successfully moved, but only at considerable expense.

On the whole the past season has been the most favourable we have yet experienced for every kind of work. It is an extremely fortunate thing that the first years of the work of the Forestry Branch in western tree planting have been so propitious. There are seasons which of course are very dry, when tree planting might not have proved so successful, and had we started with one or two dry years it is probable that the general interest now being taken in tree planting would not have been so apparent as we now find it. The plantations already set out under the co-operative scheme have now got such a good start that a dry year or two would not do them any injury, so that they are bound to remain as object lessons to those in the neighbourhood as to the possibilities of tree growing under proper conditions.

Your obedient servant,

NORMAN M. ROSS,

Assistant Superintendent.

APPENDIX No. 2.

REPORT OF ROLAND D. CRAIG, B.S.A., F.E., ASSISTANT IN FORESTRY.

CARLYLE, SASK., September 9, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit herewith the second annual report of work carried on under your directions.

At the time of writing my last report I was in Brandon looking after the heeling in of the nursery stock on the experimental farm. When that was completed I returned to Ottawa where I remained until April 7. On April 11 I commenced the distribution of seedlings from the Brandon nursery to Manitoba farmers. We sent out from this nursery 468,425 Manitoba maples, 300,000 green ash, 73,000 cottonwoods and 5,000 willow cuttings, a total of 846,425 in all. The number of applicants to receive trees from the Brandon nursery was 664.

On May 1 Mr. Wallin and I went to the Spruce Woods Forest reserve, and with the assistance of a man and team planted 12,000 two-year old Scotch pines in the sand hills. We selected for this year's planting a piece of land which had been broken up about ten years ago but which, since it was too light for grain, had been allowed to revert to prairie. The old spruce trees which are scattered about this locality are too far apart to effect natural reproduction. Last year's experience taught that where the young pines were protected on the south from the sun they succeeded better, so this year we adopted the following system in planting: Furrows 4 feet apart and about

4 inches deep were ploughed from east to west, throwing the sod to the north. The seedlings were then planted with a dibble close to the land side. We found that with one man making the holes with the dibble and two planting, we could put in 4,000 seedlings per day.

A heavy snow storm came before planting was finished and wet the ground thoroughly so that the plantation had every chance to succeed.

The pines planted in 1904 wintered well and showed good growth for the first year.

INSPECTION.

I have already inspected the plantations from La Rivière to Lyleton, Brandon to Pierson and Sinclair and have yet to do the Glenboro branch. I have found the trees on the whole well cared for and the people enthusiastic about their success. I have noticed very little damage this year from the cottonwood rust or other fungus diseases. Some of this year's maples killed back due partly to the fact that they grew too late in the fall and did not ripen before the winter came. This year two year old ash were sent out and they proved much more satisfactory than the one-year olds. Fully 85 per cent of all the trees planted are alive and growing well.

FORESTRY INVESTIGATIONS.

This summer a start was made in the systematic study of the Dominion forest reserves, and a party under my charge, consisting of H. R. MacMillan, chief, F. C. Hart, compass man, one caliper man and a cook, was sent to the Turtle Mountain timber reserve, with the object of finding the nature of the stand on the reserve and the best means to protect and improve it.

This reserve, as indicated on the accompanying map, consists of about 108 square miles in township 1, ranges 19, 20, 21 and 22, being about one-half of the area originally timbered.

We left Boissevain on June 2, and the party under Mr. MacMillan's charge spent until September 1 in the reserve. I stayed with the party most of June, and returned several times during the summer for week ends. Heavy and frequent rains, especially during the month of June, greatly interfered with the work.

The Turtle mountains consist of a rolling country, the highest hill being not more than 400 feet above the prairie. Fully one-third of the land is under water in lakes or sloughs. In many places the sloughs have been caused by beavers damming up the streams. The drainage is chiefly towards the north, and as a glance at the map will show, nearly all the streams in south-western Manitoba rise in these hills.

The soil is chiefly of a clay or clay loam with very little rock exposed. The underlying rock appears to be limestone, but the boulders which are scattered about are chiefly of granite and gneiss. A few of the hills are gravelly.

The forest is composed of aspen (*Populus tremuloides*) with an admixture of about 10 per cent balm of gilead (*Populus balsamifera*), 5 per cent birch (*Betula papyrifera*), 1 per cent ash (*Fraxinus viridis*), 1 per cent oak (*Quercus macrocarpa*), 1 per cent elm (*Ulmus americana*), and a very little Manitoba maple (*Acer negundo*). The underbrush is composed of a great variety of shrubs, the chief of which are willow, hazel, Saskatoon berry and cranberry. Pea-vine forms the greater part of the ground cover and grows with great luxuriance, making walking through the brulés very difficult.

The aspen is found everywhere trees grow at all, and now that practically all the oak has been cut from the reserve is the most valuable wood. When dried it makes excellent fuel, but as saw material it is not very valuable.

The balm of Gilead is more frequently found where the soil is moist, while the birch and ash usually occur on the tops of ridges. The oak is gregarious in its habit and formed groves frequently on south slopes or level plateaux.

Through fire and cutting nearly all the good merchantable timber has been removed and only on a few sections in the south-eastern part of the reserve is there anything like a virgin stand of green timber. From these places 50 to 75 cords per acre could be cut, but over the greater part of the reserve 1 to 5 cords per acre is all that could be found.

Small groves of trees one to ten acres in extent have here and there escaped the fire and these supply seed for reproduction. One could not wish better reproduction of aspen and balm than there is on nearly all of the reserve, and if protection is afforded in twenty to thirty years there will be a stand equal to or better than the original. On thousands of acres which were burned over in 1893 and 1897 there are stands of young aspen and balm, three to seven thousand per acre and 6 to 18 feet high. The trees in this young growth are even aged and even sized, and being so dense grow up straight, clean and tall, producing the best quality of wood.

There are a few sections on the east and west ends where the fires have been so persistent that the prairie condition has almost been reached. Once a heavy sod has been formed the poplars find it difficult to gain a foothold again.

Nearly every year fire burns over some part of the reserve, thereby reducing its value for timber production and the protection of the water-shed. The fires may be attributed chiefly to the following sources:—

1. Our American neighbours.
2. Squatters.
3. Farmers burning hay meadows on the reserve.
4. Farmers clearing adjacent bush land.
5. Half-breeds and Indians leaving camp fires lighted.
6. Lightning.

The land on the American side has been thrown open for settlement, and in clearing their land the settlers on that side frequently allow fire to escape to the Canadian side. Since their stock find considerable pasturage on our side it is said that fire is used to improve the grass. Whether this is so or not, the fact remains that fires are very frequent along the boundary.

There are in the reserve seven or eight squatters who, in defiance of orders from the department, continue to clear patches of land, and are endeavouring to open up the land for settlement. Since the forest is the great barrier to the achievement of this object they are not anxious to have it preserved.

The present system of leasing hay meadows is responsible for many of the fires, for the leaseholders make a practice of burning the meadows in the spring in order to improve the hay, and little or no care is taken to prevent the spread of the fire to the forest about.

Fires escape frequently also from the clearings along the north of the reserve. Since most of the land in township 2, ranges 20, 21 and 22, is timbered and undesirable for agricultural purposes it is to be regretted that the whole of the forest had not been included in the reserve.

Half-breeds and Indians who are continually passing to and from the United States through the mountains are said to have caused not a few fires by carelessness with camp fires.

Lightning is also said to have caused some, but in my opinion the danger from this source is slight.

SUGGESTIONS FOR THE PREVENTION OF FIRES.

1. All squatters should be removed from the reserve, and it should be thoroughly understood that the land is never to be opened for settlement. If this were done, and the reserve placed on a permanent basis the public sentiment in regard to timber preservation would be greatly changed.

2. A system of trails through the reserve should be established to enable the rangers to patrol the forest thoroughly, to reach a fire when it does start, and at the same time

to act as fire breaks and vantage points in fighting fire. At present there are only three trails running into the reserve any distance which are passable during the summer, and in the spring it is almost impossible to get through on these. It would cost very little to make these first-class trails, and without much expense branch trails running east and west could be made, so that the ranger could ride from one part of the reserve to the other without going out six or eight miles to the prairie. A trail along the international boundary would be most useful.

3. Efficient patrol of the reserve during dangerous fire seasons in the spring and fall is essential. During these times two mounted men should be constantly on the lookout for fires. At present the ranger, Mr. C. A. Walkinshaw, is doing good service, but being hampered by the absence of trails he is unable to patrol the reserve as it should be done.

4. A system of telephones could be used to advantage, and if three farmers living near the edge of the reserve were supplied with telephones connected with the ranger's cabin in the reserve and with the town of Boissevain it would greatly facilitate the location of a fire and the summoning of assistance to fight it if necessary. Local telephones are rapidly being established in that part of Manitoba, and it would cost the government very little to co-operate with the farmers around Boissevain when a system is introduced there.

A fire break of 100 feet wide and about 5 miles long has been cut along the western end of the reserve, and if ploughed annually late in the summer should be considerable protection. It is a question, however, if a well kept trail would not be more effective in protecting from fire.

There is almost everywhere in the reserve an abundance of dead and down timber which is a constant menace to the young forest, not only in supplying fuel for forest fires, but in harbouring destructive insects and fungi. This should be removed as quickly as possible, and from this point of view the limiting of holders of wood permits to twelve cords seems a mistake. It is desirable also that the reserve be self-sustaining, and there seems no good reason why farmers as well as others should not pay at least 25 cents per cord, and be allowed to take as much as they wish at that price.

There has been very little green timber cut in the last two or three years, due no doubt to the difficulty of securing it and to the fact that the country adjacent has been settled for about twenty-five years, and the people have got beyond the log building stage. Now the cutting of green timber is entirely forbidden, which is a wise regulation as long as there is plenty of sound dead or down timber to be had.

It is expected that from the data collected an estimate of the wood productive power of the reserve can be obtained and a working plan formulated. If managed conservatively there is no reason why the Turtle Mountain reserve should not supply fuel for all time to the country as far as it would pay to haul it, and at the same time act as a reservoir to supply the streams which flow out of it and water the fertile prairies of southern Manitoba.

MOOSE MOUNTAIN FOREST RESERVE.

We are now at work in the Moose Mountain forest reserve and find conditions somewhat similar; fires have destroyed most of the virgin timber, but the reproduction is excellent. The public opinion seems very favourable to the preservation of the forest, and with the assistance of the North-west Mounted Police, the ranger and fire guardians have been able to prevent disastrous fires during the last few years.

Hoping that the progress of the work under my charge may meet with your approval.

Your obedient servant,

ROLAND D. CRAIG.

APPENDIX No. 3.

REPORT OF HUGO CLAUGHTON-WALLIN, F.M., TREE PLANTING INSPECTOR.

VIRDEN, June 30, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit to you the following report:

I left Ottawa April 7, for Brandon, Manitoba, where I assisted Mr. Roland D. Craig in the shipment of trees to applicants in Manitoba. On May 1, when through with the distribution, Mr. Craig and I went to Sewell, where we met Messrs. Norman M. Ross and A. P. Stevenson, and together with them continued last year's planting of Scotch pines (*Pinus sylvestris*) on the Dominion government forest reserve there. The plants were two years old, strong and hardy looking, and ought to do well.

After finishing the planting I left for Indian Head, where I worked on the forestry farm till June 9, when I started on my inspection.

Up to the present date I have, of the district allotted to me, inspected the Miniota branch, Forest extension and part of the Canadian Pacific main line west of Brandon. One hundred and ten farmers have been visited by me. We had an unusual amount of rain during the early part of the summer and the trees have as a rule made very good growth already. Very few misses are found, and those met with are, in my opinion, due to bad planting. Some men seem too much in a hurry when setting out the trees, which are not planted deep enough. The earth is not packed around the roots; consequently, when a heavy rain comes and the ground sets, part of the roots get exposed to sun and wind, and in nine cases out of ten the tree dies. The tops were frozen on some of the maples sent out last spring on account of the lack of snow in the winter of 1904, but most of them start from buds on the lower part of the stem, or from the root.

Maple, ash and elm are all perfectly hardy, but the two latter are slower growers, at least for the first years, and seem to depend more on a thorough cultivation than the maple. I would like to mention that the other day I saw some ash, planted in the spring of 1904, which could boast of a growth of fully 2 feet already this year, which I consider very good, especially as they were planted on a wholly shelterless piece of land.

The cottonwood has two enemies—the frost and the rabbits. But it is in only a few places that the frost seems to cause damage by killing back the tree for a piece, and as a rule the cottonwood is a hardy and fast growing tree, rendering a quick shelter. The rabbits are very fond of eating the cottonwoods off at the roots.

Taking all over, I consider 90 per cent of the trees sent out last spring are living; the largest percentage of dead being on the maples.

Your obedient servant,

HUGO CLAUGHTON-WALLIN.

APPENDIX No. 4.

REPORT OF A. P. STEVENSON, TREE PLANTING INSPECTOR.

NELSON, MANITOBA, July 1, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to submit the following brief report on the work done by me under your instructions as tree planting inspector in connection with the work carried on in this province by the Forestry Branch of the Department of the Interior.

On April 3 of this year I went to Brandon to make arrangements for our spring's distribution of trees. Very little snow having fallen in this district during the past winter we had in consequence an extra early spring. A large tent was secured for the packing and handling of the trees. This was hired from a party in Brandon, together with a stove, at a very nominal charge. An examination of the trees heeled in last fall and for distribution this spring showed that notwithstanding the almost entire lack of snow they had come through the winter in fairly good condition. The maple showed some signs of killing back at points of growth. This arose, I think, from the extra late soft growth made late last fall. Messrs. Craig and Wallin arrived from Ottawa on April 9, to take part in the work of distribution of trees from Brandon. All arrangements were completed by the 11th, and the first shipment of trees was made on April 12, just 21 days earlier than in 1904. Mr. Craig was left in charge of the work of distribution and packing of trees. This was carried forward in a vigorous manner and completed about May 1.

On May 1, in company with Messrs. Ross, Craig and Wallin, the spruce woods, south-east of Sewell, were visited for the purpose of planting a further quantity of Scotch pine seedlings. An examination of those planted in the spring of 1904 showed that the trees planted in a slight depression or where partially shaded from the sun had made good vigorous growth. This fact having been noted it was decided to draw plough furrows running east and west, then plant the young seedling pines in the bottom. This would afford the necessary protection from sun and wind till the young trees would get thoroughly established.

I began the work of inspection June 1. Mr. Craig took up the work of inspecting from Pilot Mound west to Estevan; Mr. Wallin the north-west part of the province, and the district to be covered by myself is the Red River valley and west on the Canadian Northern Railway to Elgin and Souris districts. The spring was an ideal one for tree planting, there having been no extended periods of drouth. The condition of the trees sent out in previous years was very good indeed. No signs of winter killing on any of the varieties was noticed. Trees that were injured a year ago by winter killing have nearly all recovered and are showing up well this year. Ninety-five per cent of the trees sent out in the spring of 1904 are alive and in fine, thrifty condition. It was noted again this year the growing favour of the ash tree with planters. I have also noted the extreme hardiness of this tree, that on dry, exposed knolls where snow did not lie in winter and maple, elm and cottonwood were killed out the ash alone came through without injury. The usual objection to this tree in the past has been its slow growth. There is some truth in this if the tree is given plenty of room to spread, but where planted closely with varieties such as maple and elm we find the growth about the same as of these. Of the trees sent out this spring over 95 per cent of the ash are growing, 75 per cent of the maple, and 85 per cent of the cottonwood. The poor showing made by the maple arose, as has already been noted, from the late, soft, immature growth made last fall. This, together with an almost snowless winter, weakened their vitality.

In accordance with instructions received from you I addressed a series of Farmers' Institute meetings, beginning on June 5, at St. Jean, St. Pierre, St. Charles, St. Eustache, Plumas and Gladstone. The meetings throughout were well attended, from fifty to eighty being the average attendance. The audiences were largely made up of French-speaking people, but nearly all could understand English. They were all very much interested indeed in hearing pretty much for the first time of the Dominion government's co-operative tree planting scheme. The question of fruit growing came up, but it was clearly shown that to those living on the prairie little or no success would attend their efforts in this line without first planting a good shelter belt. This was the first and one of the main essentials to success in fruit growing here in the west.

Concerning the general condition of the trees planted out under Forestry Branch supervision, I take great pleasure in reporting on the splendid appearance the trees are now making. Trees in some of the groves planted out in 1902 are now by actual measurement from 13 to 14 feet in height. Cultivation ceased in these groves a year ago, the trees shading the ground so effectually that no grass or weeds of any account give trouble, except couch and brome grass. These grasses will almost kill out any grove if they once get established among the trees.

Pruning and the proper time to prune appear to be a subject that troubles the average planter's mind a great deal. The question of cultivation he listens to reluctantly and puts off till the last minute, but mention pruning and his eye brightens at once and he feels for his jack-knife, eager to start in at once. It usually takes from half an hour to an hour's lecture to convince these men of the folly of cutting up their young trees, and when it is done it is with a sigh of regret that the jack-knife is dropped back into the pocket.

In planting for shade and ornamental purposes and planting for a windbreak and shelter belt the management is not the same. With the first judicious pruning is necessary; with the latter none is necessary, is in fact an injury, and in the sheet of directions I would suggest that this fact might be emphasized a little more. I also note that the Russian and white willow are coming much into favour and giving fine satisfaction. A great many willow cuttings were sent out by the Forestry Branch in 1902 and later. In many localities these have done exceedingly well and are now furnishing thousands of cuttings to people in the neighbourhood who desire them and rather prefer to get them in this way, as they are sure to get them fresh.

Your obedient servant,

A. P. STEVENSON.

APPENDIX No. 5.

REPORT OF ARCHIBALD MITCHELL, TREE PLANTING INSPECTOR.

Macleod, Alberta, August 31, 1905.

E. Stewart, Esq.,
Superintendent of Forestry,
Ottawa.

Sir,—I have the honour herewith to submit the following report of my work under the Forestry Branch in 1905, up to June 30.

On February 20, after instructions from you, I joined the deputation which was conducting stock judging schools and institute meetings in Alberta. The places visited were Lethbridge, Magrath, Cardston, Macleod, Pincher, Claresholm, Nanton, High River, Okotoks, Didsbury, Olds, Innisfail, Red Deer, Strathcona, Fort Saskatchewan, Edmonton, Wetaskiwin, Ponoka, Lacombe, and Medicine Hat, the tour ending on April 2. At most of the places two meetings were held and, as a rule, they were well attended. At several meetings there were over two hundred present. It was very gratifying to find the attendance at places where meetings were held in 1904 nearly always about double what it was in that year.

At Lethbridge, Magrath and Cardston, Mr. Harcourt, Superintendent of Fairs and Institutes, Territorial Department of Agriculture, Regina, was present with his stereopticon and a series of forestry slides. These were a very great assistance in presenting to the audiences the advantages of tree planting on the prairies. A series of large photographs with which I was furnished by you were very useful in the same direction at the other points.

The ground covered at these meetings, besides actual forestry subjects, usually embraces soil moisture, horticulture and fruit growing. The last two subjects are usually taken up in questions and answers, and in discussing them I am able to state just what I have seen succeeding in different parts of Alberta.

I may say that the plantations set out under the auspices of the Forestry Branch are, I believe, going to have quite an important influence in developing the country in this direction. Most of the plantations are arranged with a view to sheltering a future orchard, and nearly every planter purposes planting quantities of such small fruits, apples and crabs, as are proving hardy in the country, just as soon as his shelter belt is high enough to afford the necessary protection.

In the northern part of the country I again pointed out some of the advantages an agricultural country derives from the presence of a fair amount of wooded land and showed the advisability of retaining a portion of the farm lands under trees.

On June 5 I commenced inspection work and have thus far covered only a small portion of the ground. I am pleased to say that the older plantations have never come through the winter better and that those planted this spring have made a very good start. The percentage of trees alive in the 1905 plantations is maple, 93; cottonwood, 93; and ash, 96. Most of the trees in this section arrived in a snow storm, and while the frost did not harm the trees the snow rendered the soil moist and in first-class condition for planting.

The district thus far gone over is from Macleod to High River, and I might here say that in no part of my territory has there been such a general interest taken in tree planting as along this, the southern portion of the Calgary and Edmonton line. In 1903 there were only twelve applicants between Macleod and Calgary; in 1904 there were 44, and this year there are 90. Many of the settlers in this locality are from the States and have had experience in prairie planting and know the benefit of it, and many of them, besides, are able at the very outset to afford the extra time and trouble entailed by a plantation, which the average struggling settler is not.

In a very short time, as soon as the first early years of settlement are over, I look for a great increase in the number of plantations in this district, and indeed, in the whole of the prairie part of Alberta.

Your obedient servant,

ARCHIBALD MITCHELL.

APPENDIX No. 6.

REPORT OF ANGUS MacKINTOSH, TREE PLANTING INSPECTOR.

DUNDURN, August 20, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour of sending you my second season's brief report on the tree planting inspection work with which you again entrusted me.

About the middle of May Mr. Ross arranged that I should come to Indian Head, on June 1, which I did. He then gave me a list of applicants for trees, to the number of 370, on whom I was to call.

The territory assigned to me extended from North Portal on the boundary line in the south, to Rosthern, Battleford and Lloydminster, in the north-west.

The first district that I visited was that lying between Regina and Caron; the next that fertile but treeless country on either side of the Soo line, and I am now working along the Prince Albert branch, having reached as far as Dundurn.

I might say that the state of the plantations all over the districts I have visited is more or less satisfactory. The plantations made in the spring of this year are singularly free from failures. Taking them all over I do not think the loss exceeds 5 per cent. The older plantations are also as a rule in a very flourishing state; any of them that suffered from the severity of the winter of 1903-4 having quite recovered. The showery weather at or shortly after the time of planting, and the frequent rains since contributed much to the success of the former, and the mild nature of last winter was all that could be desired for the recuperation of the latter.

The growth the trees have made this summer is extraordinary. About the beginning of July I found maple that had made a growth of 3 feet and ash 2½ feet, in the Moose Jaw district; and since then have found that that is by no means exceptional. In the neighbourhood of Pense I found coniferous trees doing exceedingly well, and I believe that tamarac, Scotch pine and white (and other) spruce will in the future be found more remunerative as timber trees on the plains of the North-west, than deciduous trees.

You will find, when my books reach you at the end of the season, that as I anticipated in my last report, the number of trees required for the country over which I am at present travelling will greatly exceed that of last year. It is the same, you will doubtless find, along the Soo line, and one may safely predict that the demand will year after year go on increasing.

Wherever I go there is no lack of desire amongst the settlers to have shelter belts, indeed many of them would like to rush into tree planting before they had ground in anything like a fit shape. Settlers from the United States, of which there are many along the Prince Albert branch, are as a rule enthusiastic over trees, and are quite alive to the necessity of preparing the ground and giving them every care. Many of them know from experience on the other side of the line what tree planting means, and the value of shelter on the treeless plains.

Your obedient servant,

ANGUS MacKINTOSH.

APPENDIX No. 7.

REPORT OF JOHN CALDWELL, TREE PLANTING INSPECTOR.

VIRDEN, August 21, 1906.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I beg to submit to you the following report of my work for the season of 1905.

The territory assigned to me was the Canadian Pacific Railway main line, from the Manitoba boundary to Regina, Kirkella extension to Lipton, and the Arcola line from Regina back to the Manitoba boundary.

I began work on June 19, and expect to finish about the end of October.

Inspections so far have been very satisfactory indeed; farmers are taking great interest and pride in their young plantations. Of all the trees that have been set out since the work began, about five years ago, so far as I have seen about 90 per cent are living and making good growth.

The varieties planted so far would be about as follows: Manitoba maple, 40 per cent; native ash, 30 per cent; cottonwood, 20 per cent, and about 10 per cent made up of elm, Russian poplars and willows. The cottonwood, poplars and willows are the fastest growers, the cottonwood is liable to freeze back some the first year or two, but soon overcomes that tendency; the elm grows slowly and does not seem to hold its own as well as the others; the ash is likely to do well and is a valuable tree. Our old stand-by the Manitoba maple is very useful and satisfactory in a mixture for shelter belts. For the first twenty years the Petrofsky Russian poplar is a very pretty and fast growing tree. The dry climate of the west is likely to suit them better than the moister climate of the east. I have had quite an experience with the different varieties of willows, and the more I see of them the better I like them. The willows should be planted more extensively and are safest sent out in slim cuttings rooted.

Most farmers are very anxious for shelter around their buildings, but when it comes to planting two to five acres for the growing of fuel and fence posts, they are very slow and will require educating along that line.

A few of the main points to be observed in this work are:—

1. Insist upon the land being in a good state of cultivation before planting.

2. Guard against planting too close to the buildings, which would cause snow to lie where it is not wanted.

3. A couple of rows planted 30 yards outside of the break would hold most of the snow from the main break and save damage.

4. Advise deep planting, as we see considerable shallow planting, which is a fatal mistake.

5. A short talk on the mode of planting is very useful. I find that a good many trees have been dibbled in with a crow-bar, which is very slavish work. For two-year olds the plough is best, and for yearlings, either the plough or a light iron dibble.

6. When trees are received in the spring it is a good plan to soak them in water a few days.

7. Guard against giving too many trees at a time. A good many are inclined to take more than they have time to look after.

8. Every farmer should have a one-horse cultivator; doing the work by hand is too much work, and the cultivation not so good.

9. A few photographs of nice plantations, hedges, or groves, would be very pleasing and interesting.

10. I find the general public very much in favour of this work, as it makes life on the farm more homelike, attractive and cheerful. Agriculture is the foundation of our country. If the farmer prospers we will all prosper, and this forestry work is looked upon very favourably by all classes of the people.

11. Of course the most important part of this work is the growing of the stock to supply the demand. In looking over the stock a few days ago at Indian Head, with Mr. Ross, I was more than pleased to see such large quantities of healthy young trees grown at a very low cost. The work in this respect is certainly very encouraging.

Your obedient servant,

JOHN CALDWELL.

APPENDIX No. 8.

REPORT OF JAMES LEAMY, CROWN TIMBER AGENT.

New Westminster, B.C., September 1, 1905.

E. Stewart, Esq.,
Superintendent of Forestry,
Ottawa.

Sir,—In reply to your letter of the 11th ultimo requesting me to send forward my annual report for the period ending July 1 last, I beg to report as follows: Commencing at the eastern boundary of the province and extending to Beaver Mouth, which district is under the charge of Mr. Frank Ashdown, fire ranger, no fires have occurred between Field and Golden up to the present time. From Golden to the southern boundary of the railway belt on the Columbia river a fire occurred on Limit No. 16, which was set by some unknown person or persons, and which burned the camps and offices belonging to the Columbia River Lumber Company on the said limit, but was promptly got under control, thereby doing no damage so far; there are a number of men still guarding the fire to prevent it from spreading beyond the site of the camps.

Another fire occurred 12 miles south of Golden, on the east bank of the Columbia river; it is burning in small growing timber, and has not reached the merchantable timber; a number of men have surrounded this fire and have prevented it spreading.

About two miles south of this another fire has been burning, but is being guarded, and has done no damage so far. South of the railway boundary large fires are burning on provincial lands and we are watching them carefully, in order to prevent them from extending into the railway belt; in view of the fact that we have had some little rain very lately, I do not think they will reach inside of the railway belt; I cannot tell of what extent those fires are, but am satisfied that they cover a very considerable area of country.

On the west side of the Columbia river, opposite Moberly, on Limit No. 15, a small fire occurred but was promptly extinguished and did not damage the timber to any extent.

On the Blaeberry river a fire occurred which is supposed to have been started by lightning, but it is confined to grounds already burned over, and has not reached the bank of the Blaeberry river yet, excepting at one point where about 300,000 feet of merchantable timber has been burned; men are still guarding this, and unless we have rain very shortly, it will be liable to get away and do further damage.

An extensive fire is burning on the northern end of Limit No. 47, on the Black Water creek; it is still burning, but Mr. Ashdown is fighting it with a number of men, and has hopes of preventing it from doing damage to any extent; I have not as yet had a report from him in this regard.

The fires on Blaeberry and Black Water, we suppose were ignited by lightning, as we cannot trace them to any other source; I may here say that a number of fires all over the district have been caused in this manner, particularly in and about Revelstoke, where some 21 or 22 fires have been traced to this cause, as they were burning immediately after an electrical storm occurred in that neighbourhood, and were burning very high up on the mountain. It is a very difficult matter to fight fires that have been started by lightning, as one is not expecting them, and they occur in so many places at the same time that it is very difficult to get men to them in time to prevent them spreading.

Coming to Mr. McRae's district, which extends from Beaver Mouth on the east, to Sicamous Narrows on the west, a fire occurred on Beaver creek in the vicinity of Rogers Pass; it was attended to at once by the fire ranger, and men placed to prevent it from extending down Bear creek into Beaver valley, where there is a very large area of merchantable timber, and fortunately they succeeded in preventing it from getting out of control; it burned at Rogers Pass a considerable quantity of dead timber of no value at all.

From Glacier west to Albert canyon, a few small fires were ignited along the railway track, but were kept under control by the sectionmen in the employ of the railway, and did no damage.

At Albert canyon a rancher named Green started a fire for the purpose of clearing some land during the month of May last, and after the fire had done its work for him, he put it out, or supposed he put it out, and it smouldered in a small way until about August 23 or 24, when it broke out again.

Some tramps camped on the north side of the track and started a fire to cook food, or for some other purpose; this fire extended into the woods a short distance. I noticed this in passing, and immediately set men to extinguish it, and am pleased to say they were quite successful, as the fire did not do any damage, and I have since received word that it is completely out.

A fire started on Yale Columbia Lumber Company's limit 114, 18 miles south of Revelstoke, on the Columbia river; this fire was caused by sparks from the engine on the Arrowhead branch. The company, who maintain a watchman on this limit, gave notice to the fire ranger after the fire had been burning two or three days, but the watchman did not endeavour to put it out himself. Mr. McRae immediately proceeded to the scene of the fire and put men to work on it; it ran up the mountain, burning over a considerable area, but I am pleased to say that no timber of any value has been destroyed by this fire, as it was got under control shortly after they started to work on it.

A fire also occurred at Wigwam, burning over the flat, but it was confined to a logged-out area of Limit No. 118, and did not get into any merchantable timber.

Several fires occurred along the railway section towards Revelstoke, but did not do any appreciable damage.

North of Revelstoke, on the Columbia river, the only fire that occurred came inside the railway belt from provincial lands from the north, and burning to the mouth of Carnes creek at the north boundary of the railway belt; it did not damage the merchantable timber, being confined to an area which had been previously burnt over; it is, however, still being guarded.

In the Eagle Pass a large fire occurred at Malaka; after a severe struggle it was surrounded and prevented from doing any damage; this fire is supposed to have originated from sparks from a locomotive, though we are not sure of the cause, but it is now under control. In the district guarded by Mr. Reid, the only fire in the whole railway belt which did damage to any very large extent occurred at the head of Seymour Arm, on timber berth No. 241; I am sorry to say it has burnt over 4 square miles of the limit, and did considerable damage to merchantable timber, and to young standing timber, but the fire is now under control, and is being guarded, a considerable force of men having been employed in fighting it.

On Mara lake a would-be settler set fire to a point on the lake; the fire extended along the shore of the lake, and burned up a lot of young timber, but is now extinguished.

Numerous and extensive fires occurred in the valley of the Spillimacheen river, between Mara and Enderby, but were confined altogether to lands owned by the farmers in that vicinity, although it cost us considerable trouble and expense to prevent it from spreading into vacant Dominion lands.

On the Spillimacheen river up from Enderby to Mable lake, several fires occurred, two on limit No. 238, one or two on limit No. 237, but I am informed by the fire ranger, Mr. Alex. Reid, that little damage has been done by them. Several fires occurred on farmers' lands in the vicinity of Deep creek west of Enderby, but did not get on to Dominion lands. A fire was burning in the vicinity of Canoe creek, but it has since been extinguished, and I do not think any damage has arisen from it; I have not received any report concerning it as yet.

At Notch hill a fire was started by some ranchers, and burned into limit No. 239. In the vicinity of White lake a fire occurred on limit No. 306, a force of men were put on to fight it and they kept it confined to a small area and prevented it from doing any damage. It is still being guarded.

A fire also occurred on timber berth No. 379, on the north shore of Shuswap lake, but was extinguished without doing any damage. This fire was supposed to have been started by lightning. A small fire is still burning on timber berth No. 240, block 3, but men are watching it to prevent it from spreading. Another fire occurred at Adams river, but was promptly extinguished, and has not done any damage.

In the coast districts, commencing with Mr. Hughes' district, no fires have occurred between Yale and Agassiz, excepting a few small ones on Maria island on the Indian reserve. These were ignited by the sectionmen burning used-up ties. No damage, however, has resulted.

A fire occurred a very short time ago on limit No. 63, on the west side of Harrison lake, and it is reported that a considerable amount of damage has been done to this limit; I have not as yet received a report from the fire ranger, so I cannot say what damage has actually been done.

No other fire has occurred in Mr. Hughes' district, excepting one at the head of Stave lake, which comes within his care and that of Mr. Martyn. Mr. Martyn informs me that very little damage has been done by this fire. Numerous small fires occurred in both Mr. Hughes' and Mr. Martyn's districts, but practically no damage at all has been done.

In Mr. Johnson's district one fire is reported as having been started on limit 'B'; he has ascertained the party who set it and will prosecute him; I cannot ascertain the amount of damage done to the limit, but I do not think it amounts to much.

Several fires are reported by Mr. John Ball in his district, which extends to the American boundary line near Cultus lake, but no timber of any consequence has been destroyed in his vicinity.

Coming next to Mr. Fadden's district, no fires at all have been reported to me.

A large fire occurred on provincial lands on the Pitt river at the head of the lake some 4 or 5 miles outside of the railway belt; I learn that it has done considerable damage, as it has burned for a long time.

In conclusion, I have to say that the past season has been by far the driest since the inauguration of the fire ranging system, and in view of these circumstances, I consider that the system has once more proven a success in preventing fires which if once started, would have devastated the whole of the railway belt.

The greatest difficulty that we have experienced this year has been in obtaining men to fight fires.

The dry season having continued for so long, there has been a great scarcity of water, the small streams usually to be depended upon for drinking purposes, having all been dried up, water had to be carried to the men from a great distance, and consequently men were unwilling to engage in the work of fighting fires at so great a discomfort and hardship.

SUGGESTIONS.

I would respectfully request you to urge upon the government the necessity of placing a power launch of some description, capable of carrying some eight or ten men, upon the large Shuswap lake; the reason of this request is, that we are unable to get men around to the fires; if you will look at the map and see the large area that can be covered by the means above suggested, you will appreciate this recommendation. The fire which did so much damage on Seymour Arm could have been easily extinguished had it been possible to get men to the scene of the outbreak at once; it was several days before men could be landed there, owing to the lack of transportation, and the fire had then assumed large proportions before anything had been done to prevent it spreading. I have already written the Deputy Minister on this subject, and would ask you to be good enough to endorse my recommendation.

This report embodies the operations of the fire rangers for the period ended August 31, last.

I have received very material assistance from the officials of the Canadian Pacific Railway in carrying men to and from fires on freight trains, and giving immediate information about the locality of any fires noticed by their engine drivers and their conductors.

Your obedient servant,

JAMES LEAMY,

Crown Timber Agent.

APPENDIX No. 9.

REPORT OF THOS. YOUNG, FOREST RANGER FOR THE DAUPHIN DISTRICT.

DAUPHIN, August 31, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I have the honour to make my report as forest ranger in the Dauphin district.

With the extension of the main line of the Canadian Northern Railway, and also the completion of the Prince Albert branch, greater facilities have been given to the timber operators for the removal of their lumber products to the enlarged market created by the opening up of the new districts.

This season has been drier than that of the past six years, and the logs cut on the river system of Lake Winnipegosis were not all driven to the mills on account of low water.

The cut of lumber has been about the average, but with the prospects of an abundant harvest there will be a scarcity in the market to meet the local demand.

There has been no great damage done by fire to the forest in this district during the past season, and the work of the forest fire rangers in the spring and fall has tended to greatly reduce the danger in this respect.

There has been a marked growth in the forests in the timbered areas during the past season, but with the exception of the tree planting done in the towns and villages no great attention has been given to forestry.

Your obedient servant,

THOS. YOUNG,

Forest Ranger.

APPENDIX No. 10.

REPORT OF C. A. WALKINSHAW, FOREST FIRE RANGER FOR THE TURTLE MOUNTAIN TIMBER RESERVE.

Boissevain, June 31, 1905.

E. Stewart, Esq.,
Superintendent of Forestry,
Ottawa.

Sir,—I beg to submit to you my report on the Turtle Mountain timber reserve, for the past year.

This has been the best year since the reserve was formed, not only for the splendid growth of the young trees all over the reserve, but for the scarcity of fires inside the reserve. In some parts of the reserve which a few years ago were almost bare, a dense forest of young trees is now found, from 10 to 15 feet in height. I am sure from six to eight years from the present we will have a splendid forest, but it will have to be diligently patrolled, and every precaution taken against fire. Should fire get into the reserve this fall or next spring, with the tremendous growth of vegetation this year, it would pretty nearly clean off the reserve.

I am happy to say that the farmers and others in this district are beginning to take a keen interest in the preservation of the reserve. In my opinion the department should do something towards making at least two good trails through the reserve, running north and south, so that in cases of fire the rangers could bring in help with the least possible delay. Any of the trails at present are almost impassable. I hope that you will give this suggestion your consideration. I assure you I will do everything in my power to keep our fine young forest free from fire.

Your obedient servant,

C. A. WALKINSHAW.

APPENDIX No. 11.

REPORT OF JOS. E. STAUFFER, FOREST RANGER.

DIDSBURY, ALBERTA, August 18, 1905.

E. STEWART, Esq.,
Superintendent of Forestry,
Ottawa.

SIR,—I beg to submit a report on forest fire ranging in Alberta south of the North Saskatchewan river, for the year 1905.

I am pleased to state that we have had no fires this year that did any serious damage to standing timber. The fires that did occur were small and confined to small areas. According to the monthly reports of the rangers, these small fires were in most cases attributed to settlers clearing land. Violaters of the Fire Ordinance, where sufficient evidence could be obtained, were prosecuted.

The fire rangers under my supervision have been very energetic in their work of preventing fires, and considering they are all new at the work, they have been quite efficient.

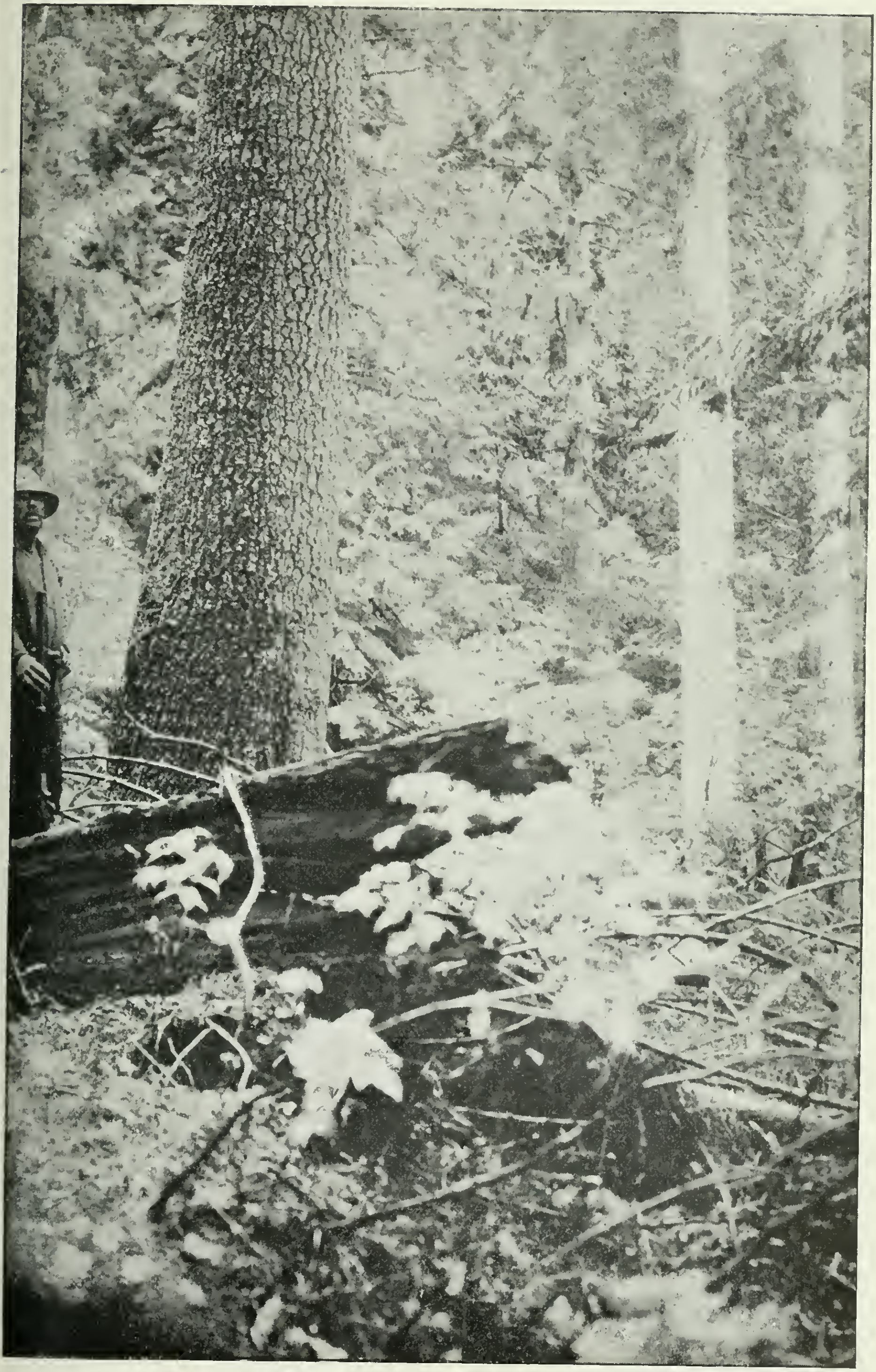
Your obedient servant,

JOSEPH E. STAUFFER.

Scotch Pine, planted about 100 years ago, at entrance to Duke of Athol's grounds at Blair Athol, Perthshire, Scotland.

Mixed Stand of Silver Fir and Oak, 40 to 60 years old, near Sulzburg, in Baden, Germany. Thinned out six years ago. In four years more a further and final thinning will be made.

25—x—4½



In the Forest on the Columbia River above Revelstoke, B.C. Showing a good specimen of a Western White Pine in the foreground.

Plantation set out under Co-operative scheme, on farm of George Harvey, Indian Head, in Spring, 1902. Photo. taken August, 1905. Cottonwood, Willow and Maple.

Plantation set out under Co-operative scheme on farm of Alf. Wilson, Indian Head, in spring, 1901. Photo. August, 1905. Cottonwood and Maple.

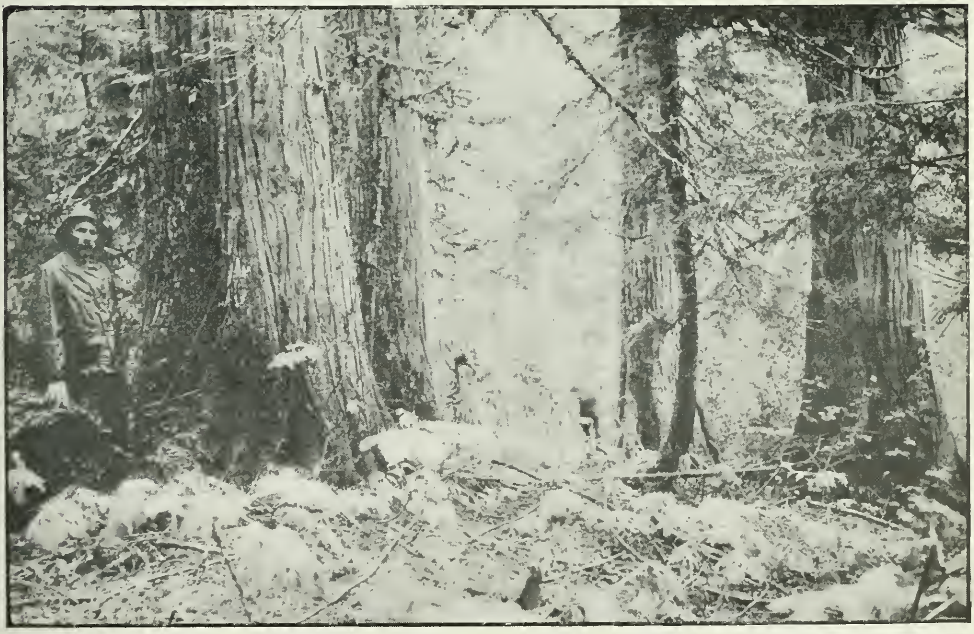
Photo. taken in June, 1905. In foreground Conifer seed beds. Shows lay out of grounds and house. Twelve months previous this was unbroken prairie.

Field of Ash Seedlings during second season's growth. Photo. July, 1905.
Nursery Station, Indian Head.

Part of Ornamental Grounds at New Nursery Station, at Indian Head, Sask. Photo. taken August 1st, 1905. In Spring of 1904 this was unbroken prairie.

Forest Nursery on estate of His Grace The Duke of Athol, near Blair Athol, in Perthshire, Scotland. In foreground are seedling trees of Larch, Scotch Pine, Oak and Elm. In background are three of the first Larch planted in Scotland by the Second Duke of Athol in 1738.

On Fish River, B.C., showing Cedar Logs and Donkey Engine used in drawing logs and water.



Cedar Trees on the Columbia River above Revelstoke, B.C.

In the Lumber Woods at Fish River, B.C., showing Donkey Engine used in drawing out Logs.

DEPARTMENT OF THE INTERIOR

REPORT

OF THE

SURVEYOR GENERAL

OF

DOMINION LANDS

FOR THE

YEAR ENDING JUNE 30

1905

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST
EXCELLENT MAJESTY
1906

DEPARTMENT OF THE INTERIOR,
TOPOGRAPHICAL SURVEYS BRANCH,
OTTAWA, October 23, 1905.

W. W. CORY, Esq.,
Deputy of the Minister of the Interior.
Ottawa.

SIR,—I have the honour to submit the following report upon the operations of the Topographical Surveys Branch for the twelve months ending June 30, 1905.

SURVEYS OF 1904.

During the calendar year of 1904, eighty-two survey parties were employed. Of these, eighty were engaged on township surveys and two on other surveys. Fifty-seven of the parties were working under contract and twenty-five were paid by the day. Forty-four of the parties working under contract were making surveys in the North-west Territories, five were in Manitoba and eight were employed partly in Manitoba and partly in the North-west Territories. The parties paid by the day were distributed as follows :—

DISTRIBUTION OF PARTIES UNDER DAILY PAY, 1904.

1. C. F. Aylsworth.—Saskatchewan and miscellaneous surveys in Central Manitoba.
2. P. R. A. Belanger.—Restoration surveys in Assiniboia, north of Qu'Appelle.
3. L. T. Bray.—Resurveys in southern Manitoba.
4. E. J. Boswell.—Resurvey of townsite of Whitemouth, Man.
5. E. Bray.—Outlines north-west of Edmonton.
6. L. C. Charlesworth.—Subdivision of Hamlet Plots, Willow Bunch.
7. J. D. Craig.—Inspector of surveys, eastern section.
8. J. J. Dalton.—Miscellaneous subdivision surveys in southern Alberta.
9. L. E. Fontaine.—Outlines in northern Alberta.
10. E. W. Hubbell.—Renewal surveys south-east of Edmonton.
11. A. W. Johnson.—Subdivision near Harrison lake, B.C.
12. J. A. Kirk.—Subdivision near Revelstoke, B.C.
13. G. J. Lonergan.—Renewal surveys in Edmonton district.
14. J. K. McLean.—Outlines north of Edmonton.
15. T. S. Nash.—Inspector of surveys, eastern Alberta and Onion Lake district.
16. E. H. Phillips.—Inspector of surveys, south of Battleford.
17. J. E. Ross.—Subdivision near Kamloops, B.C.
18. W. R. Reilly.—Subdivision near Athabaska Landing.
19. H. W. Selby.—Outlines in Peace River district.
20. A. Saint Cyr.—Outlines in Peace River district.
21. G. H. Watt.—Inspector of surveys, Edmonton and Calgary district.
23. J. N. Wallace.—Outlines in Peace River district.
23. A. O. Wheeler.—Topographical survey in Rocky Mountains.
24. J. A. Belleau.—Exploration in Peace River district in British Columbia.
25. M. B. Weekes.—Base line in Manitoba and North-west Territories.

During the year four hundred and eighty-four whole townships and forty-nine fractional townships were completely subdivided while a partial subdivision was made of thirty-nine other townships ; one hundred and twenty-one townships were completely resurveyed and a partial resurvey was made of twenty-one others.

G. H. Watt, D.L.S., J. D. Craig, D.L.S., E. H. Phillips, D.L.S., and T. S. Nash, D.L.S., of the office staff, acted during the season as inspectors of surveys made under contract. Each had a party under his charge to assist him in the work. Fifty-three contracts in all were inspected, six being contracts for surveys in 1903 and forty-seven contracts for surveys during 1904.

The following statement for the years 1902, 1903 and 1904 gives a comparison of the work of the parties engaged on township surveys during the different years :—

——	1904.	1903.	1902.
	Miles.	Miles.	Miles.
Township outlines	1,285	833	1,919
Section lines	24,488	25,982	5,867
Traverse	4,441	4,050	1,282
Re-survey	7,699	5,390	3,269
Total for season	37,913	36,255	12,337
Number of parties	80	65	37
Average miles per party	474	558	333

The decrease in the average number of miles per party from five hundred and fifty-eight (558) in 1903, to four hundred and seventy (470) in 1904, is due mostly to the fact that in 1903 the parties were working almost entirely in bare prairie but in 1904, many of the parties were at work in heavily wooded country. As stated in my last report the low average in 1902 was due to the rains, floods and high water that prevailed that year.

A comparison of the work of surveyors under daily pay and of surveyors under contract for the same three years is given in the following statement :—

Work of P. R. A. Belanger (paid by the day).

——	1904.	1903.	1902.
	Miles.	Miles.	Miles.
Re-surveys	2,768	3,100	2,878
Section lines	......	28	......
Traverse	......	6	......

Work of parties under daily pay.

——	1904.	1903.	1902.
	Miles.	Miles.	Miles.
Township outlines	719	632	1,214
Section lines	235	478	1,188
Traverse	223	236	489
Re-survey	2,122	497	374
Total for the season	3,299	1,843	3,265
Number of parties	22	12	17
Average miles per party	150	154	192

Work of parties under contract.

——	1904.	1903.	1902.
	Miles.	Miles.	Miles.
Township outlines	566	201	705
Section lines	24,253	25,476	4,679
Traverse	4,218	3,808	793
Re-survey	2,809	1,793	17
Total for the season	31,846	31,278	6,194
Number of parties	57	52	19
Average miles per party	559	601	326

SURVEYS OF 1905.

The season of 1905 has so far proved a most favourable one for survey operations. Prior to the first of July forty parties were at work, thirty-five being engaged on township surveys and two on other surveys. Twenty-four parties were paid by the day and sixteen were working under contract. Fifteen of the survey contractors were working in the North-west Territories and one in Manitoba. The parties paid by the day were distributed as follows :—

1. C. F. Aylsworth.—Resurvey in northeastern Assiniboia.
2. D. Beatty.—Resurvey northwest of Lake Manito.
3. T. R. A. Belanger.—Superintendent of surveys.
4. J. A. Belleau.—Exploration in Peace River district in British Columbia.
5. L. T. Bray.—Resurvey in southern Manitoba.
6. R. W. Cautley.—Survey of the sixteenth base line west of fifth meridian.
7. A. Driscoll.—Survey of part of seventeenth base line west of fifth meridian.
8. C. C. Fairchild.—Subdivision west of Calgary.
9. L. E. Fontaine.—Subdivision west of Edmonton.
10. G. A. Grover.—Resurvey east of Lake Manitoba.
11. E. W. Hubbell.—Resurvey in central Assiniboia.
12. A. W. Johnston.—Survey of south limit of railway belt west from Nicola river in British Columbia.
13. G. J. Lonergan.—Resurvey in central Alberta.
14. W. G. McFarlane.—Inspector of surveys western district.
15. C. F. Miles.—Resurvey and subdivision in southern Alberta.
16. T. S. Nash.—Inspector of surveys eastern district.
17. Geo. Ross.—Resurvey and subdivision northwest of Last Mountain Lake.
18. J. E. Ross.—South limit of railway belt westerly from Columbia river.
19. B. J. Saunders.—Survey of part of fifteenth base line west of fifth meridian.
20. H. W. Selby.—Outlines in Peace River district and Shaftsbury settlement.
21. A. Saint Cyr.—Outlines in Peace River district.
22. J. N. Wallace.—Outlines in Peace River district.
23. Jas. Warren.—Resurveys in Willow Bunch district.
24. A. O. Wheeler.—Topographical survey in Rocky Mountains.

Three of these parties were surveying base lines and block outlines in the Peace River district and three other parties were engaged on similar work between the fifth and sixth meridians.

Base lines and block outlines are the governing lines in the system of survey of Dominion lands, and are marked on the ground first in order that subdivision surveys may be based thereon in the future as the progress of settlement may demand.

Mr. J. A. Macdonell is in charge of a party on an exploration survey to select and locate three million five hundred thousand acres of land in the Peace River district, in British Columbia, granted to the Dominion by an Act of the legislature of that province in 1883, as a compensation for the lands in the railway belt which had been alienated prior to the transfer of the belt to the Dominion. The section of the Act under which the grant is made is as follows :—

'There is hereby granted to the Dominion government three and a half millions of acres of land in that portion of the Peace River district of British Columbia lying east of the Rocky Mountains and adjoining the North-west Territory of Canada, to be located by the Dominion in one rectangular block.'

Mr. J. A. Belleau, D.L.S., is employed as assistant on Mr. Macdonell's party to survey the boundaries of the block after it has been selected by Mr. Macdonell, to locate points, and otherwise to assist in expediting the inspection where technical knowledge is required.

The names of the surveyors employed in 1904-5, and a description of the work done by each, are given in Appendices Nos. 1 and 2.

Reports of the surveyors under daily pay upon their operations in 1904 and 1905, are inserted as Appendices Nos. 11 to 27, inclusive.

DESCRIPTION OF TOWNSHIPS.

Descriptions of the townships subdivided have been compiled from the surveyors' reports received during the twelve months ending June 30, 1905 ; they are given as Appendix No. 29. For convenience of reference the descriptions have been classified by townships and ranges.

ALLOWANCES TO SURVEYORS UNDER DAILY PAY.

Under the clauses of the Order in Council fixing surveyor's allowances, the surveyor in charge of a party had an allowance of one dollar per day for himself and sixty cents per day for every other member of his party, which allowance was to cover not only rations, but board and hotel expenses, meals on trains and rent of camp equipage. By Orders in Council of April 24, 1897, and May 16, 1899, the board and camp allowances for an assistant were made the same as for the surveyor in charge.

These allowances were sufficient twenty years ago but owing to the general increase in prices and especially in the prices of food supplies they had become inadequate for the present time.

A new schedule of allowances was prepared and approved by Order in Council of April 11, 1905. By this schedule the surveyor's allowances for himself amount to one dollar and thirty-five cents per day ,for his assistant to ninety cents per day, and for each other member of his party to sixty-five cents per day in addition to a lump sum of one dollar for the whole party. The following is a copy of the Order in Council :—

'On a memorandum, dated March 21, 1905, from the Acting Minister of the Interior, stating that allowances for rations, board and camp equipage are granted to the surveyor in charge of a survey party by Order in Council of October 26, 1894, the clauses relating to the said allowances being as follows :—

'9. The surveyor shall be allowed for himself and every man of his party a ration allowance of fifty cents per diem while in the field.

'11. For meals, board and hotel expenses of himself and party while in the field, the surveyor shall be allowed, in addition to the ration allowance, a sum of twenty-eight cents per diem for himself and four cents per diem for every other member of the party.

'12. Camp equipage shall be owned and furnished by the surveyor. For its use he shall be allowed while in the field twenty-two cents per day for himself, and six cents per day for every other member of the party.

'The Minister further states that, by Orders in Council of April 24, 1897, and May 16, 1899, the board and camp equipages allowances for the assistant are made the same as for the surveyor in charge, when the assistant is a Dominion or Provincial Land Surveyor.

'The Minister further states that it has been represented on behalf of the surveyors that owing to the general increase in prices during recent years, specially in the prices of food supplies, the allowances have become inadequate and are no longer sufficient to feed and equip properly the men of a survey party. It is also pointed out that the surveyor in charge of a small party is at a greater disadvantage, the cost per man for food and equipment being higher than for a large party.

'The Minister recommends in order that surveyors may be able to meet their expenses and that small parties may be placed on a more favourable footing, that clauses 9, 11 and 12 of the Order in Council of October 26, 1894, and the Orders in Council of April 24, 1897, and May 16, 1899, be cancelled and the following clauses substituted :—

'1. The surveyor in charge of a survey party shall be allowed a special ration allowance of one dollar per day for the party, such allowance to be paid as long as the surveyor remains in the field. He shall further be allowed an ordinary ration allowance of fifty-five cents per day for himself and every member of his party while in the field.

'2. For meals, board and hotel expenses of himself and party the surveyor shall be allowed, in addition to the ration allowance, a sum of forty cents per day for himself and four cents per day for every other member of his party while in the field.

'3. Camp equipage shall be owned and furnished by the surveyor. For its use he shall be allowed while in the field forty cents per day for himself and six cents per day for every other member of the party.

'4. When an assistant is regularly appointed as such by the Minister of the Interior the board and camp equipage allowances for him shall be twenty-five cents and ten cents per day respectively.

'The Committee submit the same for approval.

(Signed) 'JOHN J. McGEE,
'Clerk of the Privy Council.'

RATES FOR SUBDIVISION SURVEYS.

In the schedule of rates for the subdivision of townships as set forth in the Orders in Council of February 3, 1903, and February 19, 1904, the following two clauses occur, viz.:—

1st. Section lines shall be paid for at the rate of five dollars per mile of line surveyed.

15th. A payment at such rate as the Surveyor General may allow but not exceeding fifteen dollars per township may be made for the determination of the astronomical direction of the lines of the survey.

It was found that a number of contractors would not take the trouble of ascertaining the directions of the lines ; some of them did not even pretend to do so and made no astronomical observations. As correct plans of the surveys could not be made without knowing the directions of the surveyed lines, it was necessary that steps should be taken to compel surveyors to furnish these directions. Accordingly an Order in Council was passed on April 11, 1905, reducing the rate of pay for the survey of section lines from five dollars to three dollars and fifty cents per mile, and increasing the rate for the determination of the astronomical direction of the lines from fifteen dollars per township to two dollars per mile.

This amendment to the rates causes little or no change in the total cost of the survey of a township, but under it the remuneration of a surveyor whose work is not properly done may be reduced one hundred dollars per township instead of fifteen dollars per township, as under the old regulations.

The following is a copy of the Order in Council :—

'On a report dated March 28, 1905, from the Acting Minister of the Interior, stating that in pursuance of the provisions of sub-clause 1 of clause 19 of "The Dominion Lands Act," Chapter 54 of the Revised Statutes, a schedule of rates for the payment of township subdivision surveys executed under contract, was fixed by Orders in Council of February 3, 1903, and February 19, 1904.

'The Minister recommends that the first and fifteenth clauses of the said schedule be cancelled and the following substituted therefor :—

'1. Section lines shall be paid for at the rate of three dollars and fifty cents per mile of line surveyed.

'15. A payment at such rate as the Surveyor General may allow, but not exceeding two dollars per mile of township outline or section line surveyed. may be made for the determination of the astronomical direction of the lines of the survey.

'The Committee submit the same for approval.'

MANUAL OF SURVEYS.

As stated in last year's report, it was found that, owing to the many important changes in methods, a few details had been overlooked in the edition of the Manual of Instructions for the guidance of Dominion Land Surveyors issued in 1903. A small booklet of amendments was issued in 1904, but the edition of 1903 being exhausted, it became necessary to prepare a revision. Amendments were introduced wherever needed and other improvements made. The manuscript is now in the hands of the printer and it is expected to be ready for distribution to surveyors in a short time.

The issue of the astronomical field tables described in last year's report has been continued. These tables are greatly appreciated by surveyors whose work is thereby much facilitated. They have contributed in a large measure to the remarkable increase in the accuracy of our surveys during the last two years.

OFFICE WORK.

Several changes have taken place during the year in the office staff. L. P. Kennedy, third-class clerk in the Metcalfe street office, died. Miss. M. F. Percival has been appointed stenographer and typewriter. Messrs. J. D. Craig, D.L.S., T. S. Nash, D.L.S., E. H. Phillips, D.L.S., and G. H. Watt, D.L.S., were absent temporarily in charge of parties in the field inspecting surveys made under contract. The following were also absent temporarily, acting as assistants to surveyors in the field :—H. G. Barber, P. A. Carson, T. H. G. Clunn, J. C. Baker, E. L. Burgess, F. G. D. Durnford, John Empey, W. T. Green, F. D. Henderson, F. H. Mackie, J. E. Morrier, G. McMillan, A. G. Stacey, C. C. Smith, H. L. Seymour and J. E. Umbach. Messrs. J. C. Baker, J. N. Goodall, H. G. Jackson, K. R. McLennan, D. F. Robertson, C. A. Rooney, J. H. Smith, J. V. Dillabough, O. Higman, jr., E. E. Malone, D. H. Philp, G. S. Roxburgh, I J. Steele, and R. Jones left the office. The additions to the staff of draughtsmen during the year were:—M. B. Weekes, D.L.S.; A. L. Cummings, B.Sc.; W. L. McIlquham, B.Sc.; H. L. Chilver, J. N. Goodall, R. W. Morley and J. H. Smith, graduates of the school of Practical Science ; Walter Bergin, transferred from the lithographic office ; A. W. Ashton, A. A. Bailie, A. S. Cram, M. F. Cochrane, J. E. Featherston, H. V. Finnie, J. E. Morrier, W. J. Moule, J. M. Mudie, W. D. McLennan, H. A. Mackenzie, F. W. Rice, C. H. Taggart, and W. E. Weld. Messrs. H. M. Blatchly and S. Chandler were added to the staff of the geographer. Messrs. H. Fitzsimons and F. A. Moore were transferred to the railway and swamp lands branch. Messrs. J. D. Craig, D.L.S.; J. D. McLennan, S. S. McDiarmid, D.L.S., and W. F. Ratz, D.L.S., were transferred to the office of the boundary commissioner. Messrs. E. Lecourt and A. W. Ashton were transferred to the survey records office, and J. E. Featherston to the correspondence branch. W. McL. Mainguy, of the Metcalfe street office, died on August 26, 1904. He was first appointed to the staff on January 21, 1880.

CORRESPONDENCE AND ACCOUNTS.

The correspondence consisted of :—

Letters received.	9,845
Letters sent.	10,030

The accountant's records show :—

Number of accounts dealt with.	832
Amount.	$789,752.93
Cheques forwarded.	2,277

The staff consists of one correspondence clerk, one accountant, two stenographers and typewriters and two messengers.

OFFICE OF THE CHIEF DRAUGHTSMAN.

Appendix No. 7 is a schedule of the work executed in the chief draughtsman's office. His report is as follows :—

The volume of work done by this office during the past year is about the same as last year, perhaps a little greater. The number of townships surveyed this season will not to be so great as the number surveyed last season but the office work involved will be about the same. The work in preparing the instructions for the surveyors was greater than last year ; this was caused by the fact that this year a large proportion of the surveys to be made are re-surveys, surveys in partially surveyed townships, and surveys made to correct or alter former surveys. To prepare full instuctions for this miscellaneous work a great many field books, plans, sketches and considerable correspondence had to be collected and investigated. Although the number of parties in the field this year, forty-one, is about half of the number employed last year, Appendix No. 7 will show that twice as many field books and plans were received from the record office this year as last year, which shows how much greater was the work involved in the preparation of the instructions. Appendix No. 7, except in the instance mentioned above, when compared with last year's report, shows that the office work of the two years is almost similar.

Great difficulty is still experienced from the continual changes in the staff. In this office, where most of the draughtsmen are engaged in compiling plans from new and old surveys, examining plans of miscellaneous surveys and replying to questions of procedure regarding surveys extending over a period of thirty-five years, during which time the methods and system of survey have undergone considerable change, a clerk to be generally serviceable must have spent a year or two in the office in acquainting himself with the methods employed.

A slight change was made during the past year in the issue of sectional maps, both as regards the scale of the maps and the indexing and numbering of them.

Sectional maps are plotted in this office from the field notes of surveys and other information, on a scale of two miles to one inch. In printing these are reduced to a scale of three miles to one inch and the plans are issued on that scale. It was found, however, that for many purposes for which they are required, the maps are too large and inconvenient. Now, a smaller edition on a scale of six miles to one inch is also issued. This has been done for all the sectional maps completed to date, of which there are sixty-four, and has been found very satisfactory. The small sectional maps are now generally asked for.

The following sectional maps have been revised and reprinted :—

Swift Current	Vermilion	Carlton
Red Deer	Seymour	Battleford
Ribstone Creek	Donald	Kamloops.
Rocky Mountain House		

Up till this spring the numbering of the sectional maps was that adopted when the maps were first issued. Surveys in the Peace River district which are now being made necessitated the production of maps of this part of the territories and as no provision for numbering such was made in the old system of numbering, a new scheme was devised as given below. The advantages are, first, the numbering is uniform covering all Dominion lands, extending from the Pacific ocean to the Atlantic ocean and from the forty-ninth parallel of latitude to the Arctic ocean. A sectional map covers in latitude eight townships and in longitude, the number of ranges most nearly approximating two degrees. As the number of ranges in two degrees of longitude decreases by the convergence of the meridians, each group of four maps in a tier extending north is reduced by one range ; thus the first four north of the forty-ninth parallel are fifteen ranges in width, the second four are fourteen, the third four are thirteen and so on. In some cases the new maps do not cover exactly the same territory as the former ones but care is taken in issuing them to have no part of the country at any time which is not included in some map. The sheets may be asked for by their names or numbers.

In issuing section maps of the railway belt in British Columbia it has been the practice to show on the map only that part of the territory which lies within the railway belt ; but now the topography of the country is given as nearly correct as possible for all of the territory comprised within the limits of the sheet whether the same is inside the railway belt or not.

An improvement has also been made in the method of draughting township plans for printing. As stated in the annual report of the Surveyor General last year a rough plan of the township or settlement as the case may be, is made upon the examination of the returns sent in by the surveyor by compiling his returns with the notes of former surveys in the same township, and from this rough plan a copy on the same scale is drawn for photozincography. Up till recently the draughting of these plans was all done with pen and ink. A number of draughtsmen were employed continuously at this work and the difference between the styles of work of the different men was very noticeable on the finished plans. As the number of plans increased additions to the staff of draughtsmen were necessary and men who had a limited amount of experience in the work had to be employed. It was not to be expected that the draughting of the new men would compare favourably with that of men who had considerable experience. To overcome these two difficulties and at the same time to increase the number of plans issued, several type-stamping sets were procured. These are the same as those used in the Ordnance Office, Southampton, England, and have given good satisfaction. By means of these type stamps, the distances, areas, bearings and corner monuments are stamped on the plans, leaving a proportionally small amount of pen and ink work to be done. This insures more uniform plans and besides gives them a much neater appearance. The most important advantage perhaps is that the time for drawing a plan has been reduced one-eighth, a saving in time which when applied to the number of plans issued in a year is quite appreciable. It is thought that with several proposed improvements in the stamps the draughting of the plans will be still further facilitated.

At the end of June the office staff consisted of the chief draughtsman and fifty-four draughtsmen. In addition to the above mentioned staff of fifty-four at the end of June seven of the draughtsmen were engaged in survey work in the field, one acting as inspector of surveys and the others as assistants to surveyors working under daily pay. It is expected that these will return to the office when the season's operations have been closed, and they will take up their places on the office staff. The clerks who have spent some time at actual work in the field are more valuable to the office than those who have not, as they have a working knowledge of surveying operations and can understand the conditions under which a survey is made, the degree of accuracy to be expected, and many other details not to be learned elsewhere.

As last year the staff was divided, the greater part of the staff being in the building on the corner of Slater and Metcalfe streets, and the other part in the Orme block on Sparks street ; this division is not very economical as regards time, which is wasted in the transfer of business between the two offices. The work done in the Orme building is connected principally with the compilation and preparation of sectional maps and maps in connection with Yukon surveys, and all the office work resulting from surveys in the railway belt of British Columbia. The work done in the building on Slater and Metcalfe streets is divided among three principal divisions. In one division, instructions for surveys are prepared and all returns of surveys are entered and kept in a set of books for that purpose, requests for information with regard to surveys, plans, etc., are answered, preliminary plans are prepared and issued, descriptions of parcels of land for patent are prepared, the astronomical field tables for the use of surveyors in the field are calculated and issued and the manual, annual report and various pamphlets and papers are compiled, edited and proofread. In another division the returns of surveys are examined and the plans are plotted, the amount of advance to be made to survey contractors on account of contract is determined, and the contractors' field notes are checked with the inspectors' notes and reports made, upon which the amount of deductions for careless or incompetent work is based. The returns examined include returns of survey of townships, settlements, group lots, mineral claims, townsites, trails, &c. A great difference is noted in the condition and accuracy of returns made by some surveyors as compared with those made by others. Some field notes are very concise, clear and carefully made whereas others which may appear to be neatly made are inaccurate and inconsistent. Carefully made returns are quickly plotted and little delay is experienced in publishing the plans, but carelessness in making some returns is the cause of considerable amount of correspondence with the surveyor, before the notes are complete enough to allow of the survey being approved, and the plan issued. This correspondence and the delay involved by it is the chief difficulty in the way of issuing the plans promptly. Some plans such as that of a settlement require much longer to plot than the ordinary township plans. The accounts for contract work are also examined and made up in this division. In the third division all the stamping and draughting of the finished plans is done in the manner outlined above. This includes also the proofreading of the plans when they are printed.—The plans drawn are plans of townships, group lots, settlements, townsites, &c.

PHOTOGRAPHIC OFFICE.

A schedule of the work executed in the photographic office is given as Appendix No 9 : the total number of negatives and prints is 4,746, against 5,356 last year. A comparison of the statements shows 921 wet plate negatives and 675 zinc transfers against 847 and 467 respectively last year ; the decrease is in vandyke and silver prints.

The greater part of the work of the photographic office consists in reducing plans to proper scale for plotting, photographing plans and maps for reproduction and enlarging the views of photographic surveys.

The staff consists of one photographer in charge, one photo-lithographer and photo-engraver, three photographers and two assistants.

LITHOGRAPHIC OFFICE.

All township plans are now printed by photo-zincography. Zinc is also employed for other work whenever it is possible to do so : it is very convenient and economical and the quality of the work is excellent. Stones are, however, still in use for large work and for fine printing.

The statement of the work executed, given as Appendix No. 10 to this report, shows 129 maps printed against 81 last year and 524 township plans against 490 last year.

The staff consists of one foreman, one transferer, one power press printer, one apprentice, one stone polisher and one autographer.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

The regular meeting of the board was held at the usual time, commencing on the second Monday in February, and special meetings were also held from January 23 to 25, from March 6 to 10, on April 20, from May 4 to 13 and on June 30.

During the regular meeting in February, examinations were conducted in Ottawa, Toronto, Winnipeg, Calgary and Vancouver, and a special examination was also held in Toronto from May 4 to 10. Those in Toronto were held at the School of Practical Science under the direction of Prof. L. B. Stewart, while the examinations in Winnipeg, Calgary and Vancouver were conducted respectively by Messrs. J. L. Doupe, A. O. Wheeler and E. B. Hermon.

The increase in the number of candidates noticed last year is still maintained: Forty-two candidates passed the examination required previous to being articled as pupil to a surveyor, and twenty passed the final examination for commission as Dominion land surveyor.

The following candidates were successful in passing the examinations :—

Preliminary Examination for Admission as Articled Pupil.

A. Laporte, Montreal, Que.
L. Brenot, Ottawa, Ont.
H. M. R. Soars, Edmonton, Alta.
A. S. Stewart, Red Deer, Alta.
E. E. D. Wilson, Ottawa, Ont.
A. J. Elder, Barrie, Ont.
J. J. Robertson, Kingston, Ont.
B. B. Patten, St. George, Ont.
J. R. Cockburn, Toronto, Ont.
W. P. Near, Toronto, Ont.
M. R. Riddell, Toronto, Ont.
J. B. McFarlane, Claremont, Ont.
L. Malcolm, Stratford, Ont.
A. Latornell, Meaford, Ont.
H. L. Wagner, Toronto, Ont.
L. D. N. Stewart, Collingwood, Ont.
P. A. Shaver, Grantley, Ont.
J. B. Challies, Winchester, Ont.
E. F. Pullen, Oakville, Ont.
R. W. Morley, Ottawa, Ont.
H. S. Southworth, Toronto, Ont.
P. M. Sauder, Regina, Assa.
E. Rochon, Clarence Creek, Ont.
F. H. Kitto, Edmonton, Alta.
G. B. Dodge, Ottawa, Ont.
F. N. Rutherford, Toronto, Ont.
W. A. Johnston, Athens, Ont.
G. T. Clark, Toronto, Ont.
O. Hall, Frank, Alta.
E. W. Walker, N. Cayuga, Ont.
T. F. Code, Smith's Falls, Ont.
J. A. McFarlane, Toronto, Ont.
E. M. Dennis, Ottawa, Ont.
W. G. Swan, Kincardine, Ont.
C. A. Chilver, Walkerville, Ont.
E. A. Henry, Kincardine, Ont.
W. H. Young, Clifford, Ont.
F. H. Sykes, Toronto, Ont.
W. E. Weld, London, Ont.
W. A. Begg, West Flamboro, Ont.
S. Chandler, Ottawa, Ont.
F. A. McDiarmid, Ottawa, Ont.

Final Examination for Commission as D.L.S.

E. L. Burgess, Ottawa, Ont.
C. Engler, Ottawa, Ont.
A. L. McNaughton, Cornwall, Ont.
R. H. Cautley, Edmonton, Alta.
F. S. Clements, P.L.S., Nelson, B.C.
W. W. Meadows, O.L.S., Windsor, Ont.

W. F. Ratz, Ottawa, Ont.
J. L. R. Parsons, Toronto, Ont.
J. M. Empey, Thamesford, Ont.
A. L. MacLennan, Toronto, Ont.
S. S. McDiarmid, Woodstock, Ont.
R. H. Montgomery, Brantford, Ont.
N. J. Ogilvie, Ottawa, Ont.
M. P. Bridgland, Calgary, Alta.
W. G. McFarlane, Toronto, Ont.
W. J. Blair, O.L.S., New Liskeard, Ont.
A. H. Green, P.L.S., Nelson, B.C.
J. H. Smith, O.L.S., Ottawa, Ont.
W. B. Young, P.L.S., Winnipeg, Man.
E.W.M. Lysons, P.L.S., Greenwood, B.C.

Twenty-one candidates who had passed the final examination furnished the bonds required by clause 115 of the Dominion Lands Act and received their commissions as Dominion land surveyors.

Seven subsidiary standards of length were issued to surveyors during the year, in accordance with clause 125 of the Dominion Lands Act.

The correspondence of the board amounted to :—

Letters received	732
Letters sent	781

A list of the surveyors who have been furnished with standard measures to June 30, 1905, is given in Appendix No. 4, and examination papers used during the past year are submitted as Appendix No. 28.

APPENDICES.

The following documents are appended:—

No. 1.—Schedule of Dominion land surveyors employed, and work executed by them, from July 1, 1904, to December 31, 1904.

No. 2.—Schedule of Dominion land surveyors employed, and work executed by them, from January 1, 1905, to June 30, 1905.

No. 3.—Schedule showing for each surveyor employed on township surveys during 1904, the number of miles surveyed of township subdivision lines, township outlines, traverses of lakes and rivers, and resurvey, also cost of the same.

No. 4.—List of Dominion land surveyors who have been supplied with standard measures.

No. 5.—List of lots in the Yukon Territory of which surveys have been confirmed during the year ending June 30, 1905.

No. 6.—List of miscellaneous surveys in the Yukon Territory of which returns have been received during the year ending June 30, 1905.

No. 7.—Statement of work executed in the office of the chief draughtsman.

No. 8.—Statement of work performed in the survey records office for the twelve months ending June 30, 1905.

No. 9.—Statement of work executed in the photographic office during the twelve months ending June 30, 1905.

No. 10.—Statement of work executed in the lithographic office during the twelve months ending June 30, 1905.

No. 11.—Report of C. F. Aylsworth, D.L.S.

No. 11a.—Report of C. F. Aylsworth, D.L.S.

No. 12.—Report of P. R. A. Belanger, D.L.S.

No. 13.—Report of Edgar Bray, D.L.S.

No. 14.—Report of J. D. Craig, D.L.S.

No. 15.—Report of J. J. Dalton, D.T.S.

No. 16.—Report of L. E. Fontaine, D.L.S.

No. 17.—Report of E. W. Hubbell, D.L.S.

No. 18.—Report of A. W. Johnson, D.L.S.

No. 19.—Report of G. J. Lonergan, D.L.S.

No. 20.—Report of J. K. McLean, D.L.S.

No. 21.—Report of E. H. Phillips, D.L.S.

No. 22.—Report of W. R. Reilly, D.L.S.

No. 23.—Report of J. E. Ross, D.L.S.

No. 24.—Report of Arthur Saint Cyr, D.L.S.

No. 25.—Report of H. W. Selby, D.L.S.

No. 26.—Report of J. N. Wallace, D.L.S.

No. 27.—Report of G. H. Watt, D.L.S.

No. 28.—Examination papers of the board of examiners for Dominion land surveyors.

No. 29.—Descriptions of surveyed townships submitted by Dominion land surveyors during the year ending June 30, 1905.

I have the honour to be, sir,
Your obedient servant,

E. DEVILLE,
Surveyor General.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1, to December 31, 1904.

Surveyor.	Address.	Description of Work.
Abrey, G. B.	Toronto, Jct., Ontario.	Contract No. 4 of 1903. Subdivision of township 43, range 20, west of the second meridian. Contract No. 10 of 1904. Subdivision of townships 42, 47 and 48, range 15 ; townships 47 and 48, range 16 ; townships 40, 42 and 43, range 17 and townships 49, ranges 18 and 19, all west of the second meridian.
Aylen, John	Aylmer, Que.	Contract No. 52 of 1904. Subdivision of townships 29 and 30, range 5 ; part of township 28, range 5 ; townships 27, 28 and 29, range 6, and survey of north outline of township 28, range 4, all west of the fifth meridian.
Aylsworth, C. F.	Madoc, Ont.	Re-survey of north and part of east and west outlines of township 21, range 6, west of the principal meridian and south outline of township 11, range 7, east of the principal meridian. Survey of group of settlements on Bad Throat river, Man., and re-survey of Rivertown in sections 20 and 21, township 23, range 4, east of the principal meridian.
Beatty, David	Parry Sound, Ont.	Contract No. 23 of 1904. Subdivision of townships 50, ranges 26 and 27 ; township 51, range 27 and part of township 50, range 28, west of the second meridian ; part of townships 48, ranges 8 and 9; townships 27 to 34, ranges 24 and 25 ; townships 28, 29 and 30, ranges 26 and 27 ; townships 27, 28, 29 and 30, range 28, and part of townships 27 and 28, range 29, west of the third meridian ; townships 27 to 32, range 1, west of the fourth meridian ; survey of outlines in townships 51 and 52, range 26 and township 52, range 27, west of the second meridian and in townships 51 and 52, range 2, west of the third meridian.
Beatty, Walter	Delta, Ont.	Contract No. 24 of 1904. Subdivision of townships 31 and 32, ranges 26, 27 and 28, part of township 29, range 29 ; and townships 30, 31 and 32, range 29, all west of the third meridian.
Belanger, P. R. A.	Ottawa, Ont.	Renewal of corner marks in township 28, ranges 7 and 8, township 32, range 12 ; townships 27 and 27A, range 13 ; township 27A, range 13A ; townships 27 and 27A, range 14 ; townships 23, 24 and 32, range 16 ; townships 23, 24, 25, 26, 27, 28, 30, 31 and 32, range 17 ; townships 23 to 33, ranges 18 and 19 ; township 22, range 18 ; townships 23 to 28, range 20 ; townships 4 and 5, ranges 26 and 28 ; townships 3, 4, 5 and 6, range 27 ; all west of the second meridian.
Bolton, Lewis	Listowel, Ont.	Contract No. 29 of 1904. Subdivision of townships 52, 53, 54, 55 and 56, range 4 and township 52, range 5, all west of the fourth meridian.
Boswell, E. J.	Winnipeg, Man.	Re-survey in townsite of Whitemouth, Man., in township 11, range 11, east of the principal meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Bourgeault, A.	St. Jean Port Joli, Que.	Contract No. 7 of 1904. Subdivision of township 33, range 8 ; township 34, range 9 and townships 36, ranges 5 and 7, all west of the second meridian.
Bourgault, C. E.	St. Jean Port Joli, Que.	Contract No. 43 of 1904. Part subdivision of townships 52 and 53, range 6 and townships 53 and 54, range 7, all west of the fifth meridian.
Bowman, H. J.	Berlin, Ont.	Contract No. 20 of 1904. Subdivision of townships 27, 28, 29, 31, 32, 33 and 34, range 18, and townships 29, 30, 31, 32, 33 and 34, range 19, all west of the third meridian.
Bray, Edgar	Oakville, Ont.	Day work of 1904. Survey of fifth meridian across townships 72 and 73 and nineteenth base line across ranges 1 to 14, all west of the fifth meridian.
Bray. L. T.	Amherstburg, Ont.	Retracement subdivision and outlines in townships 15, 16 and 17, range 16 ; township 11, range 21, township 12, range 23 and township 10, range 26, all west of the principal meridian.
Carbert, J. A.	Lacombe, Alberta	Contract No. 39 of 1904. Subdivision of townships 32 to 35, range 21, townships 33 and 34, range 22 and township 32, range 23, all west of the fourth meridian.
Cavana, A. G.	Orillia, Ont.	Contract No. 8 of 1904. Part subdivision of townships 38, 40 and 41, range 13 ; and subdivision of townships 39, ranges 13 and 14 ; townships 39 and 40, range 12 ; and townships 38, 40, 41 and 42, range 14, all west of the second meridian.
Charlesworth, L. C.	Medicine Hat, Sask.	Day work of 1904. Survey of Hamlet plots, 'Willow Bunch,' in southeastern quarter section 17, township 5, range 27, west of the second meridian.
Côté, J. A.	Quebec, Que	Contract No. 18 of 1904. Subdivision of townships 27 to 34, ranges 14 and 15, and townships 27 and 28, ranges 10 and 11, all west of the third meridian.
Côté, J. L.	Pakan, Alberta	Contract No. 57 of 1904. Subdivision of townships 56, ranges 12 and 13 ; townships 59 and 60, range 14 ; townships 60, ranges 15, 16 and 17, and part of township 60, range 18, all west of the fourth meridian.
Craig, J. D.	Ottawa, Ont.	Inspector of surveys, 1904. Eastern section.
Dalton, J. J.	Milton West, Ont.	Day work of 1904. Subdivision in townships 14, 16, 20 and 23, range 1 , townships 6, 8, 9, 15, 17, 18 and 20, range 2 ; townships 6, 18, 19 and 20, range 3, west of the fifth meridian ; subdivision in townships 27, ranges 17 and 18, and re-survey in township 22, range 9, west of the fourth meridian.
Deans, W. J.	Brandon, Man.	Subdivision in township 3, range 22, and township 7, range 25, both west of the principal meridian.
Dickson, Jas.	Fenelon Falls, Ont.	Contract No. 64 of 1904. Subdivision of townships 29 and 30, ranges 15 and 16 ; township 30, range 17 and part of township 29, range 17, all west of the principal meridian.
Driscoll, A.	Edmonton, Alberta	Survey of section 24, township 51, range 22, west of the fourth meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Drummond, Thos.......	Montreal, Que.	Contract No. 40 of 1904. Subdivision of township 36, range 6 ; township 37, range 7 ; townships 38, ranges 6 and 7 ; part subdivision of township 36, range 7 and township 37, range 6, all west of the fifth meridian.
Dumais, P. T. C.	Hull, Que.	Contract No. 4 of 1904. Subdivision of township 25, range 12 ; townships 24 and 25, ranges 13 and 14, all west of the principal meridian.
Edwards, Geo.	Ottawa, Ont.	Contract No. 46 of 1904. Subdivision of township 41, range 6 ; townships 39 and 40, ranges 6 and 7 ; all west of the fifth meridian.
Fairchild, C. C.	Brantford, Ont.	Contract No. 37 of 1904. Subdivision of townships 45, 46 and 47, range 5 ; township 46, range 6 ; township 44, range 7 ; part of township 46, range 7 ; townships 43, ranges 9 and 10 ; township 44, range 10 ; and township 43, range 11, west of the fourth meridian ; and townships 27 and 28, ranges 15 and 16, west of the principal meridian ; and townships 27 and 28, ranges 19 and 20, west of the third meridian.
Farncomb, A. E.	Red Deer, Alta.	Contract No. 44 of 1904. Survey of north and south outlines of township 35, range 7 and subdivision of township 58, range 1, west of the fifth meridian ; subdivision of townships 58 and 59, range 23, west of the fourth meridian.
Fawcett, Adam	Dawson, Y. T.	Contract No. 28 of 1904. Subdivision of townships 54 and 55, ranges 1 and 2 ; townships 54, 55 and 56, range 3, all west of the fourth meridian.
Fawcett, Thos..........	Niagara Falls, Ont. ..	Contract No. 36 of 1904. Subdivision of townships 37, 38, 39, 40 and 41, ranges 5 and 6 ; townships 36, 37, 40 and 41, range 7 ; township 36, range 8 ; and survey of north outlines of townships 35, ranges 6, 7 and 8, all west of the fourth meridian.
Fontaine, L. E.	Levis, Que	Survey of north outlines of townships 60, ranges 1 to 7 ; townships 56, ranges 5 to 8 ; townships 48, ranges 6 to 8 ; and townships 52, ranges 8 to 12 ; all west of the fifth meridian.
Francis, J.	Poplar Point, Man. ..	Contract No. 58 of 1904. Subdivision of townships 22, 23, 24 and 25, range 28 ; part of township 26, range 28 ; and township 26, range 27, all west of the principal meridian.
Gordon, M. L.	Ottawa, Ont.	Contract No. 16 of 1904. Subdivision of townships 29, 30, 31, 32, 33 and 34, ranges 10 and 11, all west of the third meridian.
Gordon, R. J.	Stirling, Alberta	Contract No. 62 of 1904. Survey of east outlines of townships 7 and 8, range 12 ; subdivision of townships 5 and 6, range 12 ; townships 4 and 5, range 13 ; townships 3 and 4, ranges 14 and 15 and township 4, range 16, all west of the fourth meridian.
Gore, T. S.	Victoria, B.C.	Contract No. 27 of 1904. Survey of north and east outlines in township 51, range 17 ; part new survey and retracement of township 45, range 15 ; subdivision of township 52, range 17 ; townships 51 and 52, range 18 ; townships 52 and 53, ranges 19 and 20 and township 53, ranges 21 and 22, all west of the third meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Grover, G. A.	Ottawa, Ont.	›ntract No. 17 of 1904. Subdivision of township 8, range 13 and townships 9, ranges 12 and 13, east of the principal meridian ; and townships 29, 30, 31, 32, 33 and 34, ranges 12 and 13, west of the third meridian.
Harvey, C.	Toronto, Ont.	Contract No. 5 of 1904. Subdivision of townships 26, ranges 24 and 26 ; townships 27 and 28, range 27 ; townships 29, 30 and part of 31, range 29 ; townships 29 and 30, range 30 ; and township 30, range 31, all west of the principal meridian.
Holcroft, H. S.	Toronto, Ont.	Contract No. 11 of 1904. Subdivision of townships 47 and 48, ranges 13 and 14 and township 46, range 13, all west of the second meridian.
Hopkins, M. W.	Hamilton, Ont.	Contract No. 56 of 1904. Survey of east outlines in townships 59 and 60, ranges 5 and 6 ; north and east outlines in township 59, range 7 : east outlines of townships 60, ranges 7, 8 and 12 and township 59, range 8 ; subdivision of townships 57 and 58, ranges 5, 6 and 7 ; townships 59 and 60, ranges 5 and 6 ; townships 52, 57 and 58, range 8 ; and townships 58, 59 and 60, range 11, all west of the fourth meridian.
Hubbell, E. W.	Ottawa, Ont.	Day work of 1904. Renewal of corners in townships 51, 52, 55, 56 and 57, range 27 ; townships 51 and 52, range 28, west of the fourth meridian ; township 51, range 1 ; township 50, range 2, west of the fifth meridian : and townships 15 and 16, range 16, east of the principal meridian. Examination of part of A. F. Martin's work in townships 15 and 16, ranges 11 and 12 ; township 14, range 11 ; and township 17, range 12, east of the principal meridian.
Johnson, A. W.	New Westminster, B.C.	Day work of 1904. Part subdivision and retracement of townships 10 and 11, range 26, west of the sixth meridian ; part subdivision of township 26, east of coast meridian and townships 4, 5, 6, 7, 8 and 9, range 29, west of the sixth meridian. Re-survey of part of Soowahlie Indian reserve and lot 439 in townships 25 and 26, east of coast meridian. Survey of lot 1 A, group 1, and lot 30, group 1, in township 10, range 26 ; certain lots in townsite of Boston Bar in township 10, range 26; and lot 2 in township 11, range 26. Traverse of Fraser river, Canadian Pacific railroad and Cariboo road and Boston Bar in townships 10 and 11, range 26. Triangulation and traverse of west shore of Harrison lake in townships 5 and 7, range 28 and townships 4, 5, 6 and 7, range 29. Traverse of Silver creek and Snowshoe creek in townships 7, 8 and 9, range 29. Survey of north limit of railway belt in townships 7, 8 and 9, range 29, west of the sixth meridian.
Knight, R. H.	Bruce Mines, Ont.	Contract No. 54 of 1904. Survey of north outline of township 26 and east outlines of township 29, range 28 ; township 30, range 29A ; townships 29 and 30, range 29 ; township 26, range 30 ; and township 24, range 32 ; and north outline of township 23, range 31. Subdivision of townships 27, 28 and 30, range 28 ; township 29, range 29A ; townships 25 and 26, range 29 ; and townships 24 and 25, range 31, west of the principal meridian. Re-survey of township 22, range 2, west of the second meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Lemoine, C. E.	Beaulieu, Que.	Contract No. 9 of 1904. Subdivision of townships 38, 39 and 40, ranges 15 and 16; and township 37, range 15, all west of the second meridian.
Lendrum, R. W.	Strathcona, Alta.	Contract No. 31 of 1904. Subdivision of townships 51 and 52, ranges 6 and 7 and township 51, range 8, all west of the fourth meridian.
Lonergan, G. J.	Buckingham, Que.	Day work of 1904. Retracement with renewal of corners in township 45, range 15, townships 43 and 44, range 23, townships 43, 45 and 47, range 24; townships 43, 44 and 47, ranges 25 and 26; and townships 43 and 44, ranges 27 and 28, all west of the fourth meridian. Traverse of Villa lots, Hot Springs, Rocky Mountains Park.
Martin, A. F.	Winnipeg, Man.	Contract No. 63 of 1904. Survey of west outlines of townships 4 and 5, range 29; subdivision of townships 4 and 5, range 25; townships 10, 11 and 12; ranges 25, 26 and 27; townships 3 and 6, range 28 and townships 4 and 5, range 29, all west of the second meridian.
Michaud, A.	Edmonton, Alberta	Contract No. 33 of 1904. Subdivision of townships 53, 54, 55 and 56, range 9; townships 54, 55 and 56, range 10; townships 55 and 56, range 11 and part of township 57, range 11, all west of the fourth meridian.
Miles, C. F.	Toronto, Ont.	Contract No. 51 of 1904. Subdivision of township 31, range 5; townships 30, ranges 6 and 7; and townships 26, 27 and 28, range 7, all west of the fifth meridian.
Molloy, John	Winnipeg, Man.	Contract No. 3 of 1904. Subdivision of townships 9, ranges 7, 8 and 9; township 10, range 8; townships 1, 2, 3 and 4, range 9; townships 3 and 4, range 10, and township 2, range 13; and part subdivision of townships 3 and 4, range 11, all east of the principal meridian.
McFee, A.	Innisfail, Alberta	Contract No. 21 of 1903. Subdivision of townships 36 and 37, ranges 11 and 12 and townships 36, ranges 13 and 14, all west of the fourth meridian.
McGrandle, H.	Huntsville, Ont.	Contract No. 60 of 1904. Subdivision of townships 58 and 59, range 22, both west of the fourth meridian.
McLean, J. K.	Elora, Ont.	Day work of 1904. Survey of townships 65 and 66, range 22; east outlines of townships 63 and 64, ranges 23 and 24, and north outlines of townships 64, ranges 22 and 23; and part subdivision of township 63, range 22, all west of the fourth meridian.
Nash, T. S.	Ottawa, Ont.	Inspector of surveys, 1904. Eastern central section.
O'Hara, W. F.	Ottawa, Ont.	Contract No. 45 of 1904. Subdivision of townships 42, 43 and 44, ranges 5 and 6, all west of the fifth meridian.
Phillips, E. H.	Ottawa, Ont.	Inspector of surveys, 1904. Eastern central section.
Ponton, A. W.	Macleod, Alta.	Contract No. 50 of 1904. Subdivision of township 13, range 29, west of the fourth meridian; part of township 13, range 1; township 35, range 5; townships 33 and 34, ranges 6 and 7, west of the fifth meridian.
Proudfoot, H. B.	Toronto, Ont.	Contract No. 53 of 1904. Subdivision of townships 36 and 37, range 22; township 37, range 23; townships 38, 39 and part of 40, range 25; and townships 38, 39 and 40, range 26, all west of the principal meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Rainboth, G. C.	Aylmer, Que.	Contract No. 25 of 1904. Part subdivision of township 43, range 19 and township 36, range 25. Subdivision of township 35, range 25; townships 33, 34, 35 and 36, ranges 26 and 27, and townships 33 and 34, ranges 28 and 29, west of the third meridian; townships 33, 34, 35 and 36, ranges 1 and 2, west of the fourth meridian; and townships 8, ranges 12 and 13, east of the principal meridian.
Reilly, W. R.	London, Ont.	Contract No. 13 of 1904. Subdivision of townships 47 and 48, ranges 17, 18 and 19, west of second meridian; and townships 65 and 66, ranges 22 and outlines in townships 65 and 66, ranges 23 and 24, west of the fourth meridian.
Richard, J. F.	Sainte Anne de la Pocatière Que.	Contract No. 6 of 1904. Survey of north and west outlines and part subdivision of township 37, range 29; and part east and west outlines of township 38, range 29; subdivision of townships 35 and 36, range 32, west of the principal meridian; and townships 36, ranges 1 and 2, west of the second meridian.
Rinfret, Raoul	Edmonton, Alta.	Contract No. 41 of 1904. Subdivision of townships 48, 49 and 55, range 4, west of the fifth meridian.
Ross, Geo	Welland, Ont.	Contract No. 22 of 1904. Subdivision of townships 27, 28, 29, 30, 31, 32, 33 and 34, ranges 22 and 23, all west of the third meridian.
Ross, Jos. E.	New Westminster, B.C.	Day work of 1904. Subdivision of township 28, range 18; part subdivision of township 28, range 22, west of the fifth meridian; township 19, range 15; township 20, range 17; townships 17, ranges 19, 20, 21, 22 and 23; townships 18, ranges 21 and 23, townships 13, ranges 22 and 23; townships 14, ranges 22 and 23, and township 15, range 23, west of the sixth meridian.
Roy, G. P.	Quebec, Que.	Contract No. 42 of 1904. Survey of north and south outlines of townships 52, ranges 4 and 5; east outlines of township 53, range 6; east and west outlines of townships 53 and 54, range 7; part subdivision of township 51, range 4, and townships 54, ranges 5 and 6; subdivision of townships 52 and 53, range 6, and townships 53 and 54, range 7, all west of the fifth meridian.
Saint Cyr, A	Ottawa, Ont.	Survey of sixth meridian across townships 65 to 76, and eighteenth base line across ranges 23 to 27, all west of the fifth meridian.
Saint Cyr, J. B.	Ste. Anne de la Pérade, Que.	Contract No. 32 of 1904. Survey of north outline of township 52, range 8; west outline of townships 55 and 56, range 8; north and east outlines of township 56, range 8; and east outlines of townships 55 and 56, ranges 7 and 9; subdivision of townships 53, 54, 55 and 56, ranges 7 and 8, all west of the fourth meridian.
Saunders, B. J.	Regina, Sask.	Contract No. 2 of 1904. Subdivision of townships 47 and 48, range 2; townships 48 and 49, range 3; survey of east outline of township 49, range 4, all west of the fifth meridian.

APPENDIX No. 1 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from July 1 to December 31, 1904.—*Continued.*

Surveyor.	Address.	Description of Work.
Selby, H. W.	Toronto, Ont.	Survey of twenty-first base line across ranges 6 to 13 ; south and east outlines of township 81, range 13 ; east outlines of townships 85, 86, 87 and 88, range 1 ; townships 83 and 84, range 3 ; and township 82, range 13 ; and north outlines of township 88, range 1 and townships 83, ranges 2 and 3, all west of the sixth meridian.
Tyrrell, J. W.	Hamilton, Ont.	Contract No. 26 of 1904. Re-survey of township 19, range 24 ; and townships 20 and 21, ranges 24, 25 and 26, west of the principal meridian. Subdivision of township 39, range 24 ; townships 37, 38 and 39, ranges 25, 26 and 27 ; township 43, range 26 ; townships 40, 41 and 42, range 27 ; and townships 43, ranges 27 and 28, west of the third meridian.
Wallace, J. N.	Hamilton, Ont.	Survey of twentieth base line across ranges 1 to 13 and nineteenth base line across ranges 1 to 12, both west of the sixth meridian.
Warren, Jas.	Walkerton, Ont.	Contract No. 19 of 1904. Subdivision of townships 27, 28, 29, 30, 31, 32, 33 and 34, ranges 16 and 17, all west of the third meridian.
Watt, G. H.	Ottawa, Ont.	Inspector of surveys, 1904. Western section.
Weekes, A. S.	Glencoe, Ont.	Contract No. 21 of 1904. Subdivision of townships 29, 30, 31, 32, 33 and 34, ranges 20 and 21 ; and townships 27 and 28, range 21, all west of the third meridian.
Weekes, A. S.	Ottawa, Ont.	Contract No. 30 of 1904. Subdivision of townships 53, 54 and 55, ranges 5 and 6 ; township 56, range 6, all west of the fourth meridian.
Wheeler, A. O.	Calgary, Alta.	Topographer of the Department of the Interior. Survey of the Rocky Mountains.
Wilkins, F. W	Norwood, Ont.	Contract No. 38 of 1904. Subdivision of townships 42, ranges 8 and 9 ; township 43, range 8 ; township 40, range 10 ; and townships 39, ranges 9, 10, 11 and 12 ; traverse of Battle river in township 42, range 10, all west of the fourth meridian.

APPENDIX No. 2 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from January 1, 1905, to June 30, 1905.

Surveyor.	Address.	Description of Work.
Aylsworth, C. F.	Madoc, Ont.	Day work of 1905. Near Fort Pelly. No returns.
Beatty, David	Parry Sound, Ont.	Day work of 1905. Battleford district. No returns.
Belanger, P. R. A.	Ottawa, Ont.	Supervision of surveys, 1905.
Belleau, J. A.	Ottawa, Ont.	Exploration survey of three and a half million acres, grant to the Dominion Government 'in that portion of the Peace River district of British Columbia lying east of the Rocky Mountains and adjoining the North-west Territories of Canada.' No returns.
Bray, E.	Oakville, Ont.	Day work for 1905. Between Shoal and Manitoba lakes. No returns.
Bray, L. T.	Amherstburg, Ont.	Day work of 1905. Retracement and part subdivision in townships 15 and 16, range 16, both west of the principal meridian.
Cautley, R. W.	Edmonton, Alta.	Survey of sixteenth base line between fifth and sixth meridian.
Côté, J. L.	Pakan, Alta.	Contract No. 13 of 1905. North-east of Edmonton. No returns.
Deans, W. J.	Brandon, Man.	Contract No. 8 of 1905. Near Sounding creek, Alta. No returns.
Ducker, W. A.	Winnipeg, Man.	Survey of east outlines in townships 7, ranges 11 and 12, and township 8, range 12 and centre line in township 8, range 11, all east of the principal meridian.
Driscoll, A.	Edmonton, Alta.	Survey of seventeenth base line across ranges 1 to 7, west of the fifth meridian.
Edwards, Geo.	Lacombe, Alta.	Contract No. 10 of 1905. Near Sullivan lake. No returns.
Fairchild, C. C.	Brantford, Ont.	Day work of 1905. Near Stony Indian reserve, Rocky Mountains. No returns.
Fawcett, Thos.	Niagara Falls, Ont.	Contract No. 11 of 1905. North of Beaver Hills. No returns.
Fontaine, L. E.	Levis, Que.	Day work of 1905. Near White lake, Alberta. No returns.
Francis, J.	Poplar Point, Man.	Day work of 1905. South of Porcupine Mountains, Manitoba. No returns.
Grover, G. A.	Ottawa, Ont.	Day work of 1905. Retracement and part subdivision of township 21, range 3, east of the principal meridian.
Hopkins, M. W.	Hamilton, Ont.	Contract No. 15 of 1905. North-east of Edmonton. No returns.
Hubbell, E. W.	Ottawa, Ont.	Day work of 1905. Re-surveys in vicinity of the third meridian. No returns.
Johnson, A. W.	New Westminster, B.C.	Day work of 1905. Survey of south limit of railway belt in British Columbia. No returns.
Knight, R. H.	Bruce Mines, Ont.	Contract No. 9 of 1905. Near Sullivan lake. No returns.
Lemoine, C. E.	Beaulieu, Que.	Contract No. 4 of 1905. North of Medicine Hat. No returns.
Lonergan, G. J.	Buckingham, Que.	Day work of 1905. Retracement of township 46, range 2, west of the fifth meridian.
Miles, C. F.	Toronto, Ont.	Day work of 1905. South of Sounding creek, Assa. No returns.
Molloy, J.	Winnipeg, Man.	Traverse of Roseau river in township 3, range 4, east of the principal meridian. Contract No. 16 of 1905. Near Bedford. No returns.
MacFarlane, W. G.	Toronto, Ont.	Inspector of surveys, 1905. Western section.

APPENDIX No. 2 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE of Dominion Land Surveyors employed, and work executed by them, from January 1, 1905, to June 30, 1905.—*Continued.*

Surveyor.	Address.	Description of Work.
McGrandle, H	Huntsville, Ont.	Contract No. 3 of 1905. North of Medicine Hat. No returns.
Nash, T. S.	Ottawa, Ont	Inspector of surveys, 1905. Western central section.
O'Hara, W. F	Ottawa, Ont.	Contract No. 6 of 1905. Near Sounding creek. No returns.
Parsons, J. L. R	Toronto, Ont.	Contract No 1. of 1905. Survey of east outlines of townships 5, 6, 7 and 8, range 22 and subdivision of townships 7 and 8, ranges 19, 20, 21 and 22, all west of the second meridian.
Ponton, A. W	MacLeod, Alta.	Contract No. 7 of 1905. East of Hand hills. No returns.
Proudfoot, H. B	Toronto, Ont.	Contract No. 2 of 1905. North of Medicine Hat. No returns.
Rinfret, Raoul	Edmonton, Alta.	Contract No. 5 of 1905. North of Medicine Hat. No returns.
Ross, Geo.	Welland, Ont.	Day work of 1905. Retracement of township 27, range 12, and township 29, range 25, both west of the second meridian.
Ross, J. E	New Westminster, B.C.	Day work of 1905. Survey of south limit of railway belt in British Columbia. The subdivision of townships 20, ranges 19 and 20 and townships 21, ranges 20 and 21, all west of the sixth meridian.
Roy, G. P	Quebec, Que.	Contract No. 12 of 1905. North of Alexander Indian reserve. No returns.
Saint Cyr, A	Ottawa, Ont.	Survey of nineteenth base line across ranges 15 to 24, west of the fifth meridian.
Saunders, B. J	Regina, Sask.	Survey of the fifteenth base line across ranges 5 to 20, west of the fifth meridian.
Selby, H. W	Toronto, Ont.	Survey of township outlines north-west of Athabaska Landing. No returns.
Tyrrell, J. W	Hamilton, Ont.	Contract No. 14 of 1905. North-west of Saddle lake. No returns.
Wallace, J. N	Hamilton, Ont.	Day work of 1905. Survey of north and east outlines in townships 68 and 69, range 1, and north outlines in townships 68, ranges 2 and 3, west of the fifth meridian ; and east outlines of townships 73 and 74, range 13, west of the sixth meridian.
Warren, Jas.	Walkerton, Ont.	Day work of 1905. Southeast of Johnson lake. No returns.
Weekes, M. B	Ottawa, Ont.	Day work of 1905. Survey of the tenth base line across ranges 19 to 21 ; and twelfth base line across ranges 27 to 32, both west of the principal meridian.
Wheeler, A. O	Calgary, Alta.	Topographer of the Department of the Interior. Survey of the Rocky Mountains.

APPENDIX No. 3 TO THE REPORT OF THE SURVEYOR GENERAL.

SCHEDULE showing for each surveyor employed on township surveys during 1904, the number of miles surveyed of township subdivision lines, township outlines, traverse of lakes and rivers and resurvey, also cost of same.

Surveyor.	Miles of Subdivision.	Miles of Outlines.	Miles of Traverse.	Miles of Resurvey.	Total Mileage.	Total Cost.	Cost per Mile.	Method of Execution.
						$ cts.	$ cts.	
Abrey, G. B.	473·56	12·00	135·44	4·00	625·00	16,321 78	26 11	Contract.
Aylen, J.	237·53		1·38	45·44	284·35	8,851 65	31 13	"
Aylsworth, C. F.	25·80		0·50	128·40	154·70	9,122 31	58 97	Day work.
*Beatty, D.	1,770·07	75·27	212·49	64·25	2,122·08	22,757 32	10 72	Contract.
*Beatty, W.	357·64		27·58		385·22	2,743 13	7 12	"
Bolton, L.	278·04		45·65	30·32	354·01	6,623 67	18 71	"
Belanger, P. R. A.				2,765·75	2,765·75	19,071 68	6 89	Day work.
Boswell, E. J.				6·30	6·30	253 15	40 18	"
*Bourgeault, A.	168·00			12·00	180·00	4,932 25	27 40	Contract.
*Bourgault, C. E.	120·42	6·02	5·21	12·02	143·67	4,366 15	30 39	"
*Bowman, H. J.	660·10		41·63	14·00	715·73	5,137 54	7 18	"
Bray, E.		91·00			91·00	10,074 08	110 70	Day work.
Bray, L. T.			4·50	504·00	508·50	5,870 97	11 55	"
*Carbert, J. A.	347·30		65·25	6·00	418·55	4,672 41	11 16	Contract.
Cautley, R. W.	255·51		74·94	14·10	344·55	7,575 29	21 99	"
*Cavana, A. G.	388·57	31·38	66·72	16·92	503·59	12,609 30	25 04	"
Charlesworth, L. C.	1·30				1·30	229 50	176 54	Day work.
Côté, J. A.	966·92		131·65		1,098·57	7,519 98	6 84	Contract.
*Côté, J. L.	484·18		99·11	47·00	630·29	15,936 73	25 28	"
†Craig, J. D.						6,038 59		Day work.
*Dalton, J. J.			59·30	234·50	293·80	7,025 95	23 91	"
Deans, W. J.	13·00		13·19	133·86	160·05	1,084 07	6 77	Contract.
Dickson, J.	167·63		86·19	23·29	277·11	6,098 31	22 01	"
Drummond, T.	398·57	6·00	197·88	12·04	614·49	14,760 02	24 02	"
Dumais, P. T. C.	262.90	6·11	18·42	82·59	370·02	10,372 70	28 03	"
Edwards, G.	293·77		39·97		333·74	8,747 68	26 21	"
*Fairchild, C. C.	598·98		144·43	53·58	796·99	9,140 71	11 47	"
*Farncomb, A. E.	242·00		13·92	12·08	268·08	7,191 22	26 82	"
Fawcett, A.	301·87		115·00	28·98	445·85	8,847 84	19 85	"
Fawcett, T.	693·38		293·33		986·71	10,232 55	10 37	"
Fontaine, L. E.		114·50			114·50	12,223 77	106 76	Day work.
Francis, J.			15·33	424·60	439·93	8,094 80	18 40	Contract.
Gordon, M. L.	567·27		35·30	6·24	608·81	4,599 49	7 55	"
Gordon, R. J.	427·17	24·26	34·83	25·00	511·26	3,990 98	7 81	"
Gore, T. S.	514·61	19·56	82·23	60·51	676·91	15,694 96	23 19	"
Grover, G. A.	712·98	6·00	73·81	13·00	805·79	9,665 24	11 99	"

Harvey, C.	515·29	10·15	144·17	28·93	698·54	18,524 99	26 52	"
Holcroft, H. S.	290·58	12·00	22·46		325·04	9,250 52	28 46	"
*Hopkins, M. W.	592·50	90·80	76·75	24·00	784·05	23,670 45	30 19	"
Hubbell, E. W.				444·00	444·00	8,127 00	18 30	Day work.
Johnson, A. W.	36·00	7·00	75·00	18·00	136·00	5,665 93	41 66	"
Kirk, J. A.	1·65				1·65	469 42	284 50	"
Knight, R. H.	318·25	74 35	79·36	363·95	835·91	19,148 17	22 91	Contract.
Lemoine, C. E.	333·94	12·07	275·19	18·14	639·34	12,127 18	18 97	"
Lendrum, R. W.	245·00		47·06	7·05	299·11	4,451 95	14 88	"
Lonergan, G. J.			0·70	747·00	747·70	9,380 58	12 55	Day work.
Martin, A. F.	789·35	24·07	32·25	33 00	878·67	8,114 32	9 23	Contract.
Michaud, A.	501·38	13·99	134·92	17·24	667·53	16,770 23	25 12	"
*Miles, C. F.	248·35	12·04	5·95	45·78	312·12	9,390 13	30 08	"
Molloy, J.	432·41			315·97	748·38	20,958 09	28 00	"
*McFee, A.	318·19		48·71		366·90	2,729 99	7 44	"
*McGrandle, H.	103·72	6·00	0·62		110·34	3,065 14	27 78	"
McLean, J. K.	22·34	41·16			63·50	3,912 83	61 62	Day work.
†Nash, T. S.						6,422 39		"
*O'Hara, W. F.	293·00	12·00	10·00	6 00	321·00	12,514 84	38 99	Contract.
†Phillips, E. H.						5,647 48		Day work.
*Ponton, A. W.	191·36		1·49	48·37	241·22	6,905 50	28 62	Contract.
Proudfoot, H. B.	586·55	18·08	69·14	136·64	810·41	20,538 86	25 34	"
Rainboth, G. C.	1,134·18	6·11	78·66	8·03	1,226·98	12,304 89	10 03	"
Reilly, W. R.	287·19		66·98	4·49	358·66	9,572 81	26 69	"
Reilly, W. R.	79·00	24·00	3·00		106·00	3,426 47	32 33	Day work.
Richard, J. F.	156·78	11·07	3·78		171·63	5,164 22	30 09	Contract.
*Rinfret, R.	239·27	6·10	67·91	37·05	350·33	8,553 21	24 41	"
Ross, G.	750·44		16·75		767·19	5,376 42	7 01	"
Ross, J. E.	69·00	23·00	80·00	40·00	212·00	7,421 34	35 01	Day work.
Roy, G. P.	427·52	30·20	65·63	28·94	552·29	14,990 72	27 14	Contract.
*Saint Cyr, A.		97·50			97·50			Day work.
*Saint Cyr, J. B.	380·40	28·77	174·64	17·78	601·59	13,133 21	21 83	Contract.
Saunders, B. J.	331·32		9·47	24·22	365·01	10,997 29	30 13	"
Selby, H. W.	122·54		36·14	6·00	164·68	4,255 64	25 84	"
Selby, H. W.		103·00			103·00	18,060 96	175 35	Day work.
Thomson, W. T.	7·87		73·60	201·25	282·72	4,069 98	14 45	Contract.
*Tyrrell, J. W.	709·41		273·51	296·34	1,279·26	18,039 14	14 10	"
Wallace, J. N.		169·25			169·25	16,399 71	96 90	Day work.
Warren, J.	773·02		12·11		785·13	5,316 08	6 77	Contract.
†Watt, G. H.						5,521 40		Day work.
Weekes, A. S.	718·59		26·90		745·49	6,851 49	9 19	Contract.
Weekes, M. B.	386·51	12·00	120·01		518·52	11,343 21	21 88	"
Weekes, M. B.		48·50			48·50	3,751 25	77 35	Day work.
Wilkins, F. W.	366·10		172·77		538·87	7,328 62	13 60	Contract.
	24,488·15	1,285·31	4,440·81	7,698·94	37,913·21	728,141 82	19 21	

Total mileage, 37,913·21 ; Total cost, $728,141.82 ; Cost per mile, $19.21.

* Estimated, complete returns not yet received. † Inspection of contract surveys.

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR GENERAL.

List of Dominion Land Surveyors who have been supplied with Standard Measures.

Name.	Address.	Date of Appointment.	Remarks.
Abrey, G. B.	Toronto, Junction, Ont.	April 14, 1872	
Austin, G. F.	Dewdney, Alta	" 14, 1872	
Aylen, J.	Aylmer, Que.	May, 29, 1885	
Aylsworth, C. F.	Madoc, Ont	" 17, 1886	
Barwell, C. S. W.	Dawson, Yukon Territory,	Aug. 21, 1894	
Bayne, G. A.	Winnipeg, Man.	April 14, 1872	
Beatty, D.	Parry Sound, Ont	" 14, 1872	
Beatty, W.	Delta, Ont.	" 14, 1872	
Belanger, P. R. A.	Ottawa, Ont	May 17, 1880	Surveys Staff Dept. of Int.
Belleau, J. A.	"	" 15, 1883	" " "
Bigger, C. A.	"	Mar. 30, 1882	Astronomer "
Bolton, L.	Listowel, Ont	April 14, 1872	
Boswell, E. J.	Winnipeg, Man.	Feb. 18, 1903	
Bourgeault, A.	St. Jean Port Joli, Que.	Mar. 29, 1883	
Bourgault, C. E.	" " "	Feb. 21, 1888	
Bourget, C. A.	Ste. Adelaide de Pabos, Que.	May 14, 1884	
Bowman, H. J.	Berlin, Ont.	Feb. 16, 1888	
Brabazon, A. J.	Medicine Hat, Assa	May 12, 1882	District Engineer, N.W.T.
Bray, S.	Ottawa, Ont.	Nov. 14, 1883	Dep.. of Indian Affairs.
Bray, E.	Oakville, Ont.	April 14, 1872	
Bray, L. T.	Amherstburg, Ont	Feb. 18, 1903	
Bridgeland, M. P.	Calgary, Alta.	Mar. 10, 1905	
Brodie, S.	Fort Qu'Appelle, Assa.	April 14, 1872	
Brownlee, J. H.	Victoria, B. C.	" 15, 1887	
Burke, W.	Minnedosa, Manitoba	" 14, 1872	
Burnet, H.	Victoria, B. C	June 22, 1885	
Burwell, H. M.	Vancouver, B. C.	Feb. 17, 1887	
Carbert, J. A.	Lacombe, Alta.	May 12, 1880	
Carroll, C.	Prince Albert, Sask.	April 14, 1872	District Engineer, N.W.T.
Cautley, R. H.	Edmonton, Alta	May 1, 1905	
Cautley, R. W.	"	Sept. 2, 1896	
Cavana, A. G.	Orillia, Ont	Nov. 16, 1876	
Charlesworth, L. C.	Regina, Assa.	Feb. 27, 1903	
Cleveland, E. A.	Vancouver, B. C.	June 27, 1899	
Côté, J. A.	Quebec, Que.	May 14, 1884	
Côté, J. L.	Edmonton, Alta.	Mar. 21, 1890	
Cotton, A. F.	New Westminster, B. C.	May 11, 1880	
Craig, J. D.	Ottawa, Ont	Feb. 24, 1902	
Dalton, J. J.	Weston, Ont.	April 17, 1879	Dominion Topographical Surveyor.
Deans, W. J.	Brandon, Man.	May 13, 1886	
Dennis, J. S.	Calgary, Alta	Nov. 19, 1877	Dominion Topographical Surveyor, Inspector of Irrigation and British Columbia Land Commissioner, C.P.R.
Denny, H. C.	"	April 1, 1882	
Desmeules, J. C.	Murray Bay, Que.	" 14, 1872	
Dickson, H. G.	Whitehorse, Yukon Territory.	Mar. 19, 1889	
Dickson, J.	Fenelon Falls, Ont	April 14, 1872	
Doupe, J.	Winnipeg, Man.	" 14, 1872	
Doupe, J. L.	" "	Oct. 6, 1888	Asst. Land Commissioner, C. P.R.
Drewry, W. S.	Victoria, B. C.	Nov. 14, 1883	
Driscoll, A.	Edmonton, Alta	Feb. 23, 1887	District Engineer, N.W.T.
Drummond, T.	Montreal, Que.	June 24, 1878	Dominion Topographical Surveyor.
DuBerger, C. C.	Waterloo, Que.	Nov. 17, 1881	
Ducker, W. A.	Winnipeg, Man.	Mar. 30, 1883	Swamp Land Commissioner.
Dumais, P. T. C.	Hull, Que	" 29, 1882	
Edwards, Geo.	Thurso, Que.	April 14, 1872	
Ellacott, C. H.	Regina, Assa.	Feb. 22, 1899	
Fairchild, C. C.	Brantford, Ont	" 20, 1901	
Farncomb, A. E.	Regina, Assa.	Mar. 12, 1902	
Fawcett, T.	Niagara Falls, Ont	Nov. 18, 1876	Dominion Topographical Surveyor.

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR GENERAL.—*Con.*

LIST of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.	Remarks.
Fawcett, A	Dawson, Yukon Territory	Feb. 22, 1893	
Fontaine, L. E	Levis, Que	Aug. 13, 1892	
Foster, F. L	Toronto, Ont	" 14, 1872	
Francis, J	Poplar Point, Man	June 17. 1875	
Garden, J. F	Vancouver, B. C	May 13, 1880	
Garden, G. H	Lethbridge, Alta	April 14, 1872	
Garden, C	Winnipeg, Man	" 14, 1872	
Gauvreau, L. P	Quebec, Que	" 14, 1872	
Gibbon, J	Dawson, Yukon Territory	Feb. 12, 1891	
Gordon, M. L	Toronto, Ont	" 18, 1904	
Gordon, R. J	Stirling, Alta	Mar. 12, 1902	
Gore, T. S	Victoria, B. C	April 19, 1879	
Green, T. D	Dawson, Yukon Territory	May 19, 1884	
Grover, G. A	Kingston, Ont	Feb. 18, 1904	
Harris, J. W	Winnipeg, Man	April 14, 1872	City Surveyor, Winnipeg.
Harvey, C	Indian Head, Assa	Feb. 17, 1904	
Henderson, W	Chilliwack, B. C	Nov. 17, 1883	
Holcroft, H. S	Toronto, Ont	Feb. 18, 1903	
Hopkins, M. W	Hamilton, Ont	" 20, 1901	
Hubbell, E. W	Ottawa, Ont	May 19, 1884	Survey Staff, Dept. of Int.
James, S	Toronto, Ont	April 14, 1872	
Jephson, R. J	Dawson, Yukon Territory	May 12. 1880	
Johnson, A. W	Kamloops, B. C	Mar. 12, 1902	
Kirk, J. A	Revelstoke, B. C	May 11, 1880	
Klotz, O. J	Ottawa, Ont	Nov. 19, 1877	Dominion Topographical Surveyor, Astronomer, Dept. of the Interior.
Knight, R. H	Bruce Mines, Ont	Feb. 18, 1904	
Latimer, F. H	Detroit, Mich	" 13, 1885	
Laurie, R. C	Battleford, Sask	April 27. 1883	District Engineer. N.W.T.
Lawe, H	Ottawa, Ont	" 14. 1872	
Lemoine, C. E	Quebec, Que	Mar. 31, 1882	
Lendrum, R. W	Strathcona, Alta	May 15, 1880	
Lonergan, G. J	Buckingham, Que	Feb. 28, 1901	
Lucas, S. B	Ponoka, Alta	April 14. 1872	
Lumsden, H. D	Ottawa, Ont	" 14, 1872	
MacPherson, C. W	Dawson, Yukon Territory	Mar. 7, 1900	Director of Surveys, Y.T.
Magrath, C. A	Lethbridge, Alta	Nov. 16, 1881	Dominion Topographical Surveyor, Land Commissioner, Alberta Railway and Coal Co.
Malcolm, L	Blenheim, Ont	April 14, 1872	
Michaud, A	Montreal, Que	Feb. 18, 1903	
Miles, C. F	Ottawa, Ont	April 14, 1872	
Moberly, H. K	Innisfail, Alta	Feb. 27, 1903	
Molloy, J	Rosser, Man	April 14, 1872	
Moore, H. H	Township York, Ont	Feb. 17, 1904	
McArthur, J. J	Ottawa, Ont	" 17, 1879	
McFadden, M	Neepawa, Man	" 14, 1872	
McFarlane, W. G	Toronto, Ont	May 19, 1905	
McFee, A	Innisfail, Alta	Feb. 19, 1879	
McGrandle, H	Huntsville, Ont	May 30, 1883	
McKenna, J. J	Dublin, Ont	April 14, 1872	
McKenzie, J	New Westminster, B.C	Nov. 18, 1888	Dominion Lands Agent, New Westminster.
McLatchie, J	Nelson, B.C	April 14, 1872	
McLean, J. K	Ottawa, Ont	" 1, 1882	
McPherson, A. J	Dawson, Yukon Territory	Feb. 21, 1901	
McPhillips, G	Windsor, Ont	June 17, 1875	
McVittie, A. W	Blairmore, Alta	March 12, 1902	
Nash, T. S	Morrisburg, Ont	Feb. 18, 1904	
Ogilvie, W	Ottawa, Ont	April 14, 1872	
O'Hara, W. F	Chatham, Ont	Feb. 19, 1895	
Ord, L. R	Winnipeg, Man	April 1, 1 82	

APPENDIX No. 4 TO THE REPORT OF THE SURVEYOR GENERAL.—*Con.*

LIST of Dominion Land Surveyors who have been supplied with Standard Measures.—*Continued.*

Name.	Address.	Date of Appointment.	Remarks.
Parsons, J. L. R	Toronto, Ont	Feb. 23, 1905	
Patrick, A. P	Calgary, Alta	Nov. 19, 1877	Dominion Topographical Surveyor.
Pearce, W	Calgary, Alta	May 10, 1880	
Phillips, E. H.	Ottawa, Ont	Feb. 24, 1902	
Ponton, A. W	Macleod, Alta	May 18, 1881	
Proudfoot, H. B	Toronto, Ont	March 28, 1882	
Rainboth, E. J	Ottawa, Ont	May 19, 1881	
Rainboth, G. C	Aylmer, Que	April 14, 1872	
Reid, J. L	Ottawa, Ont	" 14, 1872	
Reilly, W. R	London, Ont	Nov. 17, 1881	
Richard, J. F	Ste. Anne de la Pocatière, Que	May 13, 1882	
Rinfret, R	Edmonton, Alta	Feb. 20, 1900	
Ritchie, J. F.	Nelson, B.C	Jan. 7, 1889	
Robertson, H. H	Montmagny, Que	April 14, 1872	
Roberts, S. A	Victoria, B.C	May 16, 1885	
Roberts, V. M	Sturgeon Falls, Ont	" 17, 1886	
Robinson, F. J	Macleod, Alta	Feb. 22, 1900	District Engineer, N.W.T.
Rombough, M. B	Morden, Man	April 14, 1872	
Rorke, L. V	Sudbury, Ont	Aug. 13, 1891	
Ross, G	Welland, Ontario	Nov. 21, 1882	
Ross, J. E	Kamloops, B.C	Feb. 12, 1901	
Roy, G. P	Quebec, Que	Nov. 17, 1881	
Saint Cyr, J. B	Ste. Anne de la Perade, Que	Feb. 17, 1881	
Saint Cyr, A	Ottawa, Ont	" 17, 1887	
Saunders, B. J	Edmonton, Alta	Nov. 16, 1884	
Seager, E	Rat Portage, Ont	April 14, 1872	
Selby, H. W	Wabigoon, Ont	Nov. 15, 1882	
Sewell, H. de Q	Toronto, Ont	May 16, 1885	
Shaw, C. A. E	Victoria, B.C	" 10, 1880	
Speight, Thos	Toronto, Ont	Nov. 16, 1882	
Starkey, S. M	Starkey's P. O., N.S	April 14, 1872	
Stewart, G. A	Calgary, Alta	" 14, 1872	
Stewart, L. B	Toronto, Ont	Nov. 22, 1882	Dominion Topographical Surveyor Professor School of Practical Science, Toronto.
Stewart, E	Ottawa, Ont	April 14, 1872	Superintendent of Forestry.
Talbot, A. C	Calgary, Alta	May 13, 1880	District Engineer, N.W.T.
Thompson, W. T	Fort Qu'Appelle, Assa	Nov. 19, 1877	Dominion Topographical Surveyor and District Engineer, N.W.T.
Tracy, T. H	Vancouver, B.C	April 14, 1872	City Engineer, Vancouver.
Tremblay, A. J	Les Eboulements, Que	Feb. 18, 1890	
Towle, C. E	Waterloo, Que	April 14, 1872	
Turnbull, T	Winnipeg, Man	March 29, 1882	
Tyrrell, J. W	Hamilton, Ont	Feb. 16, 1887	
Vaughan, J. W	Vancouver, B.C	June 11, 1878	
Vicars, J	Kamloops, B.C	May 17, 1886	
Wallace, J. N	Hamilton, Ont	Feb. 20, 1900	
Warren, J	Walkerton, Ont	April 14, 1872	
Watt, G. H	Ottawa, Ont	Feb. 24, 1902	
Weekes, A. S	Clinton, Ont	" 11, 1892	
Weekes, M. B	Ottawa, Ont	" 18, 1903	
Wheeler, A. O	Calgary, Alta	Nov. 21, 1882	Topographer of the Department Interior.
White-Fraser, G. W. R	Ottawa, Ont	Feb. 21, 1888	Dominion Topographical Surveyor.
Wiggins, T. H	Regina, Assa	" 18, 1896	
Wilkins, F. W	Norwood, Ont	May 18, 1881	Dominion Topographical Surveyor.
Wilkinson, W. D	Toronto, Ont	Feb. 22, 1893	
Woods, J. E	Frank, Alta	Nov. 14, 1885	

APPENDIX No. 5 TO THE REPORT OF THE SURVEYOR GENERAL.

List of lots in the Yukon Territory of which surveys have been confirmed during the year ending June 30, 1905.

GROUP NO. 2.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
99	4·96	T. D. Green........	1905..	June 8, 1905..	H. H. Norwood.
107	50·3	"	1904.	Nov. 28, 1904..	C. H. Wells et al., as trustees.
108	8·87	"	1904..	" 28, 1904..	J. F. Patterson.
109	22·23	"	1904..	" 28, 1904..	C. H. Wells et al., as trustees.
110	24·36	"	1904..	" 28, 1904..	" "
113	50·43	"	1904..	" 28, 1904..	" "
114	2·62	"	1904..	" 28, 1904.	" "
115	51·65	"	1904 .	" 28, 1904..	C. H. Wells, P. Ledieu and E. McAdam, trustees.
123	51·65	"	1904..	" 28, 1904..	C. J. D. Colley and C. H. Wells.
131	5·78	"	1904..	" 28, 1904..	C. H. Wells et al., as trustees.
173	51·65	"	1904..	" 28, 1904..	" "
174	51·65	"	1904..	" 28, 1904..	" "
177	27·83	R. J. Jephson	1904..	Oct. 3, 1904..	Mrs. E. H. Depter.
178	48·78	"	1905..	June 8, 1905..	The Sister Superior of St. Mary's Hospital, Dawson.
179	41·85	"	1905..	" 8, 1905..	The Sister Superior of St. Mary's Hospital, Dawson.
195	13·09	T. D. Green........	1904..	Nov. 28, 1904..	J. R. McDonald.
196	51·65	"	1904..	" 28, 1904.	C. H. Wells et al., as trustees.
197	8·24	"	1904..	" 28, 1904..	" "
198	51·65	"	1904..	" 28, 1904..	" "
210	17·35	"	1904..	" 28, 1904..	John A. Hudson.
215	50·818	R. J. Jephson	1904..	July 11, 1904..	C. N. Williams.
237	50·76	T. D. Green........	1904..	Nov. 28, 1904..	R. B. Ackerman.
238	10·00	C. S. W. Barwell. ..	1904..	" 21, 1904..	L. L. Stephens.
244	47·81	T. D. Green........	1904..	" 28, 1904..	E. McAdam, et al.
258	45·91	"	1904..	" 28, 1904..	W. D. McKenzie et al.
259	12·15	"	1904..	" 28, 1904..	H. D. Fountain.
261	2·54	R. J. Jephson	1903..	April 17, 1905..	G. Vermurier.
272	50·17	T. D. Green...	1904..	Nov. 28, 1904..	A. LaLande.
278	5·62	C. S. W. Barwell. ..	1904..	" 21, 1904..	Thurner Townsend.
285	43·47	T. D. Green...	1904..	" 28, 1904..	C. H. Wells et al., as trustees.
286	9·87	"	1904..	" 28, 1904..	" "
287	24·17	T. D. Green........	1904..	Nov. 28, 1904..	C. H. Wells et al., as trustees.
288	50·49	"	1904..	" 28, 1904..	" "
289	51·65	"	1904..	" 28, 1904..	" "
290	15·49	"	1904..	" 28, 1904..	A. A. Douglas.
299	11·47	C. S. W. Barwell ...	1905..	April 17, 1905..	O. R. Brener.
300	4·02	" ...	1905..	" 18, 1905..	"
301	51·52	T. D. Green	1905..	March 28, 1905..	David W. Cullen.
302	50·08	C. S. W. Barwell. .	1905..	April 17, 1905..	Dawson City Quartz Mining Co., Limited.
303	36·44	" ...	1905..	" 17, 1905..	" "
304	51·45	" ...	1905..	" 17, 1905..	"
305	37·03	" . .	1905..	" 17, 1905..	W. J. Rendell.
319	31·70	T. D. Green........	1905..	July 6, 1905..	L. A. Herdt.
320	12·00	A. J. McPherson...	1905..	May 3, 1905..	H. A Stewart.
327	1·52	R. J. Jephson......	1905..	June 26, 1905..	Mrs. C. Goldstein.
328	51·52	"	1905..	" 26, 1905..	"

GROUP No. 3.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
27	40·27	R. J. Jephson......	1905..	June 23, 1905..	Donald McKinnon.

APPENDIX No. 5 TO THE REPORT OF THE SURVEYOR GENERAL.

LIST of Lots in the Yukon Territory of which Surveys have been confirmed during the year ending June 30, 1905.—*Concluded.*

GROUP No. 4.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
11	20·74	C. W. MacPherson..	1903..	Aug. 5, 1904..	Thos. Whelan.
13	40·01	" " ..	1903..	Sept. 28, 1904..	R. N. W. M. Police.
14	9·99	" " ..	1903..	Nov. 12, 1904..	Capt. John Fussell.

GROUP No. 5.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
61	23·32	H. G. Dickson......	1904..	July 7, 1904..	Robert Lowe & B. Lamoureux.
62	43·39	"	1904..	Aug. 1, 1904..	Harry J. Miller & Frank Dake.
63	47·24	"	1904 .	Nov. 28, 1904..	Wm. Woodnay.
64	33·63	"	1904.	" 3, 1904..	Miss Iter A. Board.

GROUP No. 6.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
15	80·02	H. G. Dickson.....	1905..	June 15, 1905..	Survey Office, Y. T.
16	80·01	"	1905..	" 15, 1905..	"

GROUP No. 7.

Lot No.	Area in Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.
8	40·01	C. W. MacPherson .	1904..	Sept. 28, 1904..	R. N. W. M. Police.

APPENDIX No. 6 TO THE REPORT OF THE SURVEYOR GENRAL.

LIST of Miscellaneous Surveys in the Yukon Territory of which returns have been received during the year ending June 30, 1905.

Year.	Surveyor.	Description of Survey.
1903...	A. J. McPherson ...	Reference traverse on McQueston River from the Stewart River to Haggart Creek.
1903........	" ...	Reference triangulation in the Duncan District extending from the McQueston River to the Head of Mayo Lake.
1904.... ...	" ...	Base Lines on Highet Creek and its tributaries Rudolph and MacRae Gulches.
1904........	" ..	Base Lines on Edmonton Creek and its tributary Battleford Creek
1904.......	" ...	" Cascade Creek.
1904........	" ..	" Steep "
1904.... ...	" ...	" Ledge "
1904.... ..	C. W. MacPherson..	*Dawson & Whitehorse Road, Stewart Crossing to Yukon Crossing.
1904.... ...	A. J. McPherson ...	Yukon River traverse, Moosehide to Thistle Creek.

* In eleven sections.

APPENDIX No. 7 TO THE REPORT OF THE SURVEYOR GENERAL

STATEMENT of work executed in the office of the chief draughtsman.

Returns of surveys examined :—	
Township subdivision	599
Township outlines	149
Mineral claims	53
Correction and other miscellaneous surveys	93
Township plans completed for printing	527
Preliminary township plans prepared	550
Proofs of plans examined	527
Outline sketches prepared	1,783
Plans of Yukon lots received	57
Plans of miscellaneous Yukon surveys received	9
Tracings of Yukon survey plans made	72
Sectional maps revised but not reprinted	19
Sectional maps revised and reprinted	10
Sectional maps printed	79
Declarations of settlers received	466
Progress sketches received and filed	850
Miscellaneous plans and tracings made	369
Applications for various information dealt with, about	1,055
Field books received from record office and used in connection with office work	2,829
Plans received from record office and used in connection with office work	962

P. B. SYMES,
Chief Draughtsman.

APPENDIX No. 8 TO THE REPORT OF THE SURVEYOR GENERAL.

STATEMENT of work performed in the Survey Records Office for the twelve months ending June 30, 1905.

Files received and dealt with	3,596
Letters drafted	3,412
Reports, drafts, memos. to Council	3
Plans, tracings, &c., copied and compiled	410
Statutory declarations copied and mailed	409
Plans sent to agents, registrars, &c	8,405
Pages of field notes copied	660
Prints of plans received and stored	55,763
Original plans received and recorded	897
Original field books received and recorded	554
Letters written to agents, registrars, &c	792
Registered parcels mailed	878
Work done for Topographical Surveys Branch :—	
Books searched for	2,995
Books sent	2,641
Books returned	2,302
Plans searched for	1,079
Plans sent	898
Plans returned	111
Volumes sent	38
Volumes returned	15

In addition to the above, all the field books in the office, over 7,000, were removed from the vault and placed in the new steel cases furnished by the Eclipse Office Company.

Advantage was taken of the change necessitated by the new furniture to re-index and re-arrange all the record plans which now number over 11,000. A new index of the record plans numbered consecutively was made. All the printed plans were arranged and indexed.

During the year four members of the staff were working almost continuously on the maps prepared under Mr. Young's supervision, showing lands taken up and lands yet available in the even and odd numbered sections respectively of the North-west Territories and Manitoba.

C. J. STEERS,
In charge of Survey Records.

APPENDIX No. 9 TO THE REPORT OF THE SURVEYOR GENERAL.

STATEMENT of work executed in the Photographic Office during the twelve months ending June 30, 1905.

FOR THE DEPARTMENT OF THE INTERIOR.

—	4 x 5	5 x 7	8 x 10	10 x 12	11 x 14	16 x 18	18 x 20	24 x 30	30 x 36	36 x 42	42 x 48	Total.
Wet plate negatives	22	....	83	......	66	719	31	.....	......	......	.....	921
Zinc transfers	.....	.....	3	....	9	..	663	.....	.....	....	....	675
Dry plate negatives	156	94	....	......	.	.....	.....	.....	.....	....	.....	250
Bromide prints	...	232	74	9	627	......	212	23	51	1	5	1,234
Vandyke prints	..	.....	22	.....	16	....	53	190	120	2	...	403
Silver prints	271	.....	447	....	4	......	......	.....	......	.....	..	722
Coloured photographs	.....	...	79	...	..	......	......	....	.....	.....	....	79
Transparencies	.....	.....	...	....	12	......	.....	.....	....	.....	.....	12
Total	449	326	708	9	734	719	959	213	171	3	5	4,296

FOR THE GEOLOGICAL SURVEY.

—	4 x 5	5 x 7	8 x 10	10 x 12	11 x 14	16 x 18	18 x 20	24 x 30	30 x 36	36 x 42	42 x 48	Total.
Dry plate negatives	120	36	.....	....	....	....	.....	.....	..	......	......	156
Bromide prints	..	....	.....	....	50	......	......	......	..	......	......	50
Silver prints	169	58	18	...	......		......	......	.....	......	......	244
Total	288	94	18	.....	50	..	......	......	....	......	.....	450

APPENDIX No. 10 TO THE REPORT OF THE SURVEYOR GENERAL.

STATEMENT of work executed in the Lithographic Office during the twelve months ending June 30, 1905.

Month.	Maps.		Township Plans.		Forms, &c.	
	No.	Copies.	No.	Copies.	No.	Copies.
1904.						
July	7	1,425	22	2,200	3	1,600
August			49	4,900	3	2,800
September	4	1,200	40	4,000	5	3,000
October	17	8,450	54	5,400	2	450
November	5	600	34	3,400	5	3,250
December	26	13,225	30	3,000	6	2,300
1905.						
January	24	5,100	14	1,400	4	6,026
February	17	1,450	66	6,600	3	2,600
March	19	1,010	49	4,900		
April	2	1,000	43	4,300	6	2,050
May	6	2,400	64	6,400	1	3,000
June	2	3,900	59	5,900	6	6,800
Totals	129	39,760	524	52,400	44	33,876

SUMMARY OF WORK FOR THE YEAR.

	No. of Jobs.	No. of Copies.	No. of Impressions.	Cost.	Cost per Map or Form.
Maps	129	39,760	82,510	$2,682 85	20·79
Townships	524	52,400	53,200	3,458 99	6·31
Forms, &c.	44	33,876	33,876	557 31	12·66
Totals	697	126,036	169,586	$6,699 15	

APPENDIX No. 11 TO THE REPORT OF THE SURVEYOR GENERAL.

REPORT OF C. F. AYLSWORTH, D.L.S.

SURVEYS IN MANITOBA DURING SEASON OF 1903.

MADOC, March 9, 1905.

E. DEVILLE, Esq., LL.D.
Surveyor General,
Ottawa.

SIR,—I have the honour to report that pursuant to instructions from you dated April 25, 1903, I arrived in Winnipeg on May 4, and the next day I went to Teulon to dispose of the transport outfit stored there by D.L.S. St. Cyr. After selling a portion of it I despatched B. Langly with the balance to Stuartburn. Upon my return to Winnipeg, I received instructions from you to dispose of some transport articles in the hands of D.L.S. Bourne, which I did ; a report of which I have already made to you.

I then went to Stuartburn and from there to township 1, range 14, east of the principal meridian, which township I was to subdivide but found it was impossible to do this for water, such work only being possible in the winter when the ground is frozen. From there I went and made a traverse of Whitemouth river in township 11, range 11, east of the principal meridian, after finding that it was impossible to subdivide township 10, range 11, east of the principal meridian during the summer months. After completing this traverse I proceeded to townships 27 and 28 in range 29A, west of the principal meridian, to subdivide them. I arrived there on June 24 and completed the subdivision of them on July 30. I reached the township by a good trail from Grand View. I found the soil in these townships to be excellent except in the extreme north end of township 28 where the surface was somewhat damaged by some large muskegs and sloughs; and in the extreme south end of township 27 where sections 11, 12, 13 and 14 are broken by Boggy creek ravine. The land must have had the reputation abroad of being of a very desirable quality as people were rushing in from all quarters to secure homesteads, and although every acceptable homestead quarter had been squatted upon previous to our arriving to subdivide the township, still almost every day after our arrival others would come along and ask us regarding the system of survey and whether we knew of any available land, and they were not discouraged by a negative reply, but would either endeavour to pre-empt or squat upon odd numbered quarters, upon one pretext or another. The greater portion of the land in these townships is scrubby prairie. There is no timber worthy of mention. I do not believe there would be any more than would suffice for temporary building and fencing, and one winters supply for fuel. There is scarcely any available hay in these townships. The water is all good and fresh with a small percentage of alkali, but a permanent supply may be had in abundance by digging from twenty to forty feet. All the slough brooks shown in the notes go dry during the summer months of dry seasons. Boggy creek which passes through the south end of township 27 is a deep sluggish flowing stream about twenty-five links wide, of no commercial value except as a source of water supply for stock, and as far as my observation extended I saw no site for a water power. The climate is as satisfactory as in any other quarter of Manitoba. Although we had a severe snow storm on September 12, while I was there, that storm was general and caused a great amount of damage to crops and stock. I saw some very good samples of many varieties of grain and vegetables grown here and altogether I consider it a decidedly good district for mixed farming.

While we were engaged at this work, the Canadian Northern railway contractors were encamped in Boggy creek valley at the south end of township 27, grading that railway and tracklaying was being extended from Grand View. At a point about five miles east of Boggy creek railway crossing a little village with a pretentious grain elevator was rapidly developing into business-like proportions, thus displaying their confidence in the productiveness of the adjoining district. On account of the heavy grading and deep cutting in descending to and ascending out of Boggy creek valley, the contractors were detained at this point about four months, but I venture the assertion that the view to be had from the train at a point just entering this valley from the east will be one of the most desirable and attractive along the line of the Canadian Northern railway between Winnipeg and Edmonton.

I then left for Valley river to survey the north boundary of township 26 in ranges 25 and 26 west of the principal meridian. I arrived at this work by following Mr. T. A. Burrows' lumber trail, passing along Valley river from the Indian reserve of that name. The reserve may be reached by excellent trails from both east and west. The soil along these two boundaries is generally a clay loam with clay subsoil and when cleared will be suitable for mixed farming, as good vegetables are grown on the reserve four miles south. The country is now densely timbered with poplar and spruce, and the surface is rolling. The water in Valley river is fresh and rapid flowing, but I did not observe any sites for developing power. In the lakes the water is of a very alkaline nature. I fancy this district in the hills is more subject to thunderstorms than the prairie and at present rather more inclined to summer frosts.

Mr. Burrows is carrying on extensive lumbering operations in this district and further to the north and floating his logs down Valley river to his large saw mill in Grand View.

On finishing this work I left for township 27 in ranges 29 and 30 to establish all the section and quarter section corners in those townships that D.L.S. Belanger did not find during his examination the previous season.

After the completion of these townships on October 14, I left, pursuant to instructions dated September 25, to survey sections 4 and 22 in township 26, range 26 west of the principal meridian. I first surveyed the south boundary of this township and then proceeded to survey those two sections which I completed on October 31.

I may be permitted to report, without going into details, that I was seriously handicapped during this season by a very inefficient party.

On November 2, I broke camp, stored my outfit in Grand View, and, after discharging my party, I arrived home on the 10th.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) C. F. AYLSWORTH, Jr.,

D.L.S.

APPENDIX No. 11a TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF C. F. AYLSWORTH, D.L.S.

SURVEYS IN MANITOBA.

MADOC, March 6, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to inform you that pursuant to instructions dated December 30, 1903, I left Madoc on January 12 to resurvey and re-mark the corners in Rivertown, or what is now called Icelandic river, as the post office there is called by that name.

I proceeded to Winnipeg, and after making some arrangements and engaging one man, I went by train to Winnipeg Beach, and from there I proceeded by sleigh to Gimli ; and thence to Icelandic river. I found the winter roads to be in excellent condition for travelling on account of the immense freighting of fish that passes over them at this season from that portion of Lake Winnipeg lying north of Icelandic river. I am told that some of the freighters go as far north as within fifty miles of Norway House. The teamsters and horses on these trips suffer a great amount of hardship on account of lack of accommodation along the route. The population of Icelandic river is exclusively Icelandic, and they do not indulge in any farming worthy of mention ; depending almost entirely upon the fishing resources of Lake Winnipeg. The people in the settlement adjacent to Icelandic river state that they do not desire to clear their homesteads of the heavy growth of timber that they are generally covered with, until they have been supplied with railway facilities for shipping this valuable timber to market and they are employing every available means of impressing upon the different railway companies their wants in this respect. And it has been suggested that the settlers would cut out the right of way provided a company would agree to construct a railway to afford them means of intercourse with the outside world.

Although I was informed that the original corners were lost, I found, as the notes of the resurvey of this village site will show, many of the original corners, causing the work, from the surveyor's standpoint, to be satisfactory. Some of the buildings erected, were found to be somewhat out of the position they were intended to occupy because the owners had made some measurements to locate their lots on the basis that the streets were one chain wide, whereas they are in reality one chain and a half wide. I began the resurvey of this village by first locating carefully the meridian along the east side of section 20, township 23, range 4 east of the principal meridian as the village is situate on the southwest quarter of section 21 and the southeast quarter of section 20. As the meridian quarter post and that at the southeast angle of section 20 had disappeared years ago, I was compelled to commence the location of the meridian at the original quarter post I found at the middle of the east side of section seventeen, and from this point I ran the meridian north to the original post I found at the northeast angle of section 20. I then divided the chained distance thus found equally between the three quarter-sections, making due allowance for the road and established the lost corners and renewed the corners I found, according to the methods prescribed. During the progress of this survey I found that the original survey had been executed in an accurate manner. I planted axe hewn tamarac and spruce posts three inches square and twenty-four inches long, marked with a scribing iron, at all the corners excepting at one of the corners of all street intersections where I planted an iron post, marked with a cold chisel according to the directions prescribed. After completing the planting of the posts I made, a traverse of Icelandic river across the village connecting in passing with the production of each street, all of which is shown on the plan and notes of survey.

There is a creamery in the village operated by private individuals and patronized by the settlers. There are two general stores, a good blacksmith shop, two boarding houses, a good school and a farmers hall. While we were engaged on this survey we practically lived on coffee and fish, being I may be permitted to assure you a very agreeable substitute for the surveyor's usual ration of pork and beans. As coffee-makers I am firmly convinced that the Icelandic ladies would easily secure first prize in any competition in the art. They buy the coffee bean in the raw state and put it through the different processes of roasting and grinding to powder in just such quantities as they desire for each serving, which when steeped by them in their own inimitable style is simply irresistable.

Having completed the survey we proceeded to Winnipeg to organize a party to re-mark township 21, range 7, west of the principal meridian in which I was delayed on account of some very heavy snow storms. The outfit was delayed nearly a week in arriving at Reaburn on account of washouts along the line on the Canadian Northern railway.

Having organized a party on April 18, I left Winnipeg by Canadian Pacific railway for Reaburn and proceeded to township 21, range 7 west of the principal meridian, which we re-posted. There are a number of settlers along the lake shore in this township who are engaged almost entirely in stock raising, but wherever farming, such as the cultivation of grain and vegetables has been attempted singular success has rewarded their efforts. Although the settlement in this township was confined to the lake shore along what is known as the Colonization road, which enters at section one and passes almost diagonally across the township, and leaves it near the northwest angle of section 30, before we had completed the survey every available homestead quarter had been entered for. There is a great amount of muskeg throughout the north end of this township, but that did not deter the people. On June 9 we moved into and proceeded to re-post township 21, range 6, west of the principal meridian which we cmpleted on August 1. It is generally a dense scrubby poplar brulé excepting in the west tier of sections there are large areas of muskeg, which, in many places, are impassable and I cannot conceive how the surveyors in the original survey passed over them if they contained as much water then as now, but I am rather inclined to think that they did not, and the fact that what is locally known as Chippewa lake, near the northeast angle of section 6 is not shown on the original plan would appear to lend force to that theory although Chippewa creek, the outlet of this lake, appears to have an uninterrupted rapid flow of water emptying into Lake Manitoba.

There are many exposures of limestone throughout the south end of this township and when this district has been supplied with railway facilities it will be found a very valuable asset for building stone and the manufacture of lime. Whether it is on account of the proximity of the limestone formation or not, I found that the vegetables grown in this district wintered better and were of a finer flavour than any I had yet seen in Manitoba. These qualities in the vegetables were known in Winnipeg, where they always command superior prices. Another special feature of this district was its capacity for growing timothy hay. So it may be inferred that development is now only delayed by the absence of railway facilities ; the nearest railway being the Canadian Northern at Oak Point, twenty-five miles distant. When it became known that we were re-surveying this township, land seekers were arriving every day and upon our completion of the township every homestead quarter was entered for that was at all desirable, and many regrets expressed that more land was not available.

The original survey and telegraph line of the Canadian Pacific railway passes through this township and some of the old telegraph wire may be seen strung along the line yet. From about the east boundary of section 21, the old cleared right of way is now used as a trail to the narrows of Lake Manitoba, but it is almost impassable in some places. I did not experience any difficulty in finding the corners in this township except passing over the dangerous muskegs.

After completing this township and pursuant to instructions from you, dated May 6, I started for West Selkirk en route to survey a 'settlement at Manigotogan (Bad Throat) river.' We arrived at Selkirk by following the trail passing through Minnewakan, Clarkleigh, St. Laurent, Woonona, Oswald, Stonewall, thence across the bog a short distance north of Stony mountain to Lower Fort Garry and West Silkirk. Upon making diligent inquiry I found that the transport outfit should be dispensed with here, and that we would go by steamer to Manigotagan river and to this end I placed the horses on pasture and stored the remainder of the transport outfit. On the evening of August 13, we left by steamer for Manigotagan river. Upon our arrival there we were agreeably surprised at the activity of the settlement. Here we found a sawmill running night and day, employing about one hundred hands, illuminated by electricity and turning out between ten and fifteen thousand feet of sawn lumber per day, which is delivered in barges down to Selkirk. While we were there the James Drake Lumber Company, owners of the mills, were building a new steam tug to bring in supplies and deliver lumber to Selkirk. A pleasing feature of this district that soon became known to us was that we were in the land of the huckleberry, for here were many low rocky ridges on which they were to be had in abundance.

We commenced the survey of the settlement lots by first making a traverse of the north shore of Manigotagan river across the district proposed to be subdivided into a group of settlement lots. Subsequently I adopted this traverse as the location for the proposed road through the settlement. On the south side of the river I adopted some of the base lines as the most desirable location for the proposed road as it seemed to afford the most practicable route for construction and also did not cut up the good land along the river bank which was better adapted for agricultural purposes. I endeavoured to block out this group of settlement lots on bearings so as to give as little disturbance as possible to subsequent subdivision of the surrounding district into townships and sections. I connected the group with the Hole river Indian reserve by commencing at the post marking the southwest angle of the reserve and followed the eastern limit of timber berth No. 544 to where the same intersects the easterly production of the northerly limit of lot number one as shown on the plan.

I have executed this survey in accordance with your instructions and the instructions prescribed in the Manual.

After leaving the banks a few chains on the north side of Manigotagan river, the land will not be suitable for agricultural purposes until a large amount of money has been expended upon the drainage of it. It was drawn to my attention by Mr. James Drake (of the Drake Lumber Company) that they were desirous of seeing the settlement subdivided for the convenience of the settlers who when they become owners of the land would then become attached to the neighbourhood and thus their services would be always available to him, but they did not want their mill site to be disturbed, and they also did not want to be disturbed in the privilege they have enjoyed of using the cove along the front of lot No. 8 to harbour their logs held in booms, previous to cutting them. Captain William Robinson, who also carries on lumbering operations in this district floats his logs, inclosed in booms into the cove at the east side of the point at the front of the west side of lot No. 9 previous to loading them by a steam propelled endless chain carrier onto barges. With a view to facilitating these privileges to each of these lumbermen and at the same time, in order that the occupants of lots 8 and 9 may have access to the river, I have placed a road allowance from the main road to the river front at station 9 on lot 9. These lumbering operations are only temporary here and will be abandoned when their limits are depleted of timber and then these strips of land between the road and the river could become the absolute property of the owners of land for which they form the front.

After the completion of this survey on October 5, we returned by steamer to West Selkirk, where we collected our outfit and on the 11th proceeded to township 11, range 7, east of the principal meridian where we made a restoration survey of the south boundary of that township. On the night of the 17th we had the heaviest rain and thunderstorm I think I ever witnessed, and as we were encamped on somewhat low ground, our quarters became anything but comfortable.

On the 18th I broke camp and left for Winnipeg. I went in by one of the teams, which I sold and the remainder of the party came to Winnipeg via Tyndall. After discharging my party I arrived home on October 25.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) C. F. AYLSWORTH, Jr.,

D.L.S.

APPENDIX No. 12 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF P. R. A. BELANGER, D.L.S.

RENEWAL OF SURVEY MARKS IN EASTERN ASSINIBOIA.

OTTAWA, March 11, 1905.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I beg to submit the following general report concerning my survey operations during the past season.

In accordance with your instructions dated March 16, 1904, authorizing me to continue the restoration of survey monuments in the district of Assiniboia, I started from home on April 7, for Saltcoats where I had to get the transport outfit which I had left at that place for wintering, and I reached there on the 12th.

The next day I sent three men to take possession of the outfit and bring it to Yorkton, but before they could leave Saltcoats a heavy snow storm arose with a strong north wind which piled the snow in banks which proved too deep to pass through with carts and wagons which after a vain attempt to come through were obliged to return.

This storm was followed by a cold spell which compelled me to proceed to Yorkton by train to provide for hotel accommodation for my assistants and the 20 men who had been appointed on my party and whom I had instructed to meet me at that place on April 15.

Here I had to wait with my party till the 21st, before the snow had melted sufficiently to allow me to bring my transport outfit from Saltcoats, but after this unavoidable delay I proceeded at once to my initial point in the Beaver hills, which I reached just in time to avoid the flood and the great thaw which rendered the roads impassable for several weeks.

I started work by restoring the survey marks of township 25, range 11, west of the 2nd meridian, and after having also restored those in the adjoining townships I worked southerly to township 23, range 12, and then turned westerly restoring the marks in township 23, ranges 12 to 19, when I decided to postpone the work for some time in order to perform the Willow Bunch surveys, before proceeding northerly.

On June 25, I proceeded to Willow Bunch via Regina, a distance of about 260 miles for the round trip. This journey together with the restoration of survey marks in eight townships which comprised all the surveys that had been made at that place kept me busied for a full month, and it was not before July 28 that I could resume operations in township 23, range 19, from which I worked northerly towards Quill lake restoring all old surveys comprised between ranges 16 and 20 as far north as township 33 inclusive. This work was completed by October 17, when I immediately went to Touchwood hills where I renewed monuments in townships 27 and 27A, ranges 13 and 14 after which I made the same operations in township 32, range 12, and then headed towards township 28, ranges 7 and 8, where I closed my season's operations on November 26.

Besides the renewal of surveys above mentioned, I also surveyed a small piece of land in actions 11 and 12 of township 26, range 17, which had been left unsurveyed, caused by change in Gordon's Indian reserve.

During the course of the season, I re-marked the corners in 65 townships in some of which they were almost entirely obliterated, principally those which had only been marked with wooden posts. As to those which had been marked by mounds and iron or wooden posts, the mounds though partly obliterated were easily found, but the wooden posts were so far gone that the markings on them could not be read. As to the iron posts, 50 per cent had been taken away.

In township 28, range 8, where there is a settlement of Galicians, none of the settlers had found the corners of their homesteads. They were so badly obliterated that it was only by running and measuring all the meridians and section chords that I could locate the charred or rotten remains of posts generally buried under a thick accumulation of hay, leaves, wood and moss.

All survey marks restored as far as possible according to the latest regulations of the Manual, but in a few cases, where these could not be followed, I proceeded as already explained at full length in my last year's report for the same kind of work.

Large errors were found in the position of monuments in several townships, and correction was generally applied where the land was vacant, but I regret to say that in township 23, ranges 11 and 12, two of these errors were such that no correction could be made without depriving the owners of land of the improvements made on their homesteads. These improvements consisted of a house and a stable in one case, whilst in the other they represented about 30 acres of land under cultivation. In these cases I did not venture to make any correction.

Many irregularities were also detected in the character of monuments as found on the ground compared with their description in the original field notes. Some of these being described as witness mounds in notes, proved to be regular mounds at true corners, and others shewn as true corner mounds in notes were nothing but witness mounds on the ground.

Irregularities were also discovered in the marking of witness mounds whose distance from true corners as shewn in notes is erroneous.

A memorandum accompanying my plans of renewal will indicate the location of all these errors and irregularities and show the corrections applied in each case.

Double rows of marks for the same corners were also found in several townships, some of them being mounds made on lines surveyed according to the old system of survey, and re-surveyed later for the 3rd system and marked accordingly without destroying the monuments of the old system. Similar double marking had also been made by subdividers who having detected errors in their survey applied correction by erecting new monuments at the right places neglecting to destroy the wrong ones, or destroying them only partially.

The destruction of such erroneous marks is also shewn on my plans together with their distance from the right ones.

The country I passed over during the course of my operations in the Touchwood hills district was mostly vacant at the beginning of the season, but before the middle of the summer was over, settlers were coming in every day filling up the country so fast that tents and buildings under construction were to be seen in all directions over the land I re-marked, principally in the vicinity of the Canadian Pacific Railway known as the 'Pheasant Hills' branch which runs westerly across the southern part of the district and also along the proposed Grand Trunk Pacific Railway which will run south of Quill lakes.

As to the Willowbunch country, it is mostly vacant, being only occupied by ranchers, and so long as railway communication is not established in the immediate vicinity it is bound to remain in its present state which however may be called prosperous owing to the large quantities of cattle, horses and sheep which are raised at that place and sold at great profits.

I might state here that the large number of settlers who had come into the Assiniboia district since last year seemed quite satisfied and, I have no doubt, with perseverance will soon be in a prosperous condition.

Before closing this report, I am also pleased to state that, with a few exceptions the whole of my party gave me entire satisfaction, everybody trying his best to please by doing his work conscientiously. The great amount of work done during the season demonstrates also plainly the advantage of concentrating several survey parties under one chief in one camp, and such arrangement does not only insure rapidity of work but also reduces the expenses considerably.

From the 28th till the 30th November, I was occupied in discharging my party and making final arrangements for wintering my outfit, and disposing by auction sale articles considered unfit for further use, and on December 1, I boarded the train for home.

I have the honour to be, sir, your obedient servant,

P. R. A. BELANGER, *D.L.S.*

APPENDIX No. 13 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF EDGAR BRAY, D.L.S.

SURVEY OF OUTLINES IN PEACE RIVER DISTRICT.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

Sir,—I have the honour, in accordance with my instructions, to submit the following report on the survey of that part of the 5th meridian which lies in township number 72, and also on the survey of the 19th base line, from ranges 1 to 14, both inclusive, west of the 5th meridian.

I left home on April 20, 1904, and arrived at Edmonton on the 29th, having remained in Winnipeg four days, hunting men and procuring camp outfit. At Edmonton I had some difficulty in finding suitable horses at reasonable prices, but after a few days hunt I was offered a lot of fifteen fair animals which I purchased.

Supplies, &c., were then bought and the men engaged and on May 13, we left Edmonton and arrived at Athabaska Landing on the 17th of that month. Here the provisions were transferred to a boat for transportation up the Athabaska and the camp outfit, &c., packed on the horses and sent across the country to the mouth of Lesser Slave river, where everything arrived on May 28.

From this point we cut a pack trail to the 5th meridian and thence north to a suitable camp ground about 75 chains north of the southeast corner of township 72, range 1, but owing to some very bad swamps we did not get all our outfit moved until June 2.

Cloudy weather prevented an observation until June 6, therefore on that day I commenced the survey of the 5th meridian, and thereafter the survey was continued as steadily as the weather and other circumstances permitted.

Twice, during the survey, a considerable interval elapsed between astronomical observations, the first being in July and the second in September, caused in the first instance by dense smoke, and in the second by almost continuous clouds and frequent rains, which also retarded the progress of the work.

On Saturday, June 25, John Bower, a member of my party, while bathing and practically alone got into deep water and was drowned. His body was recovered and buried, and his relatives informed of the accident.

On June 30, while moving camp, a bush fire destroyed what had been left behind for a second trip, consisting mostly of clothing belonging to myself and members of my party, with some smaller instruments and (excepting the field notes) the records of the survey up to that date. An investigation showed that the fire did not start from any of our camp fires, but aparently had its origin some distance to the southeast.

As this fire burned some of the tables for determining the azimuth of the line, by time observations, I was obliged, thereafter, to take these observations at either elongation of Polaris ; especially because, soon after the fire, the main spring of my sidereal watch was found broken.

In October I closed the survey in time to go down the lake and rivers by the last possible boat. This plan was adopted because my provisions were nearly used up. No adequate supply could be got at the lake, and there was no chance of getting more until the rivers were frozen and passable for teams which might be late in December. My transit, also required repairs, on account of its having been roughly handled by a bear, during our temporary absence from the line.

(Note.—Description of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

Good water was always easily found within the country covered by the survey.

The Moose, Assineau, Swan and Driftpile rivers are fine streams, but as their value for water power is limited to their lowest water, their importance for that purpose is very small. On the other hand Lesser Slave river always has a considerable flow of water, but only in the lower part, near the Athabaska, can banks be found sufficiently high to allow for the erection of dams.

Some differences of opinion exist regarding the climate and the agricultural possibilities of this region, and respecting that matter I may mention that our last frost in spring was about June 20, and the next thereafter was on August 28, an interval of about ten weeks. I have had some experience in the North-west and have noticed some summers where the interval betwen frosts was very much shorter than the above, and that in districts where farming is now carried on with success; a result due, no doubt, to cultivation of the soil and drainage. I think I can safely say that there is no material difference between the climate at Lesser Slave lake and that of the Saskatchewan.

Small quantities of coal were noticed in the larger streams running into Lesser Slave lake, which shows that coal may be found up stream, probably in Swan hills.

Waterfowl and other game birds were not plentiful, but indications of moose, deer and bears were so often noticed that I believe these animals are very numerous, especially south of Lesser Slave lake.

I have the honour to be, sir,

Your obedient servant,

EDGAR BRAY, *D.L.S.*, 1904.

APPENDIX No. 14 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF J. D. CRAIG, D.L.S.

INSPECTION OF CONTRACT SURVEYS IN EASTERN ASSINIBOIA AND SASKATCHEWAN AND IN MANITOBA.

OTTAWA, March 17, 1905.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on examination of contract surveys in the eastern portions of Saskatchewan and Assiniboia and in Manitoba during last season, under instructions from you dated March 18, 1904.

After having collected the necessary information with reference to the contracts, I left Ottawa on April 26 and arrived at Regina on the 29th. Here I found that there were no trains for the north, there being washouts at several points on the railway between Regina and Prince Albert. The town was full of settlers and others waiting to get north, and there were many cars of stock and settlers' effects in the freight yards. I was detained here until May 7. three days of this being spent in quarantine, as smallpox had broken out at the hotel where I was staying. I reached Prince Albert on May 9, after a forty-two hour trip, most of the time in a crowded freight car. The Qu'Appelle river was crossed at Lumsden on small scows and the Saskatchewan at Saskatoon in a small steam ferry.

After outfitting at Prince Albert. I was forced to wait until May 24 for my baggage, which did not arrive till that date. I left on the 25th for contract No. 15 of 1904, and camped in the contract that night. After examining this contract, I went to contract No. 14.

On reaching Prince Albert on June 17. after having finished this contract, I received your instructions to proceed to Redberry lake to contracts Nos. 10 and 11 of 1903. After restocking with provisions, I left Prince Albert the next day and arrived at the lake on the 21st. We experienced a rather severe hailstorm that evening, which badly damaged two tents. I spent about three weeks in these two contracts; then went east to contract No. 13, near Fort a la Corne, spending one day in Prince Albert buying provisions and having the horses shod.

Reaching la Corne on July 16, I learned that Mr. Reilly had left his work, after having completed only two townships. These were examined, and I left for contract No. 11, being forced to go round by Melfort, and east and north from there, as there was no direct trail from la Corne. After examining this contract, I proceeded to Contract No. 10 via Melfort and then spent three days, August 15, 16 and 17, with Mr. Lemoine in contract No. 9, north of the Quill lakes. While the wagons and outfit were moving eastward from here towards Fishing lake, I made a trip by buckboard to Nut lake to try to ascertain in what township Mr. Cavana (contract No. 8) was working. I was unable to do this, and went next to contract No. 55, near Touchwood. From there I went north through Contracts Nos. 7 and 6 to No. 59 north of Swan river, then south, over the western shoulder of Duck mountain, through contracts Nos. 5 and 54 to No. 58, thence northeast to Nos. 4 and 64 east of Dauphin lake.

The horses were, by this time, very much fagged by so much moving, and by the poor feed available, and I was forced to stay at Makinak three days, November 11, 12 and 13, to rest them. Then I went southwest over Riding mountain to the addition to contract No. 26.

From here I proceeded by rail with the outfit 250 miles to contract No. 3, southeast of Winnipeg, reaching there on December 3. After examining this contract the outfit was shipped back by rail to Solsgirth for a supplementary examination of contract No. 26, as per your instructions. This was finished on December 31, and after arranging for wintering the horses and storing the outfit, I left for Ottawa on January 4 and reached there on the 8th.

The season was, on the whole, a good one for field operations, very little bad weather being experienced. The main trails travelled over were, as a rule, good, but when off the main trails, the travelling was very rough, and very hard on horses and outfit. One horse became so weak that he had to be left at Carlton on July 12, and he has since been sold.

The distance travelled by the outfit as a whole was 1,735 miles. In addition to this there were 600 miles covered by various side trips and 500 miles by rail. In all some eighteen contracts were examined. Nos. 8 and 9 had not enough work done in them when I was in that district to make an examination of any value, and they were left, as at that time, I expected to be able to return later in the season. This, however, was found to be impracticable.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) J. D. CRAIG.

APPENDIX No. 15. TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF J. J. DALTON, D.T.S.

SURVEYS IN ASSINIBOIA AND ALBERTA.

WESTON, April 5, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit my report of surveys made by me last year in Assiniboia and Alberta, under your instructions of April 8, May 26, June 27, &c., 1904.

I left Milton on April 13 and arrived at Calgary on Sunday, 17. The following two weeks were occupied in collecting transport and preparing for the surveys. I engaged a car at Calgary and transferred all my horses, outfit and party to Brooks arriving there after much delay on May 4 when I immediately assembled the wagons and prepared generally for a start on the following morning and arrived at township 22, range 9, west of the 4th meridian on the 7th and on the 9th, I commenced the inspection of this township by running the north boundary of section 19 and other lines again from this one finding it necessary to re-survey the whole township upon which I have already reported to you.

On June 13 I arrived at Calgary by train, purchased supplies, engaged new men and returned meeting my party at Bassano on the 15th. I proceeded to township 27, range 17, west of the 4th meridian arriving early on the 17th.

I comenced the survey of township 27, ranges 17 and 18 by running their south boundaries and then running the meridians to Red Deer river.

The character of the country in township 27, is very similar to that of the first mentioned township all being crossed by Red Deer river but the ravines are much longer in township 27 and become veritable canyons as they approach the banks of the Red Deer being formed of cut banks from 300 feet to 400 feet high over which it is impossible to cross and which had to be triangulated in order to carry the lines over them.

The three foregoing townships are best adapted for ranching and are apparently fully occupied by men of that craft who have it all or nearly all fenced. Some of the upper lands are cultivable but are rather too broken to raise cereals in sufficiently large quantities. The soil generally is sandy loam with clay subsoil; on the hill sides and much of the river valley it is barren and bare. There is very little scrub or timber and it occurs only as a margin on the river banks, and in some of the ravines. Coal is found in township 27, range 17.

On July 8 I started on my return journey to Calgary and arrived on the 13th without incident and camped on the Elbow, township 23, range 1, west of the 5th meridian. I proceeded to traverse this river (at this camp) I was much delayed by sickness among my horses on which you have received my report).

On July 25, I commenced the survey of Sheep river in township 20, range 2, west of the 5th meridian which with the survey in township 20, range 3, detained me until August 18.

There are 15 settlers in the last mentioned township, 9 of whom made their declaration, one deliberately refused and others though notified of the opportunity were at least indifferent about it.

There is evidently one good coal seam on section 2 of this township which had been worked for several years but is now in disuse. The soil generally is 6 inches black loam with clay subsoil on the ordinary level, on the hills which range to 400 feet the soil is lighter and rock protrudes, but the pasture is luxuriant and the country is excellent for ranching but too hilly and broken for farming on a large scale. The township is drained by Sheep river and some of its small tributaries.

Township 19, range 3, west of the 5th meridian has two new squatters on sections 12 and 11. I located these by running the north boundaries of their sections from the northeast corner of section 12 and then the meridional boundaries. Tongue creek runs through these sections and Lineham post office is on section 35. This township is hilly but excellent for ranching, hay and natural shelter being abundant.

Township 13, range 3, west of 5th meridian. As the south boundary of this township had not been run, I ran a section line to it and then I ran it before proceeding with the survey. This chord was chained twice owing to a mistake in the outline survey of one chain. This township is a favourite ranching district and is nearly all taken by ranchers on account of the immense growth of grass on both high and low land. The soil is deep black and sandy loam and subsoil from sandy to clay. Spring water is abundant. Timber is found in small quantities along Highwood river both poplar and spruce 20 inches in diameter. Two fine varieties of trout are abundant in all the streams.

Township 16, range 1, west of 5th meridian. I finished the survey of this township which is traversed by two branches of Mosquito creek which run through sections 2, 3, 10, 14, 15, 16 and 17. The north part of this township is well watered witr springs which unite into creeks. There is no timber and very little brush; grass is luxuriant and in favourable seasons is cut over the tops of the hills which are about 400 feet high. The soil is generally good black loam with sandy subsoil. The township is nearly all ranched.

Township 17, range 2, west of 5th meridian. I retraced the boundaries of sections 3 and 4 which are nearly all hay land and are traversed by Stimson creek, a stream 20 links wide.

Township 15, range 2, west of 5th meridian. In this township I ran the east boundaries of sections 29, 20, half of 17 and 36, range 3, all of which is well suited to ranching having plenty of hay land and natural shelter. The soil is deep loam.

Township 9, range 2, west of 5th meridian. I completed the survey of this township by running the east boundary of section 31 and the north boundaries of 31 and 32 which were over hills 600 or 700 feet above the bed of Todd creek.

Township 8, range 2, west of 5th meridian, though very hilly is an excellent township for ranching having abundance of grass and natural shelter.

Township 6, range 2, west of 5th meridian. I ran the east boundary of section 30 and the north boundary of section 20, which are rather mountainous though excellent ranching land with good grass and shelter. Wheat and potatoes are successfully grown here. There is coal on section 29.

Township 6, range 3, west of 5th meridian is altogether mountainous and is very much covered with small timber, jackpine and poplar just recently burnt. The land is not arable more than in small patches. I surveyed sections 17, 20, 21, 22, 27 and 28 which was all that could practically be done from any camp along the South Fork river. To move my camp to the north of the township in order to complete the work there would require two or more days to go around by the Pincher creek trail. I was loath to do this knowing that the country was all burnt and would likely fail for want of pasture.

In travelling south from township 15 I followed the settlers trail to Willow creek and from this point I sent a mounted man down into township 14, range 1 who returned stating that he had gone 5 miles down the river and had found no new settlers and that the road was impassable for the outfit, (later in the season this proved to be incorrect). Proceeding south I arrived at Westrup creek and also at the end of the wagon trail. Contrary to the advice of settlers I continued my journey south between the Porcupine hills and the mountains but found it very difficult though practical for a strong outfit. Sometimes I had to put three teams to a wagon in order to climb some of the hills. After crossing township 12, the road was comparatively easy to the several points south. On leaving township 6, range 3, I proceeded to Pincher Creek with the intention of completing the surveys to the south of that place but on my arrival there I received notice of surveys required to the north and upon which I have already reported to you. I then proceeded to Calgary and placed my outfit for the winter about two miles west of Midnapore, dismissed my party and departed, arriving at Weston on November 23.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) JOHN J. DALTON, D.T.S.

APPENDIX No. 16 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF L. E. FONTAINE, D.L.S.

OUTLINE SURVEYS IN NORTHERN ALBERTA.

LEVIS, February 15, 1905.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on block outline surveys executed by me in Alberta district during the past season, in conformity with your instructions dated March 18, together with subsequent instructions of May 20, June 6 and August 19.

On receipt of your instructions and after attending to a few preliminary preparations, I reported at your office to obtain the necessary forms and data in connection with the work, and then left for Edmonton, where I was to organize my party.

On April 12, while in Calgary waiting for a train to proceed northwards, your telegram addressed to Mr. A. O. Wheeler, containing your order that I was to take charge of the horses and outfit used during the previous season, was handed to me. I then proceeded to the Rio Alto ranch on High river, where the horses had been wintered, and the outfit stored. Owing to the short notice and the roads being wet and heavy, it was impossible to undertake an overland trip to Edmonton. I therefore sent the outfit by rail, and it arrived in Edmonton on April 19.

The next few days were employed in ordering supplies, hiring men and taking steps to have four months' supplies freighted to a depot that I had decided to establish at the junction of the Macleod and Athabaska rivers; also the purchasing of horses to make up the number allotted and to replace those which were discarded on account of being too heavy and therefore not suitable as packers.

My organization was completed on April 28, but from then until May 3, owing to the prevalent rains, I was obliged to postpone my departure. On the last named date, conditions being favourable, I left Edmonton by way of St. Albert and Riviere Qui Barre and from there proceeded to the Pembina river, crossing by the Chalmers trail. The recent heavy rains had rendered the roads so soft that wagons would get mired, and in consequence we were obliged to double the teams on a load. The floods had in places damaged the culverts and bridges, necessitating temporary repairs to enable us to continue our journey. With these difficulties to contend with, progress was slow, and I was delayed somewhat in reaching the crossing.

On my arrival at the crossing, finding the water of the river of sufficient depth, I decided to use the river to transport the supplies and men, sending the horses by overland trail. Accordingly I built four strong rafts, and on May 12, I left for the sixteenth base line, at the 5th meridian, landing three days later, within two hundred yards of the said point.

At the starting point, on account of the cloudy weather and the smoky atmosphere, several days elapsed before I could take proper observations to carry on the survey. Then the operations had only been carried on a distance of one mile and three-quarters where the base line intersected an open muskeg of two and one-half miles in extent and surrounded by a tamarac swamp of one-half mile in width and flooded with one foot of water. The passing of this obstacle had to be done by running a right angled offset, which, of course meant additional work and impaired progress—eventually this being accomplished, the opening of the base-line was successfully carried on, and considering the heavy timber, good progress was made every working day; and on July 20 I intersected the east bank of Athabaska river, at which point I was to close the survey of this line.

My next work consisted in running the 15th base line across ranges 5, 6, 7 and 8, and in doing this no serious difficulties were encountered, and were it not for a few days delay at the start, owing to the inclemency of the weather, the work would have been accomplished in a remarkably short time.

The next clause in your instructions called for the opening of the 13th base line across ranges 6, 7 and 8. I may state that during this work, progress was greatly delayed owing to the scarcity of water, obliging us to have camp a considerable distance from the work, and in consequence entailing a loss of time in going to and fro. Nevertheless, the whole was eventually carried out.

I next gave my attention to the 14th base line, and proceeded as follows :—

1. I checked by observation the bearing of the line in range 6 and found it to be 270°.159.

2. I went to range 7, repeated the operation and found for the bearing of the chord 270°.196.

3. I retraced and chained the portion of the base line in range 7 run by Mr. G. P. Roy, D.L.S., during the present summer.

The line opened by Mr. Roy is a true prolongation of the portion of the township chord previously established, the chainage is satisfactory and the posts and monuments conform in all respects to the Manual of Surveys.

My next operation was to produce westerly the base line across ranges 8, 9, 10, 11 and 12. In ranges 8 and 9 I made a deflection south of west of ten minutes, that is to say, that in these two ranges the township chords are 269° 50′ instead of being theoretic. This was done so as to offset the deviation found in ranges 6 and 7, as explained above, and thereby place the line nearly in its proper latitude. In ranges 10, 11 and 12 the base line is theoretic.

On the completion of these operations I left for Edmonton where I discharged the party. A few days were devoted to settling survey accounts and making arrangements for the storing of the outfit, after which I left for home where I arrived on December 12.

Having given a brief account of the operations carried on during the season I will now give a description of the territory covered.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

Concluding, I may say, that in order to carry out my instructions I had occasion to cross in a southerly direction the area included between the 16th and 13th base lines, and out of it in my estimation the zone comprising townships 54 to 58 inclusive and from range 6, westerly to range 11 would be well adapted for settlement.

Before closing this report I must say that my assistant, Mr. J. E. Umbach was most willing and that he performed his share of the work with ability.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) LOUIS E. FONTAINE.

APPENDIX No. 17 TO THE REPORT OF THE SURVEYOR GENERAL.

REPORT OF ERNEST W. HUBBELL, D.L.S.

RE-SURVEYS IN NORTHERN ALBERTA.

OTTAWA, December 30, 1904.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report of my survey operations during the past season in northern Alberta, made under your instructions, dated March 18, 1904.

Leaving Ottawa on April 7, I reached Edmonton on Saturday the 16th, being delayed about two days en route by wash-outs on the Canadian Pacific Railway. On Monday the 18th, I had my survey outfit overhauled, horses shod, &c., and left the following day for Leduc (20 miles), where I arrived on the 20th. The next day was spent in making general repairs to outfit, completing the organization of my party, loading supplies, &c.

On the 22nd I left Leduc with my outfit, but owing to the almost impassable condition of the trails, it was necessary to hire an extra team of horses to assist with the transport, it being impossible to haul anything like an ordinary load with one team through such deep mud.

I arrived at section 2, township 50, range 27, west of the fourth meridian, the initial point of my survey, on Saturday the 23rd, and commenced the resurvey of this township on Monday by running the east boundary of section 2.

I completed the renewal and re-establishment of the survey monuments in this township as far north as the Saskatchewan river and by May 7, most of the portion which is under cultivation; the remainder is covered with poplar, willow and some spruce of fair size, more especially in the deep ravines which run into the river. Many of the survey monuments were obliterated, some entirely lost. In order to find the original corners, it was necessary to reopen all the old survey lines and chain them accurately—work equal to an original survey.

I also renewed the monuments on the north boundary of township 49, range 27, and next proceeded with the resurvey of township 50, range 28, west of the fourth meridian, and townships 50, ranges 1 and 2, west of the fifth meridian.

Not one iron bar was found in any of these townships, nor even at the township corners on the fifth meridian.

These townships are nearly all covered with a thick growth of heavy poplar, spruce and tamarac and great areas of windfall. The surface is broken by the deep ravines of Weed creek and Strawberry creek, the banks being in places three hundred feet in height and most precipitous. These streams average about fifty links in width, are from two to four feet in depth and have a good current, which at high water is sufficient to convey logs to the Saskatchewan river. Not the least difficult part of our work was the cutting of trails in order to move camp, and the climbing over immense windfalls and wading through deep muskegs to and from work every day was most fatiguing and laborious. Whilst in this vicinity, one of my best horses accidentally ran a piece of rotten wood into his chest, where it remained, we being at the time oblivious of the fact. We did all we could for the wound under the circumstances, but he failed daily. Five weeks afterwards we led him a 70 mile trip to Edmonton, where the veterinary surgeon extracted a piece of wood 1½ inches in diameter and nine inches long from his chest. I am glad to say the horse recovered after the operation and rapidly gained in weight and strength.

At the northeast corner of section 23, township 50, range 28, I found a difference of ten chains in the position of the river, as compared with the plan of the original survey. This I rectified by making a mound at 80 chains after resurveying township 50, range 2, west of the 5th meridian. I decided that it would be waste of time to resurvey further west for the present, more especially as there are no settlers in that vicinity, nor likely to be for a number of years, the townships being entirely covered with thick heavy timber and having no means of access. I concluded that it would be better to cross the Saskatchewan river and complete as much work as possible on the north side and also resurvey township 51, range 1, as instructed in your letter of the June 17. Not finding a ford, I was compelled to cross the river at Edmonton, which necessitated a detour of eighty miles or more.

We reached Stony Plain on July 15, commenced work the following day in township 52, range 27, west of the fourth meridian and completed the resurvey by the 30th instant with the exception of a few corners in the southeast corner, which were unapproachable owing to deep muskegs. This is one of the finest townships in the Edmonton district, and is nearly all under cultivation. The immense beautiful fields of waving grain give the passing traveller or emigrant but a faint idea of the vast resources of this fertile country. They reflect much credit on the settlers, who are chiefly Germans in this district.

I then resurveyed fractional townships 51 and 52, range 28, west of the fourth meridian, in which nearly every corner was obliterated or lost. I next resurveyed township 51, range 1, west of the fifth meridian, which required reposting very badly; one corner out of every five was obliterated or lost. It is fairly well settled, but about seventy-five per cent is covered with timber, principally of an inferior quality. I then completed the resurvey of township 50, range 28, west of the fourth meridian and township 50, range 1, west of the fifth meridian, which lie to the north of the Saskatchewan river, and on September 1, moved camp to township 51, range 27, and commenced the resurvey of the same.

This township is about one-third muskeg. two-thirds of the remainder being covered with poplar, tamarac and willow. Settlers of German origin occupy all the available land.

The system of drainage which is being gradually adopted by many settlers in the west, might be applied with advantage in this township.

From here, I moved camp to township 55, range 27, west of the fourth meridian, and completed the resurvey of the same by October 15. I then resurveyed townships 56 and 57, range 27, west of the fourth meridian, the latter being mostly covered with large timber, poplar, willow and spruce.

Owing to an accident which I received whilst riding, I was reluctantly compelled to close my field work earlier than I anticipated. After storing my outfit and sending my horse into winter quarters, I returned to Ottawa.

GENERAL REMARKS.

Settlers are continually going into this very fertile district, and as the greater portion of the open country is settled upon, they are gradually pushing into the more wooded country.

CROPS.

The crops this year on the whole correspond very favourably with other years. Oats averaged fifty to sixty bushels to the acre and wheat about thirty. The vegetables, as they have always been, are the finest in the North-west Territories. All sorts of wild berries are most abundant.

GAME.

Bears, wolves, foxes and muskrat are quite numerous, as are also prairie chicken, partridge, geese, ducks and the sand-hill crane.

CLIMATE.

Taken as a whole, the season was most favourable for vegetation and harvesting and for surveying operations in the field, the month of November being a summer month with sunshine, no snow and but little ice.

I have the honour to be, sir,

Your obedient servant,

E. W. HUBBELL, *D. L. S.*

APPENDIX No. 18 TO THE REPORT OF THE SURVEYOR GENERAL. REPORT OF ALFRED W. JOHNSON, D. L. S.

SURVEYS IN NEW WESTMINSTER DISTRICT, B.C.

KAMLOOPS, B.C., 1905.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—Before getting my party together I spent three days finishing up some work on the approach to the south end of the New Westminster railway bridge, and on Musqwam Indian reserve. On April 13 I went up to Chilliwak with a small party and began work a couple of days later on Chilliwak river in lot 439. The north boundary of this lot was in doubt, and it was not until several false starts had been made that we found one of the original posts, very rotten, but with bearing trees standing, and it was then a comparatively simple matter to retrace the lines.

On May 5 we moved to Harrison river, thence to Harrison Hot Springs on the 6th.

In my triangulation up the east side of Harrison lake in 1903 I had found a considerable difference between my work and that of the previous survey. My instructions were to run a triangulation up the west side of the lake as a check. So I measured a base at the south end of the lake as carefully as possible with what instruments I had, chaining over levelled stakes at 50 link intervals, on a wet day, and comparing with the standard tape. Stones with lead bolts let into them were sunk at each end of the base. In the triangulation all angles were read right round the circle, left and right, three angles in each triangle, and adjusted. The closing base was at the mouth of Silver creek, measured in 1903. This year's length of that base by triangulation differed from the actual measurement by about three tenths of a link, and confirmed my last year's report.

Following instructions I destroyed all the posts of the previous survey and put new ones in at the correct corners. I then established the north limit of the railway belt on the west side of the lake. Unfortunately before quite finishing the work there I cut my foot rather badly with an axe, and though the actual time lost while away getting it sewed up only amounted to a couple of days, the work was necessarily kept back somewhat during the next three or four weeks, as I had to confine myself to traversing on the water's edge and similar places, where crutches could be used.

Toward the end of July, after marking out the belt limit on the east side of the lake and connecting our work at the mouth of Silver creek with the mineral claims there, we began a series of lines up the creek, checked by a traverse, to get at the railway belt in townships 8 and 9, range 29, west of the 6th meridian. On July 29, I was summoned to Kamloops on a purely private affair, and after a couple of days packing in my absence, work ceased, and everything was run at my expense, until August 7, when I got back.

We got at the railway belt again on the east boundary of section 6, township 8, and followed it to the northeast corner of section 29. The last mile rose 3,700 feet from one corner to the other and as the belt limit then led over extremely precipitous country at the foot of the ice on Mount Douglas, I decided to continue the traverse of Silver creek and work up to the belt limit again at a more accessible point.

We had been packing for a month and were now too far from the nearest point to which canoes could be brought to make it worth while to pack in fresh supplies. So.

taking large packs, we left tents and clothes behind and kept the traverse going while food lasted.

Though I did not consider that there was time to reach the belt by means of a double traverse, every care was taken over the single one, the chaining being done twice by different men.

We touched the limit on the north boundary of section 16, township 9, range 29, west of 6th meridian and again on the east boundaries of sections 19 and 30, in the same township and range.

This was at the foot of a glacier on the north slope of Mount Douglas, an exceedingly rough piece of country.

As sickness and hardship had turned two men back, a couple of weeks before, and the rainy weather was beginning, I put witness posts in and went back to the mouth of Silver creek.

The timber up this creek will not bear comparison with that in the Chehalis valley, but the whole of what there is, is in the railway belt. The district has not been very actively prospected and the only mine being seriously exploited is on Fire mountain in provincial land. Except for a little bench land on the west side of the creek between Clear creek and the mouth and perhaps half a square mile right at the mouth there is no land fit for agriculture. Lower down the lake at 'Twenty Mile' point there is about a square mile altogether of fair land. After leaving this district we ran a traverse and put in two witness posts in sections 18 and 19, township 5, range 28, west of the 6th meridian, near Rainbow falls and three more witness posts on the south shore of Harrison river in sections 15 and 14, township 4, range 29, west of the 6th meridian.

On October 20, we moved to North Bend and next day camped on Boston Bar.

I began by retracing the north boundary of section 34, township 10, range 26, west of the 6th meridian and producing it across Fraser river. Running south I tied onto lots 1 A, and 30, group 1, and 8 lots, comprising the old townsite of Boston Bar. Section lines were run through these lots and produced as far as Shrypt-ta-hook Indian reserve. In township 11 a few lines were run and posts put in at the intersection of the Canadian Pacific Railway right of way and the legal subdivision lines.

On November 11 I paid off all but two of the men, who were retained to help me in the townsite of Boston Bar, a full party not being necessary. These were paid off on the 18th and I got into Kamloops the same night.

There is some bench land on the west side of the Fraser in sections 34 and 27, township 10, and in sections 11 and 12, township 11, but in general the mountain rises very steeply almost from the railway.

The season of 1904 has been exceptionally fine on this coast, and we did not lose four whole days on account of rain, which is a most unusual thing.

I have the honour to be, sir,

Your obedient servant,

ALFRED W. JOHNSON, *D.L.S.*

APPENDIX No. 19 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF G. J. LONERGAN, D.L.S.,

RESURVEYS IN EDMONTON DISTRICT.

BUCKINGHAM, QUE., April 10, 1905.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I beg to submit the following general report on resurveys made during the past season in the Edmonton district.

I left Ottawa on April 12, and arrived at Edmonton on April 18, here I had my outfit to meet me by previous arrangement. I made inquiries about the trail from Strathcona to Millet and was strongly advised not to attempt it with loaded teams, as the frost was coming out of the ground and it would be three days hard work. The difference of the freight rates on the provisions only and that for a car where I could load the entire outfit was so little that I decided on that latter. The morning of April 20, I left Strathcona and arrived at Millet in the township where my first work was to begin. The same afternoon I looked up old corners and the following morning commenced operations.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

After completing the surveys I returned to Wetaskiwin, where I paid off most of my men. I then drove my outfit to Edmonton, where I stored it for the winter. I was preparing to return east when I received your message to go to Banff, to do some surveying for the superintendent of the Rocky Mountain National park. This I did and then returned home, arriving after an absence of eight months and one day.

I have the honour to be, sir,

Your obedient servant,

G. J. LONERGAN, *D.L.S.*

APPENDIX No. 20 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF J. K. McLEAN, D. L. S.,

OUTLINE SURVEYS IN NORTHERN ALBERTA.

OTTAWA, October 17, 1904.

E. DEVILLE, ESQ., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to report as follows on my survey of township outlines in northern Alberta, west of the fourth meridian, during this season.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

As a whole none of these townships are of much value for agricultural purposes. However, where they are partially open there is a fine growth of summer feed.

There are a few settlers in the valley of the Towtinow along the Athabaska Landing trail. They keep stopping places for travellers and freighters, but have difficulty in getting hay, having to hunt the country and haul it long distances; the amount of good land in the valley is small and consists of occasional flats along the river. These settlers grow good potatoes and garden stuff. At Sandy creek in township 63, range 23, I saw a field of about 10 acres of as fine oats as could be seen in the neighbourhood of Edmonton, but no large farm could be made there. There are also some settlers in the south part of township 66, range 22, but the small areas of crops they had looked very poor owing perhaps to the dry season and late sowing. None of the stuff growing, grain or garden stuff, looked nearly as well on the high ground or top of the valley as that growing in the valleys.

At Athabaska Landing as fine a garden could be seen as anywhere in the west.

I saw a settler from Baptiste lake, about 15 miles west of Athabaska Landing, who told me he had squatted there and had 120 acres broken, 60 being under crop; that up to this season he had good crops of oats but had not tried wheat. The oats he disposed of at high prices to freighters going to Lesser Slave lake and Peace river. He stated that there were no large areas such as he was on, the country generally being covered with timber or scrub and badly broken by large muskegs.

I have the honour to be, sir,
Your obedient servant,
J. K. McLEAN, *D.L.S.*

APPENDIX No. 21 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF E. H. PHILLIPS, D.L.S.

INSPECTION OF CONTRACT SURVEYS WEST OF SOUTH SASKATCHEWAN RIVER.

OTTAWA, December 17, 1904.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on my field operations in connection with the inspection of contract surveys made west of the south Saskatchewan river during the season of 1904.

I received instructions for this work on March 18, 1904, and at once began to collect information in respect to the contracts in my district. This occupied my time until April 16, on which day I left Ottawa for Saskatoon.

On reaching Regina I learned that a washout had occurred at Lumsden on the Prince Albert branch of the Canadian Pacific Railway, where the roadbed for a distance of five miles was flooded and partly washed away. Information as to the probable length of the delay was difficult to obtain, the general impression being that the water would subside and that the road would be ready for traffic in a few days. Owing to numerous heavy rains at the time the whole country was under water, and towns north of the washout were beginning to run short of provisions. Immigrants and settlers were arriving in such numbers that the town could not accommodate them, many sleeping in tents, the railway station and even in stables. To make matters worse small-pox broke out in the town, and the hotel at which I had secured accommodation was placed under quarantine. In the meantime the railway authorities had established a ferry at Lumsden, and on May 7, after being vaccinated and all my effects fumigated I was able to proceed to Saskatoon, where I arrived after 36 hours travel in a crowded freight car. At this place the railway bridge across the south Saskatchewan had been destroyed by the ice and everything had to be ferried across the river in boats.

I immediately started to outfit, and went into camp next day, as soon as my tents, which luckily I managed to have shipped on the same train, were brought across the river. Part of my baggage, however, did not reach me till June 7.

My first work was to retrace the lines in contract No. 7 of 1903 and for this purpose I left Saskatoon on May 18. I proceeded by trail to Dundurn, where owing to the bad state of the roads, I left part of my outfit and sent back for it later. I reached township 32, range 28, west of the second meridian without incident two days later and began work. In this district I retraced the lines in township 31, ranges 26, 27 and 28, west of the second meridian and township 32, ranges 27 and 28 and the lines in that part of township 32, range 26 lying south of Little Manito lake.

The season being well advanced and having received telegraphic orders to proceed with the work of inspection of the 1904 contracts, I left this district on July 9 and reached Saskatoon on the 12th. I spent the next day overhauling my outfit, making repairs and purchasing supplies and left town on July 14.

According to instructions I proceeded to contract No. 23, a distance of about 120 miles southwest from Saskatoon, remaining, however, for several days in contracts 21 and 22, in order to allow my horses to rest after the hard trip over a hilly country with no trail. During this time I examined the surveys in township 34, ranges 20, 21, 22 and 23 and township 33, range 23, west of the third meridian, travelling by easy stages to contract No. 23. Many severe thunder storms accompanied by hail occurred about this time, one of which almost completely destroyed my tents.

I examined the survey of 40 miles of section line in contract No. 23 and proceeded with the examination of the survey of contracts 24, 25 and 26, in which I retraced 47, 39 and 37 miles of section line respectively. This occupied my time until August 29 when I proceeded to make a correction survey in township 40, range 24, west of the third meridian, according to your instructions of June 29. This work being in the direction of Battleford and as by going there I would have a good trail to contract No. 19, I proceeded to Battleford, which I reached on September 2. After a day spent in replenishing my supplies and outfit, I started south on the Swift Current trail and camped in township 34, range 16, west of the third meridian. In this district I examined the survey in the northern portions of contracts 18, 19 and 20. On September 17, a snowstorm came on and continued until the 19th about a foot of snow falling. I next moved southward along the Swift Current trail to township 30, range 17, west of the third meridian, reaching there on September 23. From there I made a trip westward into the southern portions of contracts 20, 21 and 22. About this time we had some very disagreeable weather with cold rain and snow flurries. On October 4 I started eastward and examined the survey in the southern portion of contract 18 and in contracts 16 and 17, which I finished on October 21.

I had received instructions to examine the survey in contract No. 63 which was situated south of Moosejaw, and also to make several correction surveys on my way there. I found that the ferry, which had been started at Hanly during the past season, was not running on account of a sand bar in the middle of the river, so I proceeded to Saskatoon in order to cross the river at that point. On my arrival there on October 24, I found that the ferry there had not been running for some time on account of sand bars, and preparations were being made to move it to another part of the river. This made it necessary that I should ship the outfit by rail to Moosejaw, and while it was en route I went to Craik and retraced the east boundary of section 6, township 25, range 27, west of the second meridian, according to instructions in your letter of September 15, 1904. A considerable error was found here in the original survey, but no change was made in the position of the monuments, as all the parties whose land was affected would not agree to the change. I then proceeded to Moosejaw arriving there on October 27. The next two weeks were spent in the examination of contract No. 63 about 25 miles south of Moosejaw.

On my return to Moosejaw several members of the party were paid off and I went to township 18, range 29, west of the second meridian to investigate a reported error in the old survey. An error had also been reported to exist in the south boundary of township 19, range 29, west of the second meridian. I found that the errors reported existed on the ground but being unable to obtain the consent of all the parties whose lands were affected thereby, I did not move any of the monuments, but simply retraced the lines as they were on the ground.

I arrived in Moosejaw again on November 13, and next day paid off the remainder of the party, with the exception of one man to look after the horses, and arranged for the storage of the outfit. The horses were sold on November 16 by public auction, and I started for home the same day and arrived at Ottawa on November 19.

During the season the survey of 12 contracts was examined, in which 413 miles of section lines were retraced. I also retraced 251 miles of section lines in contract No. 7 of 1903, and 12 miles of old survey lines making a total of 676 miles of section lines retraced. The number of pits measured in the examination of the 12 contracts was 3,016, the length of the sides and the depth in 4 places having been measured in each pit. In addition to these many witness trenches and stone mounds were also measured. Traverses to the extent of 6¾ miles were examined and 136 astronomical observations were taken including duplicate check observations.

The district comprising contracts 16 to 26, being a block of land composed of townships 27 to 34, ranges 10 to 29, west of the third meridian, together with a narrow strip extending northward in ranges 26 and 27 to Manito lake, can be generally described as rolling prairie. Fuel is very scarce throughout the whole district. It occurs in small quantities, however, in several places. In townships 34 and 35, range 16, west of the third meridian, is what is known as the '60-mile bush'; this is the greatest wood area in the whole district being possibly 20 square miles in extent. A little wood is obtainable in the ravines leading to Eagle creek, in township 34, ranges 19 and 20, west of the third meridian, also in township 31, ranges 11 and 12, and in the hills on the south side of Eaglehills creek in township 31, range 18, west of the third meridian. No other wood of any account was seen during the season.

Eaglehills creek flows in a wide valley which is in some places approached by very easy slopes; in ranges 17, 18, 19 and 20, west of the third meridian, however, the banks in some places are very precipitous, especially in the Tramping lake district where for 10 or 12 miles the valley becomes a deep canyon. The location line of the Grand Trunk Pacific Railway runs through this district, crossing the Saskatchewan river at or near Hanly; it runs in a westerly direction in townships 32 and 33 until it reaches the deep canyon referred to above which it enters and follows striking northward. It was again seen in township 38, range 27, west of the third meridian.

Fresh water is very scarce except in the sloughs which in some parts are very numerous. Nearly all the lakes and most of the streams including Eaglehills creek are alkaline and the water hardly fit for use, especially towards the end of the summer.

After the end of June very little rain fell and the summer and fall were exceptionally favourable to surveying operations.

In conclusion I wish to express my appreciation of the services rendered by Mr. J. E. Morrier who was appointed to my party and acted as assistant.

I have the honour to be, sir,

Your obedient servant,

E. H. PHILLIPS, *D.L.S.*

APPENDIX No. 22 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF W. R. REILLY, D.L.S.

SURVEYS NEAR ATHABASKA LANDING IN NORTHERN ALBERTA.

SINTALUTA, ASSA., March 3, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to report that acting according to instructions dated July 18, 1904, to take charge of Mr. J. K. McLean's party at Athabaska Landing, I performed the following surveys all west of the 4th meridian, under above instructions.

East boundary townships 65 and 66, range 24.

North boundary township 65, range 23.

East boundary township 66, range 22.

Subdivision of townships 65 and 66, range 22.

Re-survey of east boundary township 66, range 23, under instructions dated September 12, 1904.

I left Sintaluta July 30, Regina, July 31, arriving at Athabaska Landing in the evening of August 3, where Mr. McLean met me. I assumed charge of the party on the following day, August 4, settling accounts with Mr. McLean as before reported, and moving camp from west of the Landing to the southwest corner of township 65, range 22.

On August 5, I stored the wagons and moved by pack-train and camped on a small creek about one mile east of the southwest corner of township 65, range 23, from where I began work on the east boundary of township 65, range 24, finishing the survey with the subdivision of township 65, range 22.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

Generally speaking, this survey did not cover a country that can be called suitable for settlement, however, small stretches where wood, hay and water are plentiful will make homes for settlers whose whole time is not devoted to farming, but variously employed, on the river, freighting, and other work in connection with the handling of furs and supplies for the north, Athabaska Landing being virtually the gateway for the trade of the country on the Mackenzie and Peace rivers.

I finished work in the field October 20. At Edmonton on the 24th I paid off the men, stored the outfit with McDougal and Secord, and let the horses out for wintering with Mr. Alexander McDonald. On the 25th I started for home, arriving here on the 26th.

I have the honour to be, sir,
Your obedient servant.

WM. R. REILLY.

APPENDIX No. 23 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF JOS. E. ROSS, D.L.S., 1904.

SURVEYS IN THE RAILWAY BELT IN BRITISH COLUMBIA.

KAMLOOPS, B.C., March 31, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit my report on the surveys performed by me, in the Railway Belt, British Columbia, during the past season.

I began the season's operations by making several small surveys in the vicinity of Kamloops. From Kamloops I proceeded to the Nicola valley where I made a survey from a point near the mouth of Nicola river to the boundary of the railway belt. The Nicola valley trends in a southeasterly direction, scarcely ever exceeds half a mile in width and has high mountains on either side. Nicola river is about three chains wide and two to five feet deep and has a fall of about twenty feet in the mile. Most of the agricultural land had been taken up in Indian reserves and provincial lots. The remaining cultivable land lies in small flats along the river. The soil is a sandy and gravelly loam and requires to be irrigated to be productive. The freshets in the river, almost every year, do considerable damage to the low lying land along the banks. The lower part of the valley is mostly open, but the upper end and the mountain sides are pretty well wooded. Skuhun and Spiaos creeks which flow into the Nicola have narrow valleys with some agricultural land and merchantable timber. On the latter creek there are said to be some very good coal prospects. Both creeks could provide considerable water-power. The resources of these valleys will doubtless be fully utilized as soon as the railway now projected is built. The only engineering obstacles in the building of the railway will be the bridging of the river. There is a good wagon road on the north side of the Nicola. The stage makes weekly trips between Kamloops and Spence's Bridge. There are two highway bridges across the river, one at each end of the valley. The climate is good. The drawback is that even what little land there is fit for settling on, is so scattered that a good settlement can never be formed.

From the Nicola valley I went to Shuswap lake where I made a survey of some land required in connection with a mill site. After this I surveyed several sections near Moberly. Most of the land here is a swamp or muskeg. It is proposed to reclaim it by dyking and draining. It is conveniently situated to Moberly station and lies between the railway and Columbia river. Several settlers have located on the high land adjoining. On the east side of the railway the country is hilly and broken. The timber has been almost completely swept by fire. On finishing the survey here I laid out a small townsite at Field. The town site adjoins the grounds of the Canadian Pacific Railway Company and lies at the foot of Mount Stephen. The lay of the land does not permit of an extensive townsite, but there are probably more lots in the present survey than will be required for many years. The site had been already built on. There are two good hotel buildings and a number of small shops and cottages. The plan of survey which had been previously arranged was projected with the intention of interfering, as little as possible, with the present buildings.

From Field I went to Highland valley where I continued the survey of the previous year to the boundary of the railway belt. The valley is narrow with wild hay meadows along the creeks. The altitude being from 3,500 to 4,500 feet, it is only adapted for stock raising. The latter part of the meadows is included in Indian reserves. A few settlers could secure land here. The provincial government has just completed a road from Ashcroft into the valley. There are said to be several excellent mineral prospects here but sufficient development has not been done to prove that they are mines. I went to the Guichon creek valley where I continued the boundary of the belt easterly. At the same time I made a survey through the Meadow creek valley as far as Trout lake. This valley is similar to Highland valley. The wild hay land and grazing land make it suitable for stock arising. The best part has been already taken up in provincial lots. A few more settlers might be accommodated here.

I continued operations to the end of the year. The season was almost an ideal one for surveying work, but rather dry from a farmer's point of view. It seems most unfortunate that British Columbia with its fine climate and beautiful scenery should not have more agricultural land. If we only had the land I think there would be little difficulty in procuring settlers. As it is, I fear, quite a few settlers have taken up land where it will be difficult to make a fair living. Good land in the interior of the province, when well watered, sells in small lots at from fifty to two hundred dollars per acre.

I have the honour to be, sir,

Your obedient servant,

JOS. E. ROSS, *D.L.S.*

APPENDIX No. 24 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF ARTHUR SAINT CYR, D.L.S.

OUTLINE SURVEYS IN ATHABASKA.

Lesser Slave lake, Atha., May 1, 1905.

E. Deville, Esq., LL.D.,
Surveyor General,
Ottawa.

Sir,—I have the honour to submit the following interim report of my surveys of base lines and block outlines in the Peace River district, performed under your instructions dated March 7, 1904, and under additional ones wired to me at Lesser Slave lake on December 15.

I left Ottawa on March 21, arriving six days later in Edmonton, where special arrangements had to be made for the transportation and delivery at convenient points in the district where I was to survey, of the outfit required for a trip which was to last fully eighteen months and where the survey work would have to be conducted through country where no supplies could be procured and where transportation is not only limited but most primitive.

On April 6, whilst in Edmonton organizing my party and completing the final arrangements, word came to me by freighters returning from Lesser Slave lake that part of my outfit, principally hardware, had not reached its destination, but had been left along the route, that the ice on the Lesser Slave river had already broken in many places and that the travel on Athabaska river itself would soon be unsafe. As it was urgent that all my outfit should be brought at least as far as Lesser Slave lake, I decided not to wait for carts expected from Brandon, but taking the four carts then in Edmonton (the two forwarded from Saskatoon by Mr. Thos. Turnbull, D.L.S., and the two stored here in 1903 by Mr. Lonergan, D.L.S.), and two light wagons, I left at once for my destination. On April 11, I arrived at Athabaska Landing where, after loading grain, I continued my trip on Athabaska river, landing just in time at Moose Portage, for on the day of my arrival great masses of ice were floating down Athabaska river. From Moose Portage, which is about six miles east of the confluence of Lesser Slave river with Athabaska river, Mr. Selby, D.L.S., and myself joined forces, and a road was opened to the foot of Lesser Slave lake. Stony Point, where Messrs. Bredin and Cornwall's trading post on Lesser Slave lake is situated, was eventually reached towards the middle of May.

On my arrival, I learned that the bulk of my supplies was still in storage here with no prospect (as previously arranged) of having them freighted to Sturgeon lake, my future head-quarters, at an early date, there being then at Lesser Slave lake no adequate means of transportation. I must say that owing to a continued long spell of hot weather, the spring of 1904 was an exceptionally early one for this country, the snow having all disappeared and the large streams having become full of ice nearly a month sooner than is usual. Therefore the hauling of freight, which in ordinary seasons could have been done on winter roads, had to be stopped. Moreover, it happened that the transportation of goods by pack-animals was impossible, there being at the time at the lake no pack-animals fit to travel over a country still devoid of vegetation. I decided therefore to open a wagon road to Sturgeon lake, which lies in a southwesterly direction from Lesser Slave lake, and is sixty-five miles distant from it. After three weeks of steady work, Sturgeon lake was reached with sufficient supplies to last me three or four months. For my wagons and carts, I then substituted pack saddles and started for the initial point of my survey, (which is the intersection of the sixth meridian with the twentieth base line) by travelling on an old pack trail which for five miles follows the eastern shores of Sturgeon lake. At three miles north of the lake, we came to the regular trail to Birch hills and Ghost river and travel improved very much. This trail which passes north of Puskwaskow (Grassy) lake follows the valley of the river of the same name and runs through a country timbered mostly with poplar woods. The trail was followed as far as its intersection with the sixth meridian, where a cache of supplies was built. Continuing now my voyage in a northerly direction, with lighter loads, I opened twenty miles more of road to the intersection of the twentieth base line with the sixth initial meridian established by Mr. W. T. Thompson, D.T.S., in 1883.

Description of the country along the sixth meridian between the twentieth and the seventeenth base lines.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

This completed the survey of the sixth initial meridian for the season. Previous to that, there had been at different times, severe snow storms and the feed for the horses had become so scarce and poor that a month before I had been compelled to send to Prairie river half of my pack animals, fearing that if I kept them much longer here, they would certainly die. With the general altitude of the country continually increasing and our coming to a pine belt with not a vestige of grass, I did not see the least chance of continuing the survey in this district at that late season. So, after leaving sufficient posts for the continuation of this survey at a more favourable time, I reluctantly returned to the northeast corner of township 68, range1, where I began the survey of the eighteenth base line, easterly from the sixth initial meridian.

Description of the country along the eighteenth base line in ranges 23, 24, 25 and 26, and the fractional range 27, all west of the fifth meridian.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

We were now in the last days of November. The ground was frozen hard to a great depth, and as all the creeks were dry and the ground still bare of snow, no water could be procured for the use of the camp. Grain which had been ordered months before had not yet arrived and the animals could not subsist much longer on the poor feed which they could pick up here and there. So I decided to close the survey work in this district and to return to Prairie river via Sturgeon lake, in order to organize for winter work. Whilst waiting for definite instructions regarding this work I made a trip to the eighteenth base line and succeeded in placing at about thirty miles intervals and close to the base line, two caches of supplies and iron posts which will greatly facilitate my survey operations during the next season. On my return to Prairie river, I received your message requesting that I should produce the nineteenth base line westerly from range fourteen, where Mr. Edgar Bray, D.L.S., had left it a few months before. The final arrangements for carrying this work having been completed in Lesser Slave lake and at Prairie river, I removed my camp to the northeast corner of township 72, range 14, west of the fifth meridian, the starting point of my survey.

Description of the country along the nineteenth base line westerly from the northeast corner of township 72, range 15, west of the fifth meridian.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

Between Lesser Slave lake and West Prairie river, a distance of fifteen miles, the country is undulating and covered with scattered bluffs of poplar and spruce and clumps of willows with large areas of prairie land with good soil intervening. This section is well irrigated by East Prairie river, Iroquois creek, West Prairie river, Little Smoky river and their numerous tributaries. Many settlers have taken up land but their efforts have been generally directed to cattle raising for which any amount of good hay can be easily procured. Travelling northerly, one finds a still more open country.

From West Prairie river to the sixth initial meridian, a distance of sixty miles, lies a rolling or undulating country, wooded with spruce, poplar, birch, cottonwood, balm of Gilead and jackpine on the ridges. Some large spruce is found on Hunter's mountain, in ranges 15 and 16. Further west, the forest has in places suffered greatly through the inroads of destructive fires started by careless miners in the Klondyke rush of 1896. This is particularly the case along such streams as Little Smoky, Simonette and Moose rivers, where the only remaining serviceable timber is found in narrow belts in the flats along these streams.

Drift lignite was seen along the Little Smoky river.

Drift coal was found along the banks of Moose river and in the cut banks of this stream were seen indications of the same mineral.

The quality of the soil is pretty uniform, being a black or sandy loam from 3 to 10 inches deep overlying a subsoil of hard clay. Whenever the fire has overrun the country, the top soil has disappeared and left the clay exposed.

In the vicinity of Hunter's mountain, Dessaline's mountain and other minor elevations crossed by the 19th base line, the land is stony in places and near the rivers much broken by deep gulches and ravines.

South of Sturgeon lake which lies in townships 70 and 71, range 24, west of the fifth meridian, the country is partly open and would be well suited for cattle raising.

The summer season of 1904 was a very dry one. Inconvenience was frequently experienced from the smoke of forest fires fanned by high winds and burning in all directions, which kept up the nuisance for weeks and interfered at times with the survey.

During the summer days, the heat is generally tempered by cool breezes blowing from the direction of the Rocky mountains in the southwest. In summer or winter a northeast wind is sure to bring stormy weather which will last two or three days, i.e. till wind subsides. Owing possibly to the altitude of the country, (2,500 feet above sea), where I was surveying and the vicinity of the mountains, the nights were always cool and summer frosts occurred often. Such summer frosts are not infrequent at Lesser Slave Lake settlements. The lowest temperature registered last winter was 38° below zero and occurred in the latter part of December and in the month of January. After a few days, however, the temperature would rise considerably. The snow which was 30 inches deep on the level had all disappeared at the end of February. The growth of the native grasses is however retarded to such an extent that it is not of much account before June. But after that date in ordinary years with average rainfall the vegetation will grow with great profusion and rapidity.

I have the honour to be, sir,

Your obedient servant,

ARTHUR SAINT-CYR.

APPENDIX No. 25 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF HENRY W. SELBY, D.L.S.

SURVEY OF BLOCK OUTLINES IN PEACE RIVER DISTRICT.

TORONTO, March 4, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my field operations during the past season in the Peace river district.

On February 24, 1904, whilst still at subdivision work in township 36, range 7, west of the 5th meridian, I received your telegram asking if I would go to the Peace river district on the survey of block outlines, which work I accepted.

On February 27, at Red Deer I received your telegram asking me to meet Messrs. Wallace and Saint-Cyr on March 1, at Calgary, to discuss organization for Peace river surveys, which I accordingly did and spent the day in discussing the several questions relating to supplies and transportation and we decided to go on March 2 to Edmonton and order our supplies to be forwarded to Lesser Slave Lake.

This occupied our time until the 5th when I returned to Red Deer, paid off my party and arranged for the transportation of my outfit to Edmonton.

As the season was so far advanced and my returns of subdivision work had to be completed and the instructions for the new work to be received, I decided to go with Mr. Saint-Cyr to Ottawa to save time.

I left for the latter place on the 7th where I remained until the 19th getting information and filing my field notes of subdivision work and answering memoranda on examination thereof.

Leaving Ottawa in company of Mr. Saint-Cyr I arrived in Edmonton on March 29, and in conformity with your instructions dated March 7, I proceeded to organize my party. We were informed that there had been so much traffic over the route to Slave lake that there was not a bit of hay or oats to be had all the way out, we therefore bought several tons of hay and hired teams to freight it to Athabaska Landing and to Moose Portage where we were obliged to leave Athabaska river as the ice was unsafe to travel on any further.

We left Edmonton on April 6, and reached Moose Portage on the 14th. We began cutting a road from this point towards Lesser Slave lake, a distance of about 60 miles and after a most trying time and meeting and overcoming all the obstacles I think it were possible to meet on such work in addition to the horse feed giving out we arrived at the east end of Slave lake on May 4 only to find the ice of the lake beginning to move, contrary to our information and expectations, other years it was claimed the lake was safe to cross up to the middle of May; we were therefore obliged to wait until the ice went out and on May 17 hired a York boat from the Hudson's Bay Company, in which we reached the west side of the lake on the 20th; here I parted company with Mr. Saint-Cyr and his party and went into camp on the north side of Buffalo bay to await the arrival of the horses which had been sent by the pack trail around the north side of the lake.

There being very little feed up to this time the horses were in very poor condition when they reached there on the 26th, having a few bags of oats on hand at the lake I gave them a few days rest until their sores and lameness left them, and on June 1 started for Peace River landing. The road thereto was so bad in places that I made a lot of repairs and cut out new roads around bad holes and reached Peace River landing on June 9. On the 10th through the kindness of the Hudson's Bay Company, who loaned me a large boat, I crossed my outfit over Peace river and camped on the west side, the horses all swam the river safely except one which apparently took cramps or heart failure and sank without an effort.

The road from Peace river to Dunvegan was in very good condition and the grass improving, we reached the 21st base line in range 4 on the 16th, here I camped until I could get some supplies which had been sent to Dunvegan and finding it impossible to cross Muddy creek we went north 12 miles and then west into the 5th range crossing the west branch of Muddy creek and following the base line west to the east limit of the 6th range where my work began.

I was very pleased to get at my work on June 24 after such a prolonged and hazardous trip; I was just congratulating myself that our troubles were nearly over, when the next day we cut the line out to the bank of Peace river (810 feet above the water) only half a mile from camp. Having been informed that I could use wagons on the west side of the river I crossed them over at a point about five miles north of the line, but upon examining the country to the west, I had to abandon them and use pack trains all summer.

The survey of the 21st base line to the boundary of British Columbia and of the east boundary of township 81 and 82, range 13, lasted till September 27.

I cut a trail from Peace river northward to make a connection with the 22nd base line, but after spending days in the effort to find it I had to abandon this scheme and send my outfit down the river on a raft and take the horses over the St. John's road to Dunvegan.

My next work was to run the 6th meridian north from the 22nd to the 23rd base line.

Having arrived at Dunvegan with horses and outfit on October 19, and while giving the outfit some needed repairs I started out for the meridian on the 24th and had to cut a trail most of the way from the St. John's road and reached the starting point on November 2, and finished the line to the 23rd base on the 30th, when we began running the 23rd base line, but the snow got so deep the horses could not paw, and as there was absolutely nothing for them to eat in the burnt slash we were running through, after cutting nearly four miles of the line I decided to quit and while awaiting instructions from the Surveyor General moved the outfit to the 23rd base line where on December 16, I began running the east boundary of townships 84 and 83 in range 3, at which I continued until January 12, when I was instructed to close operations, which I did and moved camp to Hay lake where I had a corral built by Mr. H. Tremblay, an agent of the Hudson's Bay Company. I left Hay lake camp on January 19, and on February 6 had the men all paid off at Edmonton, and on February 13, reported to you at Ottawa. Having given this brief report of the work done during the past season I will now describe the territory traversed.

It is more suitable for ranching than general cultivation, the soil for the most part being very shallow and underlaid with clay which is very hard, so that the water will not soak through, this causing land slides in many places; there are numerous ravines and coulées, and some good timber a detailed statement of which is given in the annexed report according to the lines run.

(NOTE.—Descriptions of the townships surveyed have been taken from this report and published as part of Appendix No. 29).

I have the honour to be, sir,

Your obedient servant,

HENRY W. SELBY.

METEOROLOGICAL REPORT.

Compiled from observations taken by Mr. Selby during the course of the above survey.

Date.	Place.	Temperature. 7 a.m.	Temperature. 2 p.m.	Temperature. 9 p.m.	Barometer.	Humidity of air.	Direction of Wind.	Rainy days.	Snowy days.	Fair days.	Days completely cloudy.	Auroras.	Thunder storms.	Fogs.	Number of hours of bright sunshine.
1901.															
June 17	8 miles north of Dunvegan	51	52	68	28·33	41	S.W.			1					12
* " 18	N. By., Tp. 82-4-6	51	51	63	28·25	69	S.W. by W.			1					12
" 19	" 82-4-6	57	73	48	28·29	50	S.W. by W.			1					14
" 20	" 82-4-6	54	66	57	28·21	70	S.W.			1					1
" 21	Sec. 31, Tp. 81-4-6	53	59	42	28·01	70	S.W.			1					6
" 22	At Muddy Creek, Tp. 81-5-6	49	57	49	28·61	92	N.W. by W.	1							3
" 23	E. By., Tp. 81-4-6	48	61	56	28·34	80	N.W. by N.	1							9
" 24	Sec. 32, Tp. 80-5-6	49	70	60	28·53	49	N.W. by W.			1					12
" 25	" 1 " 81-6-6	57	67	60	28·48	53	W.			1					10
" 26	" 1 " 81-6-6	62	74	57	28·30	65	S.W. by W.			1					14
" 27	" 1 " 81-6-6	63	76	51	28·25	94	N.W. by W.	1							13
" 28	" 1 " 81-6-6	43	64	78	28·31	43	W.			1					14
" 29	" 1 " 81-6-6	64	76	54	28·35	58	N.W. by W.			1					12
" 30	" 35 " 80-6-6	63	78	66	28·25	66	W.	1							8
July 1	" 35 " 80-6-6	61	72	61	28·42	57	W.			1					12
" 2	" 35 " 80-6-6	63	78	56	28·55	79	N.W. by W.			1					14
" 3	" 34 " 80-6-6	71	82	60	28·50	66	N.E.			1					14
" 4	" 34 " 80-6-6	64	84	69	28·20	63	S.E. by E.			1					12
" 5	" 34 " 80-6-6	72	82	60	28·23	51	S.W.			1					4
" 6	" 34 " 80-6-6	62	68	47	28·33	93	O.								2
" 7	" 33 " 80-6-6	58	77	48	28·28	62	S.W. by W.			1					8
" 8	" 33 " 80-6-6	61	72	56	28·33	65	S.W.			1					
" 9	" 33 " 80-6-6	68	86	62	28·22	89	S.W. by S.	1							12
" 10	" 33 " 80-6-6	64	76	52	28·25	60	W.			1					14
" 11	" 32 " 80-6-6	58	88	64	28·23	48	W.			1					12
" 12	" 32 " 80-6-6	58	69	45	28·20	78	N.W. by W.	1			1		1		0
" 13	" 32 " 80-6-6	51	69	56	28·74	71	W.	1			1				0
" 14	" 32 " 80-6-6	38	66	53	28·52	82	W.	1			1				0

* Ice on water at 5 a.m.

METEOROLOGICAL REPORT.

Compiled from observations taken by Mr. Selby during the course of the above survey.

Date.	Place.	Temperature. 7 a.m.	2 p.m.	9 p.m.	Barometer.	Humidity of air.	Direction of Wind.	Rainy days.	Snowy days.	Fair days.	Days completely cloudy.	Auroras.	Thunder storms.	Fogs.	Number of hours of bright sunshine.
July 15	Sec. 36, Tp. 80-7-6	48	56	38	28·43	91	S.W. by S.	1			1				
" 16	" 36 " 80-7-6	45	68	48	27·99	85	S.W. by W.			1					14
" 17	" 36 " 80-7-6	56	72	58	28·01	70	S.W.			1					12
" 18	" 34 " 80-7-6	54	52	46	28·20	93	S.W.	1							3
" 19	" 34 " 80-7-6	47	70	48	29·09	93	S.W. by W.			1					11
" 20	" 34 " 80-7-6	45	76	52	29·26	94	N.E. by N.			1			1		9
" 21	" 34 " 80-7-6	49	92	58	28·90	55	N.E. by N.						1		9
" 22	" 31 " 80-7-6	65	81	58	27·95	44	S.W.								7
" 23	" 35 " 80-8-6	54	60	47	28·03	84	S.W. by W.			1					5
" 24	" 35 " 80-8-6	52	66	44	28·45	92	S.W. by W.			1					10
" 25	" 33 " 80-8-6	56	76	50	28·70	87	O.			1					11
" 26	" 33 " 80-8-6	43	72	64	28·52	52	N.E.								5
" 27	" 33 " 80-8-6	54	69	58	27·86	94	S.W.	1			1		1		
" 28	" 33 " 80-8-6	53	75	49	27·80	80	S.W.	1			1		1		
" 29	" 33 " 80-8-6	53	68	51	27·75	94	S.W.	1					1		11
" 30	" 33 " 80-9-6	54	68	41	27·87	92	N.W. by W.			1					12
" 31	" 33 " 80-9-6	54	68	50	27·35	87	S.W. by S.			1					12
Aug. 1	" 33 " 80-9-6	51	67	45	27·13	93	S.W. by W.			1					6
" 2	" 35 " 80-10-6	54	72	42	27·87	91	S.W. by W.			1					10
" 3	" 34 " 80-10-6	53	66	45	26·55	79	W.								4
" 4	" 33 " 80-10-6	53	70	50	26·93	68	S.W. by W.			1					6
" 5	" 33 " 80-10-6	46	68	51	27·06	69	S.E.			1					8
" 6	" 33 " 80-10-6	53	73	49	27·15	....	S.E. by E.			1					7
" 7	" 33 " 80-10-6	54	70	52	26·65	80	S.E.								
" 8	" 6 " 81-10-6	50	70	58	27·08	83	S.W. by W.	1							9
" 9	" 6 " 81-10-6	53	68	50	26·65		S.W.	1					1		3
" 10	" 6 " 81-10-6							1			1		1		
" 11	" 6 " 81-10-6									1					
" 12	" 6 " 81-10-6									1					
" 13	" 6 " 81-10-6									1					
" 14	" 6 " 81-10-6									1					
" 15	" 6 " 81-10-6							1							
" 16	" 6 " 81-10-6	50	68	54		76	S.W.								
" 17	" 6 " 81-10-6	51	68	54	27·12	94	N.W.						1		10

" 18	" 3 " 81-11-6	48	56	46	27·18	100	N.W.	1			1		1		
" 19	" 3 " 81-11-6	44	55	43	27·63	92	S.W. by W.	1							·6
" 20	" 3 " 81-11-6	32	66	52	27·43	88	S.E. by S.								8
" 21	" 3 " 81-11-6	54	66	47	26·91	79	S.W. by W.			1					7
" 22	" 6 " 81-11-6	46	58	46	27·01	92	N.W.			1					8
" 23	" 6 " 81-11-6	43	62	49	27·20	87	N.E.			1					12
" 24	" 6 " 81-11-6	37	73	53	27·41	82	N.W.			1					13
" 25	" 3 " 81-12-6	46	78	62	26·60	69	W.			1					12
" 26	" 3 " 81-12-6	42	66	46	27·31	86	N.W. by W.								4
" 27	" 3 " 81-12-6	30	58	35	27·83	73	O.			1					7
" 28	" 3 " 81-12-6	33	67	46	27·37	86	O.			1					12
" 29	" 4 " 81-12-6	34	72	48	27·50	87	N.W. by W.			1					12
" 30	" 4 " 81-12-6	34	73	55	28·00	82	S.E. by E.	1					1		9
" 31	" 4 " 81-12-6	40	73	49	28·06	93	S.W. by W.			1					12
Sept. 1	Sec. 1, Tp. 81-13-6	41	70	50	27·86	87	N.W. by W.			1					12
" 2	" 1 " 81-13-6	43	58	43	28·05	85	N.W. by N.	1			1				
" 3	" 1 " 81-13-6	40	47	38	28·19	91	O.								1
" 4	" 1 " 81-13-6	33	61	50	27·94	94	O.							1	8
" 5	" 1 " 81-13-6	42	48	45	28·12	86	S.W.	1			1			1	
" 6	" 35 " 80-13-6	44	49	47	28·19	93	N.E.	1			1				
" 7	" 35 " 80-13-6	37	64	52	29·15	100	N.W.	1							7
" 8	" 35 " 80-13-6	46	52	45	28·90	93	S.W. by W.	1					1	1	1
" 9	" 35 " 80-13-6	39	56	40	29·06	92	S.W.	1					1		3
" 10	" 35 " 80-13-6	30	60	43	29·35	92	S.W. by W.			1				1	9
" 11	" 35 " 80-13-6	30	54	36	29·28	82	N.E.	1							8
" 12	" 18 " 81-12-6	34	63	39	29·50	92	S.W. by S.			1					11
" 13	" 18 " 81-12-6	36	70	53	29·23	70	N.W. by W.			1					8
" 14	" 18 " 81-12-6	46	54	44	29·04	71	S.W. by W.	1							4
" 15	" 18 " 81-12-6	33	50	48	29·16	87	S.W.	1			1				
" 16	" 30 " 81-12-6	44	44	42	28·94	85	N.W. by W.	1			1				
" 17	" 30 " 81-12-6	38	44	40	29·04	84	S.W. by W.				1				
" 18	" 30 " 81-12-6	36	37	38	29·14	100	S.W. by W.				1				
* " 19	" 30 " 81-12-6	32	34	36	29·33	65	O.		1		1				
" 20	" 12 " 82-13-6	36	38	38	29·38	91	O.				1				
" 21	" 12 " 82-13-6	38	36	37	29·47	74	S.W. by W.	1			1				
" 22	" 12 " 82-13-6	33	34	38	29·29	67	O.				1				
" 23	" 12 " 82-13-6	33	44	36	29·40	82	S.			1					9
" 24	" 25 " 82-13-6	28	60	43	28·95	78	S.W. by W.			1					8
" 25	" 25 " 82-13-6	34	61	48	28·79	93	N.E. by N.			1					8
" 26	" 25 " 82-13-6	39	62	40	28·76	80	S.W.	1							5
" 27	" 25 " 82-13-6	53	58	42	28·47	85	S.W.			1					3
" 28	" 25 " 82-13-6	39	57	52	28·68	52	S.W.	1							6
" 29	" 25 " 82-13-6	43	54	44	29·35	57	S.W.			1					6
" 30	" 25 " 82-13-6	39	50	43	28·51	92	S.W.	1			1				
Oct. 1	" 25 " 82-13-6	40	44	42	28·41	85	N.E.	1			1				
" 2	" 1 " 83-13-6	38	36	36	28·30	82	N.E.				1				
" 3	" 1 " 83-13-6	28	30	30	28·61	78	N.E.		1		1				
" 4	E. Bdy. " 83-13-6	26	30	28	29·02	88	S.E.				1				

* 3 inches snow fell.

METEOROLOGICAL REPORT.

COMPILED from observations taken by Mr. Selby during the course of the above survey.

Date.		Place.	Temperature. 7 a.m.	Temperature. 2 p.m.	Temperature. 9 p.m.	Barometer.	Humidity of Air.	Direction of Wind.	Rainy days.	Snowy days.	Fair days.	Days completely cloudy.	Auroras.	Thunder storms.	Fogs.	Number of hours of bright sunshine.
1904.							%									
Oct.	5	E. Bby., Tp. 83-13-6	28	36	26	28·36	88	O.			1					3
"	6	" " 84-13-6	5	38	27	28·36	65	N.			1					9
"	7	" " 84-13-6	16	36	26	27·91	88	N.					1			8
"	8	" " 84-13-6	16	52	28	27·46	77	W.			1					9
"	9	" " 84-13-6	38	56	29	27·47	78	S.W.					1			9
"	10	" " 84-13-6	22	61	31	27·55	89	N.W.			1					7
"	11	" " 83-13-6	34	48	36	27·63	65	N.E.	1			1				
"	12	Peace River, Tp. 82-12-6	30	49	36	28.96	82	N.E.			1					7
"	13	On Peace River	30	41	36	28·96	91	N.E.			1		1			4
"	14	"	31	47	38	29·00	83	S.E.			1					7
"	15	"	30	49	40	29·00	84	S.E.			1					5
"	16	Dunvegan	36	50	39	28·95	76	S.W.			1					8
"	17	"	37	48	33	29·10	71	S.W.			1					9
"	18	"	35	52	35	29·01	91	S.W.			1					6
"	19	"	39	50	50	28·98	62	S.W.			1					3
"	20	"	42	51	40	29·28	68	S.W.			1					2
"	21	"	38	44	44	29·31	85	N.E.	1			1				
"	22	"	39	54	45	28·91	65	N.E. by N.			1					6
"	33	"	37	55	28	29·56	60	S.W.			1					9
"	24	"	28	47	50	29·40	81	S.W.			1					9
"	25	St. John trail, north of Dunvegan	35	62	32	28·55	90	O.			1					9
"	26	" "	26	64	46	28·12	59	S.W.			1					8
"	27	Muddy Creek	26	56	35	27·98	64	O.			1					7
"	28	"	17	52	28	27·80	88	O.			1					6
"	29	N. Bdy. Tp. 84-2-6	28	53	38	27·35	67	O.			1					7
"	30	" " 84-1-6	39	44	41	27·05	77	E.	1			1				
"	31	" " 84-1-6	32	52	44	27·02	57	S.W.			1					8
Nov.	1	E. Bdy. " 85-1-6	33	50	37	26·30	74	S.W.	1							4
"	2	" " 85-1-6	31	47	38	26·30	83	S.W. by W.	1				1			3
"	3	" " 85-1-6	26	44	29	26·60	89	S.W. by W.			1					7
"	4	" " 85-1-6	26	50	35	26·62	73	O.			1					6
"	5	Sec. 13 " 85-1-6	40	46	34	26·55	81	S.W. by W.			1					5

"	6	" 13 " 85-1-6	37	56	35	26·50	73	S.W.			1					6
"	7	" 13 " 85-1-6	33	42	36	26·63	73	N.W. by W.	1			1				
"	8	" 13 " 85-1-6	32	38	30	27·05	89	W.			1					6
"	9	" 13 " 85-1-6	32	44	29	27·25	89	N.E.				1				
"	10	E. Bdy. " 86-1-6	25	56	32	27·40	90	S.W. by W.			1					6
"	11	" " 86-1-6	28	44	32	27·32	90	S.W. by W.			1					6
"	12	" " 86-1-6	34	54	48	27·11	46	S.W. by W.			1					6
"	13	" " 86-1-6	34	54	44	26·60	57	S.W. by W.			1					6
"	14	" " 87-1-6	26	28	11	26·61	79	S.W. by W.				1				
"	15	" " 87-1-6	18	34	18	26·75	68	O.					1			2
"	16	" " 87-1-6	32	42	12	26·89		O.					1			6·5
"	17	" " 87-1-6	11	42	27	26·57	88	S.W.					1			5
"	18	" " 87-1-6	25	38	22	27·13	86	S.W. by W.			1					6
"	19	" " 87-1-6	4	42	17	27·05	49	S.W.				1				
"	20	" " 87-1-6	22	37	31	26·95	89	S.W.								2
"	21	" " 87-1-6	5	31	18	27·25	68	S.W.			1					5
"	22	" " 87-1-6	20	24	2	27·25		N.E. by N.		1		1				
"	23	" " 87-1-6	− 2	28	4	27·65		O.			1					6
Nov.	24	E. Bdy., Tp. 88-1-6	− 4	6	0	27·30		O.								3
"	25	" 88-1-6	− 4	6	8	27·41		S.				1				
"	26	" 88-1-6	10	17	7	27·21		N.E.		1		1				
"	27	" 88-1-6	12	16	11	26·35		N.E.		1		1				
"	28	" 88-1-6	3	6	−18	27·01		O.								4
"	29	" 88-1-6	−12	10	6	26·78		O.								5
"	30	" 88-1-6	11	8	8	26·50		N.E.		1		1				
Dec.	1	Sec. 36, Tp. 88-1-6	2	10	8	26·42		O.				1				
"	2	" 36 " 88-1-6	18	26	22	26·50		N.W.				1				
"	3	" 36 " 88-1-6	20	26	18	26·59		N.W.								3
"	4	" 36 " 88-1-6	20	33	31	26·60		S.W.				1				
"	5	" 36 " 88-1-6	26	29	33	26·43		W.								3
"	6	" 36 " 88-1-6	29	31	36	26·32		N.E.				1				
"	7	" 36 " 88-1-6	38	42	35	26·11		N.W. by W.				1				
"	8	" 36 " 88-1-6	31	40	38	26·14		N.W. by W.								2
"	9	E. Bdy., Tp. 87-1-6	38	15	5	26·25		N.W. by W.								3
"	10	" 87-1-6	14	14	4	26·53		O.								2
"	11	" 87-1-6	− 1	21	22	26.60		O.				1				
"	12	" 87-1-6	12	19	14	26·50		O.				1				
"	13	" 87-1-6	3	12	7	26·54		O.			1					4
"	14	" 87-1 6	− 8	16	− 4	26·46		N.E.			1					4
"	15	N. Bdy., Tp. 84-2-6	10	10	−14	26·20		O.			1					5
"	16	" 84-2-6	7	12	20	26·56		N.W. by W.		1		1				
"	17	" 84-2-6	18	18	8	26·15		W.				1				
"	18	" 84-2-6	12	18	22	26·70		N.W.		1		1				
"	19	" 84-2-6	0	6	16	26·20		S.W. by W.				1				
"	20	" 84-2-6	8	12	− 5	26·60		W.								2
"	21	" 84-2-6	− 8	−11	−16	26·70		N.E.		1		1				
"	22	E. Bdy., Tp. 84-3-6	−18	−12	−20	26·65		N.E.		1		1				
"	23	" 84-3-6	−23	− 9	−16	26·35		N.E. by N.		1		1				
"	24	" 84-3-6	−18	−12	−28	26·69		O.		1		1				
"	25	" 84-3-6	26	− 22	−38	27·30		N.			1					3

METEOROLOGICAL REPORT.

COMPILED from observations taken by Mr. Selby during the course of the above survey.

Date.	Place.	Temperature. 7 a.m.	Temperature. 2 p.m.	Temperature. 9 p.m.	Barometer.	Humidity of air.	Direction of Wind.	Rainy days.	Snowy days.	Fair days.	Days completely cloudy.	Auroras.	Thunder storms.	Fogs.	Number of hours of bright sunshine.
1904.															
Dec. 26	E. Bdy., Tp. 84-3-6	—34	—11	—15	27·37	...	O.	...	...	1	...	...	...	...	2
" 27	" 84-3-6	5	11	11	26·32	...	O.	...	...	1	...	...	...	...	5
" 28	Sec. 1, Tp. 84-3-6	13	21	14	26·19	...	S.	...	...	1	...	...	...	...	3
" 29	" 1 " 84-3-6	14	22	18	26·08	...	S.W.	...	...	1	...	...	...	...	4
" 30	" 1 " 84-3-6	25	28	20	25·95	...	O.	...	...	...	1	...	...	...	...
" 31	" 1 " 84-3-6	6	4	8	25·97	...	N.E	...	1	...	1	...	...	...	...
1905.															
Jan. 1	" 1 " 84-3-6	—25	2	—11	26·70	...	O.	...	...	1	...	...	...	...	3
" 2	" 1 " 84-3-6	11	15	18	26·49	...	S.	...	...	...	1	...	...	...	...
" 3	" 1 " 84-3-6	16	14	— 9	26·25	...	N.W. by W.	...	1	...	1	...	...	...	...
" 4	" 1 " 84-3-6	— 8	24	5	26·57	...	S.W.	...	...	1	...	...	...	...	5
" 5	" 1 " 84-3-6	3	20	— 3	26·70	...	S.W. by W.	...	...	1	...	...	...	...	5
" 6	" 1 " 84-3-6	—15	12	—11	27·30	...	S.W.	...	...	1	...	...	...	...	3
" 7	" 1 " 84-3-6	—18	7	2	27·27	...	S.W. by W.	...	...	1	...	...	...	...	5
" 8	" 1 " 84-3-6	—19	— 4	2	27·35	...	O.	...	...	...	1	...	...	...	...
" 9	" 1 " 84-3-6	5	14	—12	27·17	...	N.W. by N.	...	...	1	...	...	...	...	4
" 10	" 19 " 83-2-6	— 4	11	2	27·30	...	S.W. by W.	...	...	1	...	...	...	...	5
" 11	" 19 " 83-2-6	— 9	1	— 2	27·15	...	W.	...	...	...	1	...	...	...	...
" 12	" 19 " 83-2-6	—12	— 2	—26	27·23	...	W.	...	...	1	...	...	...	...	3
" 13	" 19 " 83-2-6	—32	— 2	—36	27·22	...	N.	...	...	1	...	...	...	...	5
" 14	Tp. 84-3-6	—50	—14	—12	27·52	...	S.W.	...	...	1	...	...	...	...	7
" 15	" 82-4-6	—25	1	—29	27·25	...	S.W.	...	...	1	...	...	...	...	5
" 16	" 82-4-6	—29	8	2	...	...	N.W.	...	...	...	1	...	...	...	...
" 17	Dunvegan	12	10	10	...	...	W.	...	...	...	1	...	...	...	...
" 18	"	20	17	8	27·05	...	N.E.	...	1	...	1	...	...	...	...
" 19	Tp. 82-4-6	2	2	0	27·25	...	E.	...	1	...	1	...	...	...	...
" 20	Burnt river	— 4	— 6	—24	27·35	...	E.	...	...	...	1	...	...	...	...
" 21	Peace "	—34	32	—30	27·58	...	S.E.	...	...	1	...	...	...	...	7
" 22	" "	—42	— 8	—36	27·57	...	E.	...	...	1	...	...	...	...	8

"	23	Peace river and Slave lake portage	-38	2	-16	27·55	.....	N.	....	....	1	.....	.....	.....	.....	7
"	24	" " "	4	12	10	27·30	.....	S.E.	.....	1	.....	1	.....	.....	.....	.....
"	25	Little Slave lake	-6	-9	-8	27·25	.....	W.	.....	1	.....	1	.....	.....	.....	.....
"	26	" "	-12	13	-13	27·51	.....	E.	.....	1	.....	.....	.....	.....	.....	2
"	27	" "	-9	1	0	27·52	.....	S.W.	.....	1	.....	1	.....	.....	.....	.....
"	28	Little Slave river	1	4	0	27·52	.....	N.E.	.....	.....	.....	1	.....	.....	.....	.....
"	29	" "	4	8	2	27·55	.....	E.	.....	.....	.....	1	.....	.....	.....	.....
"	30	" "	0	7	-8	27·58	.....	S.W. by W.	.....	1	.....	1	.....	.....	.....	.....
"	31	Athabaska river	-38	18	-30	28·95	.....	N.E.	.....	.....	1	.....	.....	.....	.....	8
Feb.	1	" "	-42	-6	-27	28·85	.....	N.E.	.....	.....	1	.....	1	.....	.....	7
"	2	Athabaska landing and Edmonton trail	-42	-5	-19	28·71	.....	S.E.	.....	.....	1	.....	.....	.....	.....	8
"	3	" " "	-28	-8	-29	27·65	.....	S.E.	.....	.....	.....	1	.....	.....	.....	.....
"	4	" " "	-27	-9	-20	27·66	.....	S.E.	.....	.....	1	.....	.....	.....	.....	4

APPENDIX No. 26 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF J. N. WALLACE, D.L.S., 1904.

SURVEY OF BLOCK OUTLINES IN PEACE RIVER DISTRICT.

CALGARY, ALTA., March 24, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my survey of block outlines in the Peace River country, under your instructions of March 7, 1904.

I left Calgary on March 2 and went to Edmonton, where arrangements were made to have the supplies and heavy outfit sent forward by freighters to Lesser Slave lake. These left Edmonton on March 10. I left myself with the survey party, on March 25.

In view of the interest taken in the Peace River country, and as the route followed was that nearly always taken, it will be shortly described.

From Edmonton to Peace River Crossing is three hundred and sixty miles. It is a further distance of seventy-five miles by this route to Spirit river and another sixty miles to Grand prairie. The Vermilion is two hundred miles down the river from the crossing. The distance to Spirit river can be shortened by using a direct route from the head of Lesser Slave lake, but it can only be followed by pack horses in summer, as it is not cut out wide enough for sleighs. Some work was done last season in opening a sleigh road from the lake to Grand prairie, but it is not completed west of Simonette river. These routes would be some fifty miles shorter than the distances stated above.

We travelled the hundred miles due north from Edmonton to Athabaska Landing in four days with sleighs. There is, however, a weekly stage which makes the journey in two days, summer and winter. We left the landing on March 30 and proceeded seventy-five miles up Athabaska river on the ice, to where Little Slave river joins it, and then travelled up this latter river for forty miles to the east end of Lesser Slave lake. Leaving the east end of the lake we travelled on the ice, following along the south shore, for some thirty miles, and then crossed the lake at the narrows, where it is nine miles wide. The route then follows the north shore for thirty miles to the west end of the lake, the total distance on the lake being seventy miles. We reached here on April 6, having travelled two hundred and eighty-five miles from Edmonton in eleven days.

In summer time the same route is followed but boats and scows are used on the water. Little Slave river is the greatest drawback on this route. In winter water floods over the ice when any thaw occurs, and the river is the last water to freeze over and the first ice to break up in the spring. This is due to the swift current and the many rapids. For the same causes it is a troublesome river on which to track up boats in the summer. There is a road cut out on land, in the neighbourhood of the river, on the north side, from Moose Portage to the east end of Lesser Slave lake. Moose Portage is a stopping place on Athabaska river sixty miles above the landing. The road is, however, a rough one, and but little used, and it is necessary to raft an outfit across Moose river on the way.

Last season we were the last outfit to travel on the ice up Lesser Slave river, and we barely managed to do so. This year (1905) the season is considerably earlier than last, but last year was the more usual.

At the west end of Lesser Slave lake there is a large settlement, a post office, English and Roman Catholic missions and the trading posts of Messrs. Bredin and Cornwall and the Hudson's Bay Company. Nearly everything can be obtained there, but prices are extremely high.

From the lake the journey was continued on April 18. Several days had been required to send back to the east end of the lake to bring up the most necessary supplies. Wagons were now used to move the outfit across the eighty miles of road to Peace River Crossing. This road is in very bad condition in early summer. Travelling on it should, if possible, be got over before sleighing ceases.

At Peace River crossing there is some settlement on both sides of the river. About twelve miles up the river on the left bank the land is reputed to be the best in the upper Peace River district, but the available area is very small, as it is restricted to the bottom lands in a narrow deep valley.

We crossed Peace river on April 28 by the aid of the mission steamer, the ice in the river having gone out on April 10, a few days earlier than usual. After travelling sixty miles on a very fine road on the high land through an open country, we reached Dunvegan on May 5, and again crossed back to the right bank of the river. This double crossing is required as the country is too rough for travelling on the right bank between the crossing and Dunvegan.

There is no settlement at Dunvegan. It is merely a name and a trading post. Sixteen miles south is Spirit River settlement, which seems the most popular locality in the upper Peace River country. We arrived here on May 10.

There are no difficulties to be encountered on this journey from Edmonton by a person travelling by himself either in summer or winter. It rarely happens that it is necessary to camp out, as there are stopping houses distributed along almost the whole route. He should have enough supplies and cooking utensils to carry him through, and his blankets, as these things are not supplied at the stopping houses, although cooking facilities are obtainable.

A heavy outfit, however, should leave Edmonton early enough to travel by sleigh to the journey's end. It is advisable to leave Edmonton as early as February 15, to be sure of the ice, and because at most of the stopping places there is only enough hay put up to last the earlier part of the freighting season. The entire journey from Edmonton to Spirit river is covered by those who have loads in about twenty-five days, but if a person cannot get his load through before the snow melts it may take six weeks.

At Spirit river I left my wagons, and for the rest of the season till October used pack horses entirely.

Work was begun on the twentieth base on May 16. Seventy-seven miles were run westerly to the boundary of British Columbia and six miles southerly along the east of township 76, range 13, the whole being completed on September 27, after which I returned to Spirit river. On October 18 we left Spirit river, after many delays caused chiefly by the difficulty of getting men. After travelling about seventy-five miles southeast, we reached the intersection of the sixth meridian and the nineteenth base, having had to raft across Smoky river on the way.

The nineteenth base was run to the end of twelve ranges, a distance of seventy-two miles, and then the east boundaries of townships 73 and 74 were run north, the whole being finished on January 10, 1905.

I was compelled to stop work on January 15, through want of feed for the horses and shortness of supplies, after making an unsuccessful attempt to run the gap of six miles along the east of township 75, range 13, which would have closed the season's work on the correction line.

On January 28, I reached Spirit river, having completed one hundred and sixty-seven miles during the season.

At Spirit river a settler was engaged to take the party to Edmonton, which was reached on February 20, after an absence of eleven months.

TWENTIETH BASE LINE.

This base line, forming the north boundary of township 76, runs through continuous timber over almost its entire length of seventy-seven and a quarter miles from the sixth meridian to the boundary of British Columbia. Along ranges 1 to 5, the timber is composed of a forest of poplar running to twenty inches diameter, with scattered spruce and a few birch. West of range 5, the country has been devastated by fire, which occurred some fifteen years ago, and is now covered with much standing and fallen burnt timber. There are a few isolated patches of scorched green timber. The fallen logs are so large and numerous that travelling is only possible with pack horses, and even then a trail must be first cut out. This area of burnt country extends westerly some twenty-four miles to the west end of range 9. For a couple of miles further west the timber is irregular and then again becomes very heavy, consisting of a heavy growth of green spruce and jack pine, with scattered poplar extending as far as range 11. So far the country has been of an undulating character. West of range 11 there are many low rolling hills and wide valleys with a growth of tangled willows and alders and scattered patches of poplar. This character continues to the centre of range 12, after which the hills continue, but patches of heavy timber are more common. The fractional range 13, extending across five sections, twenty-four chains and forty-six links, to the boundary of British Columbia, is generally more open than anything encountered previously along this base.

Along the boundary, and to the west, the country is of a rolling character, covered with small willows with patches of poplar and spruce at long intervals. Pouce Coupé prairie lies to the north and northwest of the end of this line. Its exact location could not be ascertained, but it is probable a small portion of it lies in the Territories, the greater portion being in British Columbia.

The foot hills are probably at least seventy miles west of the boundary of British Columbia. The Rockies themselves are only barely visible from the hilltops near the end of this base line.

No rivers or streams larger than a couple of feet wide cross this base line, except Burnt river, Saddle Mountain creek, Buckskin creek, and a branch of Pouce Coupé river in the last range. Burnt river, the largest, is about thirty feet wide at low water and seventy-five feet wide when in flood. It is much longer than shown on the maps It rises in a small lake south of the base line in range 10. The creeks crossed by the base east of range 5, flow to Smoky river. West of this they all ultimately reach Peace river. Only one lake occurs on the base line.

The absence of large rivers has resulted in the country being burnt over again and again. There is nothing to stop a fire from sweeping the whole country from Smoky river to British Columbia.

It seems probable that west of range 6, the whole country is forest-covered for many miles to the north and south of this base line, excepting the small area of Pouce Coupé.

East of range 6, the thick timber extends four or five miles north. To the north of this there is a great deal of open country known as Grizzly Bear prairie and Spirit River prairie. It must be remembered that in the Peace River country the word 'prairie' simply means an open space, either large or small. Prairie, like that of southern Alberta, does not occur in the upper Peace River country, so far as my observation went. It is always accompanied more or less by bluffs of poplar. Even on the larger 'prairies,' such as Grand prairie and Spirit River prairie, it would seldom occur that a straight line could be run for two miles without encountering some patch of timber. The open spaces are, however, much greater than those covered by bush.

Spirit River prairie is some eighteen miles by ten miles in area. It forms an attractive looking country but, like most prairie areas in the district, suffers for want of more water than it has. There is a considerable settlement here, with Presbyterian and Roman Catholic missions and two trading posts. A post office is badly needed, a large amount of mail matter being now brought up to the settlement from Peace River crossing, a distance of seventy-five miles, by the courtesy of the Hudson's Bay Company, and Messrs. Bredin and Cornwall.

NINETEENTH BASE LINE.

This base line, forming the north boundary of township 72, begins at the sixth meridian at a point about eleven miles east of Smoky river.

The country east of the river is undulating and lightly covered with an irregular growth of small poplar and spruce. While there is no prairie or open country, the timber is nowhere of any size. The line crosses Smoky river about three miles north of a very pronounced horseshoe bend in the river, and about four miles north of an old Indian trail, known as the 'Lower Ford.'

Smoky river, at the intersection of the line, is six hundred and thirty-nine feet wide, the water being low at the time of survey. It flows in a precipitous ravine five to six hundred feet deep. There are too many rapids for the river to be navigable.

After crossing the Smoky, the base line passes through an undulating country generally timbered irregularly with small poplar and willows, the country gradually becoming more open till, at the middle of range 4 ,the line emerges on Grand prairie.

For twenty-six miles the base continues across the prairie country and then again enters the bush near the west end of range 8. The remainder of the line, to the end of range 12, is through a bush country without any open spaces other than small local patches.

The central line of Grand prairie does not run quite due east and west, and consequently its longest dimension is somewhat greater than its extent along the base line. It runs back east, a little to the south of the base, for some five miles from where the base first enters the prairie, and continues on to the northwest for about eight miles after the line leaves it. Its width runs from ten to twenty miles north and south. This would make a total area of about seventeen townships, which is probably a large, rather than a small estimate of its area. There are small bluffs of poplar nearly everywhere, which distinguish it greatly from what is termed prairie further south, but the open areas are enormously greater than those covered by bush. Excepting on Kleskun hill, the surface is gently rolling.

While there are a number of ponds and lakes, running water is very scarce over the whole prairie, only four small creeks intersect the whole twenty-six miles of the base line crossing the prairie. The soil is very shallow but the grass very good. West of Grand prairie, where the line runs through a bush country, the soil is very much better.

At Saskatoon lake, a few miles southwest of Bear lake, there is a small settlement, two trading posts, a Roman Catholic mission and a few settlers. The locality is very picturesque, and makes a very fine cattle country, if they are properly fed during the winter.

The season was beautifully fine. From the first of May to the end of August rain only fell on a total of sixteen days, spread about equally over this period. September had thirteen rainy days, with a little wet snow at the end which disappeared in a few days. After October 3, the weather again became very fine and remained so, till November 21, when a fall of three inches of snow occurred and remained on the ground. From then till the end of January there were only eleven days on which it snowed, the total depth being twelve inches at the latter date.

While it was an ideal season for surveying, except for the constant dread of fire and the difficulty of getting water, it was much too dry for agriculture.

The Chinook wind occurred during the winter over Grand prairie and Spirit river districts, but at long intervals. It has to travel so far from the mountains before reaching here that it has lost much of its warmth, and, as a rule, did not appreciably melt the snow. Except on one occasion, on January 17, the temperature never exceeded 37 degrees when a westerly wind was blowing during the winter. On the occasion referred to, the depth of snow was reduced materially by the wind.

While these winds did not have much power to reduce the depth of snow once it had fallen, they undoubtedly tend to keep the weather dry and lessen the actual snow fall south of Peace river.

Although the temperature in the sun, during summer was quite as hot as is ever experienced in the southern part of the territories, yet when the direct rays of the sun are cut off the temperature is never excessive. Often, when it was painfully hot in the sun, the temperature in the shade would be only 75 or 80 degrees. The temperature falls rapidly after sundown, radiation being very great. Several times, during the months of July and August, although the days both before and after were oppressively hot, the temperature fell below freezing point at night. Whether cultivation, by letting in the heat of the long summer days into the ground, can neutralize this cooling by radiation is a matter of conjecture, but from the experience of many other localities, it seems reasonable to suppose it would have considerable effect.

In spite of all the difficulties that must be endured by the pioneers of a new country situated so far off from any town, the few settlers in the country seem perfectly satisfied to remain there, but a person going in with a family and having to support others than himself alone would have many trials before him.

Until some better transportation has been established, the high prices of even the absolute necessities of life, would be a very difficult proposition for a settler's family.

If railway communication could be made to almost any point on Peace river, it would enormously help the transportation problem. This river forms a magnificent highway from Fort St. John in British Columbia for nearly four hundred and fifty miles to Vermilion, and even further north if connection is made across the rapids there, to Lake Athabaska, thus affording access to the whole north country.

Unfortunately, Peace river flows for the most part in a very narrow valley nearly one thousand feet deep, and is thus difficult of approach. There are now three steamers on the river, two of them capable of carrying ten tons each, and able to make five miles an hour against the current.

In concluding this report, it may be well to point out that it refers almost entirely to the country south of Peace river.

I wish to record my appreciation of the services of my assistant, Mr. C. C. Smith, B.A., more especially for his uniform willingness to work after regular hours should occasion require it.

I have the honour to be, sir,

Your obedient servant,

J. N. WALLACE, *D.L.S.*

APPENDIX No. 27 TO THE REPORT OF THE SURVEYOR GENERAL.
REPORT OF G. H. WATT, D.L.S.

INSPECTOR OF SURVEY CONTRACTS IN DISTRICT OF ALBERTA.

OTTAWA, February 28, 1905.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on my field operations during the past season.

In compliance with your instructions, dated March 18, 1904, I left for Calgary April 26, and arrived there April 30. I was delayed about ten days awaiting the arrival of my baggage. Outside of this delay, I lost only four whole days during the season, three days on account of rain all day and one day on account of snow.

The country covered by my work lay chiefly west of the Calgary and Edmonton branch of the Canadian Pacific Railway. There were, however, several scattered contracts, one about sixty-five miles south of Calgary, one about forty miles east of Olds; two extending sixty-five miles north and west from Edmonton and one extending as far as seventy-five miles east of Edmonton. To get over this country necessitated a good deal of travelling, and this required time. The field work lasted from May 13 to December 17.

I took over some of the horses and wagons used by Mr. Pearce in 1903, and as my first work lay north of Edmonton, a distance of two hundred and forty-five miles north of Calgary, and as the horses were fresh off the pasture and not in good condition for such a long drive, I sent them by train to Edmonton and fed them up well to get them in good shape for the season's work.

I left Edmonton on Friday, May 13, and went into camp the first time, that day. My first work was the examination of the contract of R. Rinfret south and west of Lac la Nonne. This completed, I went north to Pembina river to the winter contract of Thos. Drummond. The roads in to these contracts were deep with water and mud in the spring and four-horse teams were used for long stretches of roads. The next work, the contract of C. E. Bourgault, lay south and west of Wabamun lake, and although there were direct trails from where I then was to Wabamun lake, they were not passable at this season, as the creeks were very high and the meadows full of water. I was thus compelled to take the well-travelled road back to Edmonton and go west on another main road to the work. The western end of this trail was, I think, the worst I had to use all summer. When this was completed, I went east about one hundred and twenty miles, to examine the winter contracts of Messrs. R. W. Cautley and J. L. Côté, on the Saskatchewan around Victoria. This work was unpleasant on account of the great number of sloughs, and on account of the showers of rain, which, although they were not usually heavy, were of almost daily occurrence, coming up suddenly in the afternoon or evening. On the way down to this work the creeks and streams were all full of water, but on my way back to Edmonton two weeks later, it was sometimes difficult to find enough water for camp purposes.

The next work lay along Red Deer river in ranges 4, 5 and 6 west of the fifth meridian, and consisted of the winter contracts of H. W. Selby, A. E. Farncomb and H. B. Proudfoot, all of which were to be inspected without delay. Leaving camp near Saddle lake mission July 1, I passed through Edmonton July 5, and camped on the Red Deer in range 4, west of fifth meridian on July 14, having travelled in the one move over two hundred and sixty-two miles of trail. From this camp work was done in one township by A. E. Farncomb, and one township done by H. B. Proudfoot. I moved from there to a camp on James river in range 5, and examined two more townships done by Mr. Proudfoot; and using pack horses I took a flying camp into Mr. Selby's contract and completed the examination of it. As there were not trails I had to pack in on the surveyed lines. I had two more camps in Mr. Proudfoot's work and from one of these, on Fallentimber river, I did work in one township surveyed by Mr. C. F. Miles.

I then went out to Olds over a lumbermen's winter trail (nearly all muskegs) for supplies preparatory to going farther south.

The trip to town with the whole outfit I found to be a necessity for several reasons. First, I bought supplies in the nearest town to my work to save freighting, and as the different trips lasted from three to five weeks, the quantities bought were small and I had to do all my buying in person in order to keep the cost within the allowance, Secondly, there was no trail running north and south through the work, and I had invariably to go out to the main trail from Calgary to Edmonton in order to reach the trail running into the next work. Thirdly, the roads were so rough and difficult that the wagons were constantly in need of repairs.

From Olds, I went to Didsbury and thence to a camp about ten miles south of the Little Red Deer mill, in township 30, range 4, west of the fifth meridian. I here examined part of the contract of John Aylen, and according to special instructions went to see C. F. Miles, to reach whose camp I had to travel over fifteen miles of a very rough pack trail.

From this district I went north again and examined the contracts of A. E. Farncomb, T. Drummond and G. Edwards, all of which were located on the old Rocky Mountain House trail, and then I went into W. F. O'Hara's contract just west of Medicine river, in townships 42, 43 and 44.

I then went to the contract of J. A. Carbert on Red Deer river, about forty-five miles east of Olds, and from there to Edmonton, and on to Lake St. Ann to the contracts of C. E. Bourgault and G. P. Roy, and then to examine the corner monuments of the winter contracts of R. Rinfret and T. Drummond, which were not built when I was there in the spring.

From the contract of Mr. Rinfret, I went south to that of W. F. O'Hara, west of Lacombe, which I could not complete before, and then south to the work of John Aylen and C. F Miles, each of whom did not have much work done when I was first in their contracts.

When passing Olds, I stayed over a couple of days and ran a disputed line for a settler.

I moved camp into Calgary December 18 and disposed of my outfit and came home December 19.

The weather over the whole season was remarkably fine, the fall especially so. The trails in the unsettled parts were, in the early part of the season, very deep with mud, and were generally soft, but in the latter part of the season were much drier though very rough, and in some places stony and stumpy. In the bush one cannot turn out around a bad spot, but must keep to the road and go through the difficult places. At the end of the road I left my wagons in the bush, got out the pack saddles and got into many places by pack trains.

A great deal of moving about was caused by the contracts being scattered over a large tract of country extending about two hundred and twenty miles in a north and south direction, and one hundred and sixty miles in an east and west direction, and also by the fact that the number of contracts in the extremes of the work had to be visited twice on account of the work being only partially done when it was first gone over.

Those surveyors working in heavy or spruce woods thought it a hardship to have to cut a north to south outline the second time when the trial line did not strike the corner of the outline. I observed and heard of many ways taken to avoid cutting the line the second time. In the hill country a signal was placed at the township corner, in one case a large red ensign was used on a thirty-foot pole. The surveyor ran from the opposite corner till the flag came in view, he then calculated how far from the signal his line would strike if produced, and allowing for this correction he returned and began again on the true line. In fairly level, or even moderately hilly country, where the bush was thick or tall, such a method could not be used. Here the best method I heard of was to run one of the interior chords first, preferably, the one nearest the outline to be run, the distance to the township corners between which the outline was to be run was then measured from the ends of the chord line, and if it did not involve too much cutting the transit was run over the line from which the north outline or south outline was to be surveyed. In this way the surveyor could calculate fairly closely what angle to turn to strike the opposite township corner and if after these precautions the line did not strike the post it should come so near to it that very little widening of the trial line would be necessary.

I used a 4-inch Watts transit and found it very satisfactory. I used a spider's web in the diaphragm.

The 400-link chain which I used throughout the season is almost too long for rough bush country where there is much dead fall or many small hills, unless there are three men on the chain. With three men on the chain the man in the centre keeps the chain clear and takes the notes, using the clinometer from the middle or at any distance along it from which it may be found most advantageous to do so, as in going over a knoll where the front and rear chainmen are out of sight of each other. When only two chainmen are used, in passing such a knoll the front chainman drags the chain out full length and then comes back and puts in a pin at a convenient distance on the top of the hill, and the rear chainman after noting the slope shown by the clinometer moves up and the front chainman goes ahead to his end of the chain. I heard many complaints from contractors as to the size of pits and mounds found on the outlines of their work, and I saw very few full sized pits on the outlines run by the outliners working under daily pay for the department.

The frost which came early in the fall froze the grass before some of it was cured, and this fact proved a hardship when late in the fall I was in contracts where no settlers were convenient from whom to procure hay. In one contract I was forced to send my horses back 25 miles to the nearest settler to be fed hay, keeping only three ponies for moving camp. At the end of a week, the best of the three could barely carry a man out to where the others were being kept.

During the season I travelled two thousand miles in wagons and used pack saddles on two hundred miles of trail. I travelled on the road, moving camp, on one hundred and eleven days, and worked on the line ninety-three days, or parts of days, and sent in returns of four hundred miles of line surveyed.

I have the honour to be, sir,

Your obedient servant,

GEO. H. WATT.

APPENDIX No. 28 TO THE REPORT OF THE SURVEYOR GENERAL.

EXAMINATION PAPERS OF THE BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS

EXAMINATION FOR ADMISSION AS ARTICLED PUPIL.

XXV.

PENMANSHIP AND ORTHOGRAPHY.

(Time, 3 hours.)

Write a composition of not less than 200 words on the merits of Orthography and Penmanship :

ARITHMETIC AND LOGARITHMS.

(Time, 3 hours.)

	Marks.
1. The accumulated capital of $1,250 with compound interest at five and a half per cent for 15 years is divided among three heirs in the proportions 1, 2 and 3. What does each heir get ?	12
2. Prove rule for converting a recurring decimal to a vulgar fraction.	12
3. Give result in a vulgar fraction of $(.9\dot{1}\dot{3})$ $(.0\dot{5}\dot{6})$ divided by $(6.72\dot{4})$ $(.003\dot{1}\dot{8})$.	12
4. By logarithms multiply 4.8123 by .00387 and extract the third root.	12
5. $(2.345)^7$ is the 17th power of what number ?	13
6. A and B can do a piece of work together in $2\frac{3}{5}$ days ; if A increase his speed by one-half, and B by one-third, the work is done in $1\frac{29}{43}$ days. How long will it take each to do the work alone ?	13
7. The natural secant of an angle is 3.712857 ; the natural cotangent of an angle is 4.725901 ; the logarithmic sine of an angle is 8.427318 ; the logarithmic tangent of an angle is 0.728342 ; Find the angles.	13
8. Find the numerical value of Sin A+Cos B+Sec C, where A=52° 13′ 15″, B=18° 20′ 36″, C=82° 17′ 19″.	13

ALGEBRA.

Marks.

(Time, 3 hours.)

1. Write first five terms of $(a \pm b)^n$. 12

2. Factor $a^4 + b^4 + c^4 - 2a^2 b^2 - 2b^2 c^2 - 2c^2 a^2$. 12

3. Find the H. C. F. of $x^4 - px^4 + px^2 - p^2x$, and $x^3 - p^3$. 13

4. Find the L. C. M. of $x^4 + 4x^2 + 16$, $x^5 + 2x^4 + 4x^8 + 8x^2 + 16x + 32$, and $x^5 - 2x^4 + 4x^3 - 8x^2 + 16x - 32$. 13

5. Simplify $\dfrac{1}{x^2 - 19x + 84} - \dfrac{1}{x - 12x + 35}$ 13

6. Solve $\dfrac{a+b}{x-c} = \dfrac{a}{x-a} + \dfrac{b}{x-b}$ 13

7. Solve $2x - 3y + 4z = 4$ 12
$3x + 5y - 7z = 12$
$5x - y - 8z = 5$

8. Solve $\dfrac{1}{x} + \dfrac{1}{y} = 5$
$\dfrac{1}{x^2} + \dfrac{1}{y^2} = 13$ 12

PLANE GEOMETRY.

(Time, 3 hours.)

Marks.

1. In a right angle triangle prove $a^2 + b^2 = c^2$ 12

2. In any triangle prove $a^2 + b^2 - 2ab \text{ Cos } C = c^2$ 12

3. Divide a straight line a, so that $a\,(a-x) = x^2$ 12

4. If the opposite angles of a quadrilateral be equal, the opposite sides are equal. 12

5. Inscribe a pentagon in a given circle. 13

6. Describe a circle about a given triangle. 13

7. Draw through a given point within a circle a chord such that it is bisected at the point. 13

8. The locus of a point at which a given straight line subtends a constant angle is an arc of a circle. 13

PLANE GEOMETRY.

Marks.

(Time, 3 hours.)

9. Given one angle, and the opposite side, and the sum of the other sides, construct the triangle. 14

10. The locus of a point, the ratio of whose distances from two given points is constant, is a circle. 14

11. Similar triangles are to one another in the ratio duplicate of the ratio of two corresponding sides. 14

12. Construct a square equal to the difference of two given squares. 14

13. The rectangle contained by the diagonals of a quadrilateral inscribed in a circle is equal to the sum of the rectangles contained by pairs of opposite sides. 14

14. The chords of two intersecting circles which are bisected at any point of the common chord are equal. 15

15. Prove that the bisectors of all the angles of any regular polygon meet in a point 15

PLANE TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Prove that $\text{Sin}^6 \theta + \text{Cos}^6 \theta = 1 - 3 \text{ Cos}^2 \theta + 3 \text{ Cos}^4 \theta$. 12

2. Prove that $\dfrac{\tan A + \tan B}{\text{Cot } A + \text{Cot } B} = \tan A \tan B$. 12

3. Show that $\text{Sin } 18° = \dfrac{\sqrt{5} - 1}{4}$ 12

4. Prove $\text{Cos } 4 A = 8 \text{ Cos}^4 A - 8 \text{ Cos}^2 A + 1$. 12

5. Deduce $\tan A + \tan B + \tan C = \tan A \tan B \tan C$. 13

6. If a, b, c, be the sides of a triangle and $s =$ the half sum, show that the area $= \sqrt{[s (s - a) (s - b) (s - c)]}$ 13

7. The sides of a triangle are 6, 8, and 10 ; what are the angles ? 13

8. If $a = 13$, $b = 14$, $C = 72°$, find the other parts. 13

SPHERICAL TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Deduce $\text{Cos } A = - \text{Cos } B \text{ Cos } C + \text{Sin } B \text{ Sin } C \cos a$. 16

2. Deduce $\text{Sin}^2 \tfrac{1}{2} A = \dfrac{\text{Sin } (s-b) \text{ Sin } (s-c)}{\text{Sin } b \text{ Sin } c}$ 16

3. Deduce $\dfrac{\text{Sin } \tfrac{1}{2} (A+B)}{\text{Sin } \tfrac{1}{2} (A-B)} = \dfrac{\tan \tfrac{1}{2} c}{\tan \tfrac{1}{2} (a-b)}$ 17

4. In a spherical right triangle: $c = 101° \ 16' \ 16''$, $b = 115° \ 42' \ 38''$; find A. 17

5. In a spherical triangle: $b = 99° \ 40'$, $c = 100° \ 49'$, $A = 65° \ 33'$; find a. 17

6. Given $A = 135° \ 05'$, $C = 50° \ 30'$, $b = 69° \ 35'$; find B. 17

MENSURATION OF SUPERFICIES.

Marks.

(Time, 3 hours.)

1. What part of the surface of the earth lies between the parallels of 30° and 60°, both north latitude ? 14

2. The sides of a field are 10·24, 12·18 and 14·62 chains respectively. What is its area ? 14

3. What is the surface of a circular tent, 10 feet in diameter, having a vertical wall of 3 ft., and centre pole 11 ft. ? 14

4. A right cone with radius of base r, altitude p, is cut by a plane parallel to the base so that the surfaces of the two parts are as 1 to 3. What is the height of the truncated cone ? 14

5. The area of a field is given at 100 acres, but it was found that the chain used in survey was a link too long. What is the true area of the field ? 14

6. What is the surface of a regular tetrahedron whose edge is $2a$? 15

7. What is the radius of the earth, expressed in terms of a of question 6, when the zone of the tropics (23° 30′ north and south of the equator) is equal to the surface of the above tetrahedron ? 15

EXAMINATION FOR ADMISSION AS ARTICLED PUPIL.

XXVI.

(Time, 3 hours.)

PENMANSHIP AND ORTHOGRAPHY.

Write a composition of not less than 200 words on : "Why young men should write legibly and correctly."

ARITHMETIC AND LOGARITHMS.

Marks.

(Time, 3 hours.)

1. Multiply ·13$\dot{5}$7$\dot{8}$ by ·04$\dot{8}$75$\dot{3}$.
   Divide 1·0$\dot{4}$8$\dot{6}$ by ·79$\dot{4}$2$\dot{1}$. 12

2. Prove rule for converting a recurring decimal to a vulgar fraction. 12

3. Compound interest reckoned quarterly at 2 per cent is equal to what interest reckoned yearly ? 12

4. If the difference between the simple and compound interest on a sum of money for two years at 5 per cent be \$3, find the sum ? 12

5. Given log $2 =$:3010300, log $3 =$ ·47711213, find log 46·08. 13

6. What power of ·02837 is 1·05 ?
   Find value of $(\cdot 00789)^{\frac{1}{8}}$. 13

7. Find numerical value of Sin $A +$ Tan $B +$ Sec C, when $A = 57^\circ\ 18'\ 15''$, $B = 60^\circ\ 29'\ 35''$, $C = 62^\circ\ 12'\ 10''$. 13

8. The logarithmic Sine of an angle is 9·7854321n.
   " " Tangent " 10·2356781.
   " " Secant " 12·0567429n.
   Find the angles. 13

ALGEBRA.

Marks.

(Time, 3 hours.)

1. Expand $(x \pm y \pm z)^5$ and $(x \pm y)^{10}$ 10

2. Find the L. C. M. of $x^2 + 5x + 10$, $x^3 - 19x - 30$, $x^3 - 15x - 50$. 10

3. Simplify $\dfrac{(x+y)^7 - x^7 - y^7}{(x+y)^5 - x^5 - y^5}$ 10

4. The product of four consecutive numbers is 93024. Find them. 10

5. $x^2 - 7x + \sqrt{(x^2 - 7x + 18)} = 24$; find x. 10

6. Solve the equation $(x - 2a)^3 + (x - 2b)^3 = 2(x - a - b)^3$ 10

7. Solve $x + y + z = a + b + c$. $x + a = y + b = z + c$. 10

8. A crew which can pull at the rate of nine miles an hour finds that it takes twice as long to come up a river as to go down; at what number of miles does the river flow ? 10

9. Show that the G. C. M. of two quantities is the L. C. M. of their common measures. 10

10. If $2s = a + b + c$, show that 10

$$\frac{1}{s-a} + \frac{1}{s-b} + \frac{1}{s-c} - \frac{1}{s} = \frac{abc}{s(s-a)(s-b)(s-c)}$$

PLANE GEOMETRY.

Marks.

(Time, 3 hours.)

1. Through a given point in the base of an isosceles triangle, draw a straight line which shall be terminated by the sides of the triangle (produced if necessary) and shall be bisected by the base. 12

2. If two circles touch one another externally, the straight line which joins their centres shall pass through the point of contact. 12

3. Find a fourth proportional to three given straight lines. 12

4. Similar triangles are to one another as the squares of their homologous sides. 12

5. Prove geometrically $(a+x)^2+(a-x)^2=2\ (a^2+x^2)$. 13

6. If A be a point outside a circle and B be the middle point of the chord of contact of tangents drawn from A, and P and Q be any two points on the circle, then PA is to QA as PB to QB. 13

7. To construct a triangle having each of two angles double of the third angle. 13

8. In a given circle to inscribe a triangle similar to a given triangle. 13

PLANE GEOMETRY.—*Continued*

Marks.

(Time, 3 hours.)

9. Bisect a parallelogram by a straight line drawn through a given point within it. 14

10. The sum of the squares on the sides of a parallelogram is equal to the sum of the squares on the diagonals. 14

11. Every parallelogram inscribed in a circle is a rectangle. 14

12 To inscribe a regular polygon of fifteen sides in a given circle. 14

13. To divide a given straight line in extreme and mean ratio. 14

14. Prove that the difference of the squares on a diagonal and on a side of a regular pentagon is equal to the rectangle contained by them. 15

15. Construct a triangle having given an angle and the radii of the inscribed and the circumscribed circles. 15

PLANE TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Prove Sin $3A +$ Sin $5A = 2$ Sin $4A$ Cos A. 12

2. Prove $\dfrac{\tan\theta \,.\, \cot\varphi + 1}{\tan\theta \,.\, \cot\varphi - 1} = \dfrac{\sin(\theta + \varphi)}{\sin(\theta - \varphi)}$ 12

3. Show that Sin $18° = \dfrac{\sqrt{5} - 1}{4}$ and Cos $54° = \frac{1}{4}\sqrt{(10 - 2\sqrt{5})}$. 12

4. Show that Sin $\frac{1}{2} A = \sqrt{\dfrac{(s-b)\ (s-c)}{b\ c}}$ 12

5. The sides of a triangle are 13, 12, 5 ; find the angles. 13

6. Two sides of a triangle are 14 and 16 and the included angle 40° 15′ ; find the other side. 13

7. The sides of a triangle are 22, 25, 29 ; find the angles. 13

8. Find the circular measure of 42°, and find the angle whose circular measure is $\frac{5}{8}$. 13

SPHERICAL TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Show that Cos $A +$ Cos B Cos $C =$ Cos a Sin B Sin C. 14

2. Show that Cos a Sin $b =$ Sin a Cos b Cos $C +$ Sin c Cos A. 14

3. Deduce Sin $\frac{1}{2} A = \sqrt{\dfrac{\sin(s - b \sin(s-c)}{\sin b \sin c}}$ 14

4. Given $a = 32°\ 15'$, $b = 48°\ 12'$, $c = 72°\ 16'$; find A. 14

5. Given $a = 32°\ 15'$, $b = 48°\ 12'$, $C = 72°\ 16'$; find c. 14

6. Give and prove Napier's rules for the solution of right angled spherical triangles. 15

7. Given $C = 90°$, $c = 44°\ 35'$, $a = 1°\ 12'$; find A and B. 15

MENSURATION OF SUPERFICIES.

Marks.

(Time, 3 hours.)

1. What is the area of a triangular field whose sides are 12·16, 14·72 and 16·12 chains ? 12
2. The sides of a quadrilateral inscribed in a circle are respectively 14, 15, 16 and 17 chains, what is the area ? 12
3. What is the ratio of the temperate zones to the torrid zone of the earth ? 12
4. Taking the distance of the moon at 240,000 miles and the radius of the earth 4,000 miles, what proportion of the surface of the earth is visible from the moon ? 12
5. If a tetrahedron with edge a, be converted into a sphere, what is the radius of the latter ? 13
6. A right cone whose diameter and height are equal contains 100 cubic inches, what is its surface ? 13
7. A mountain area of 10,000 square miles has an annual precipitation of 40 inches, of which 35 per cent is lost in evaporation. The water is stored in reservoirs. What area can be irrigated with 20 inches of water from the reservoirs ? 13
8. The surface of a sphere is equal to that of a cylinder whose height is three times its diameter. If r is the radius of the sphere what are the dimensions of the cylinder ? 13

EXAMINATION FOR ADMISSION AS ARTICLED PUPIL.

XII.

LIMITED EXAMINATION.

Marks.

(Time, 3 hours.)

1. Write a composition of not less than 200 words on the "River Systems of Canada."
2. When will a sum of money treble itself at three per cent compound interest ? 8
3. Find the value of $8{\cdot}7\dot{6}\dot{2} + 15{\cdot}5\dot{4}\dot{9} + 13{\cdot}20\dot{4}$. 9
4. Which of the following statements is more nearly correct ?

$$\frac{10}{9{\cdot}009} = 1{\cdot}11 \text{ or } \frac{10}{1{\cdot}11} = 9{\cdot}009$$

9

5. Given the logarithms of $2 = {\cdot}3010300$ and of $3 = {\cdot}4771213$; find the logarithm of $\sqrt{45}$; of 36 ; and of ·001 9
6. Find value of $(1{\cdot}17)^7\ ({\cdot}0082)^{\frac{1}{3}}\ ({\cdot}178)^{\frac{3}{5}}$ 9
7. Solve $x^2 - 5x + \sqrt{(x^2 - 5x + 3)} = 9$
8. Prove geometrically $(a - b)\ (a + b) + b^2 = a^2$ 9
9. Draw a tangent to a given circle parallel to a given straight line. 9
10. Construct a right-angled triangle having given the hypotenuse and the difference of the sides. 9

LIMITED EXAMINATION.

(Time, 3 hours.)

	Marks.
11. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{4}$, prove that $\tan (A + B) = \frac{6}{7}$, and $\tan (A - B) = \frac{2}{9}$.	12
12. Prove $\operatorname{Cot}\left(A - \frac{\pi}{4}\right) + \tan\left(A + \frac{\pi}{4}\right) = 0$.	12
13. In a plane triangle $a = 12$, $b = 14$, $c = 16$; find the angles.	12
14. In a spherical triangle $a = 52° 16'$, $b = 70° 34'$, $C = 46° 19'$; find the other parts.	12
15. In a spherical triangle $A = 100°$, $C = 90°$, $a = 112°$; solve the triangle.	13
16. What is the surface of a tetrahedron whose volume is equal to that of a sphere of radius r?	13
17. A right cone, whose diameter of base equals its altitude, weighs 10 pounds. The specific gravity of the mass is 12. What are the dimensions of the cone?	13
18. Give formulæ for surface and volume of sphere, cone, truncated pyramid and segment of sphere.	13

PRELIMINARY (LIMITED) EXAMINATION

XIII.

FIRST PAPER.

(Time, 3 hours.)

	Marks.
1. Write a composition of not less than 200 words: "Canada, a nation."	
2. Show that 72 divided by any rate of interest gives approximately the number of years in which a sum of money will double itself at that rate of interest.	8
3. Give and prove the rule for converting a recurring decimal to a vulgar fraction.	8
4. Find numerical value of $\sqrt{34} \cdot (5.72)^{\frac{1}{3}} \cdot (.081)^{7} (3.04)^{-3} \div (.061)^{\frac{1}{4}} (1.72)^{5}$	8
5. If the unit of measure be 7 inches, what is the measure of $\frac{8}{361}$ of a mile?	8
6. Solve $x^4 + x^3 - 4x^2 + x + 1 = 0$.	8
7. Solve the equation $8^{5-3x} = 12^{4-2x}$ having given $\log 2 = .301030$, $\log 3 = .477121$.	8
8. Prove geometrically $(a - b)^2 + 4ab = (a + b)^2$	8
9. The sides of a triangle are 10, 12, 15: prove that it is acute-angled.	8

SECOND PAPER.

Marks.

(Time, 3 hours.)

10. Prove $\dfrac{\sin A + \cos A}{\cos A - \sin A} = \tan 2A + \sec 2A.$ 11

11. Prove $\cot \dfrac{\pi}{8} - \tan \dfrac{\pi}{8} = 2.$ 11

12. Solve $\cos A + \cos 3A + \cos 5A = O.$ 11

13. Show that $\sin A = \dfrac{2}{bc} \sqrt{s (s-a) (s-b) (s-c)}.$ 11

14. In a plane triangle two sides and the included angle are given; give formulæ for solving triangle completely. 11

15. In a spherical triangle show that $\cos a \sin b = \sin a \cos b \cos C + \sin c \cos A.$ 11

16. Solve triangle, when $c = 140°$, $a = 20°$, $C = 90°$. 11

17. Given $b = 120° \ 30' \ 30''$, $c = 70° \ 20' \ 20''$, $A = 50° \ 10' \ 10''$, find a and B. 12

18. Write down Napier's analogies. 11

EXAMINATION FOR ADMISSION AS SURVEYOR

XXXIII.

PLANE GEOMETRY.

Marks.

(Time, 3 hours.)

1. Construct a triangle of given perimeter, having its angles equal to those of a given triangle. 16

2. Prove geometrically $(a + b)^2 + (a - b)^2 = 2 (a^2 + b^2)$ 16

3. Inscribe a circle in a given triangle. 16

4. Describe three circles to have their centres at three given points, and to touch each other in pairs. 17

5. Find the locus of the centre of a circle whose circumference passes through two given points. 17

6. If a straight line cut two sides of a triangle proportionately, it is parallel to the third side. 17

7. Describe three equal circles to touch each other and a given circle. 17

8. Divide a straight line in extreme and mean ratio. 17

9. Two diagonals of a regular pentagon which meet within the figure divide each other in extreme and mean ratio. 17

SOLID GEOMETRY.

Marks.

(Time, 3 hours.)

1. Define Solid, Inclination of a plane to a plane, Pyramid, Frustrum of a cone, Similar solid figures, Tetrahedron, Parallelopiped, Icosahedron. 9

2. If two planes meet in a point, they meet in a straight line. 9

3. Every point, which is equidistant from two fixed points, lies in a fixed plane. 9

4. If three planes intersect each other in pairs, their common sections either meet in a point or are parallel in pairs. 9

5. A tetrahedron is of equal volume as a sphere of radius r. What is the side of the former ? 9

6. What portion of the surface of the earth is included between latitude 60° north, and 30° south ? 10

7. A metallic globe of radius r is converted into a right cone, the diameter of the base being equal to the altitude. What are the dimensions of the cone ? 10

8. A truncated pyramid, with square base, has the following dimensions, upper surface 16 sq. inches, lower surface or base 36 sq. inches, height 10 inches. What is the volume ?

SPHERICAL TRIGONOMETRY.

Marks.

(Time, 3 hours.)

1. Show that $\text{Cos } A = - \text{Cos } B \text{ Cos } C + \text{Sin } B \text{ Sin } C \text{ Cos } a$. 17

2. Show that $\tan^2 \frac{1}{2} a = \dfrac{- \text{Cos } S \text{ Cos } (S - A)}{\text{Cos } (S - B) \text{ Cos } (S - C)}$ 18

3. Prove Napier's rules for the solution of right-angled triangles. 18

4. Deduce $\dfrac{\text{Sin } \frac{1}{2} (a + b)}{\text{Sin } \frac{1}{2} (a - b)} = \dfrac{\text{Cot } \frac{1}{2} C}{\tan \frac{1}{2} (A - B)}$ 18

5. Given $c = 140°$, $a = 20°$, $C = 90°$; solve triangle. 18

6. Given $b = 120° \ 30' \ 30''$, $c = 70° \ 20' \ 20''$, $A = 50° \ 10' \ 10''$; find a and B. 18

7. Given $A = 135° \ 05' \ 29''$, $C = 50° \ 30' \ 08''$, $b = 69° \ 34' \ 56''$; find a and B. 18

MEASUREMENT OR AREAS AND SUBDIVISION OF LAND.

Marks.

(Time, 3 hours.)

1. Divide a triangle into two parts in the ratio a : b, by a line starting from a given point in one of the sides. 16

2. In a triangle of sides a, b, c, what is the length of the line parallel to the side b, that cuts off a triangle the m^{th} of the whole area ? 16

3. In a circular area of ten acres, what is the length of the equal parallel chords within which one-half of the area lies ? 17

4. In a given triangle show how to part off a given area by a straight line passing through a given point within the triangle. 17

5. In a quadrilateral ABCD, the sides are respectively AB=8, BC=12, CD=14, DA=6, the diagonal DB=10 chains. Required to divide it into three equal parts by two straight lines drawn from A. 17

6. A field is supposed to contain 17.86 acres, but it was found that the chain used in the survey was three inches too short. What is the correct area? 17

MEASUREMENT OF AREAS AND SUBDIVISION OF LAND.

Marks.

(Time, 3 hours.)

7. The following are the notes of a survey of a quadrilateral piece of land :—

Station.	Bearing.	Distance.
1	N. 52° E.	10.63 chains.
2	S. 29° 45′ E.	4.10 "
3	S. 31° 45′ W.	7.69 "
4	N. 61° 00′ W.	7.13 "

Find the area by the method of Latitudes and Departures, first "balancing" the courses. 25

8. Express the conditions necessary for a closed survey by two equations :—

(a) And from them show what missing data in a survey can be supplied.

(b) How does the supplying of missing data in a survey affect "balancing" the survey ?

9. The centre line of a railway leaves a tangent running N. 60° E. at a lot line running due north and continues on a curve of 1,000 feet radius across the lot which is 20 chains wide. The right of way extends 50 feet on each side of the centre line. What is the area of the right of way across the lot ?

25

10. If the discharge of a river system is 10,000 cubic yards per minute, the annual precipitation 35 inches, whereof 40 per cent is lost in evaporation, what must be the area of the catchment basin ? 25

DESCRIPTIONS.

Marks.

(Time, 3 hours.)

1. A man sells the south-east quarter of Section 4, Township 5, Range 7, west of 3rd Initial Meridian.
   Make a description of the part sold for insertion in a deed. — 20

2. If in the preceding example the man had sold 160 acres in the form of an equilateral quadrilateral adjoining the eastern and southern section lines, how should the necessary description for conveyance be made? — 20

3. Through the above section a railway runs on a tangent, and for which lands 50 feet on each side of the centre line have been appropriated. The centre line cuts the northern limit of the section 15 chains, and the western limit 20 chains from the northwest corner of the section. Make a description for a deed of the whole of the section exclusive of railway right of way.

4. Off the southeast corner and adjoining its bounding limits of the section given in the above No. 1, a parcel is sold in the form of an equilateral quadrilateral and having a frontage of 200 feet along the southern limit. Make a description for a deed. — 20

5. Draw up an assumed evidence regarding the position of a lost corner post which it is desired to re-establish. — 20

ASTRONOMY.

Marks.

(Time, 3 hours.)

1. Define declination, right ascension, celestial latitude and longitude; solar, mean and sidereal time; parallax and azimuth. — 14

2. Explain fully the equation of time and its variation.
   A graphical representation may be given. — 14

3. What is the azimuth of Polaris in latitude 49° 50′ N., longitude 105° W. on June 16, 1904, 3 hours (mean time) after upper transit? — 14

4. In question No. 3 what is the apparent altitude of Polaris at upper transit? — 14

5. In question No. 3 what is the azimuth of Polaris at eastern elongation? — 14

6. What is the latitude of the place, when on June 16, 1904, the altitude of Arcturus was 70° 15′ on the prime vertical? — 15

7. On June 16, 1904, what are the limiting values that Polaris can have at elongation on the earth? — 15

ASTRONOMY.

(Time, 3 hours.)

Marks.

8. The longitude of a place is 114° 15′ 18″ W. Express this in time and state whether the time is solar, mean or sidereal time. Give also the time that a Greenwich Mean Time clock should show on June 16, 1904, at apparent noon at the above longitude. 20

9. In latitude 50° 18′ N., longitude 114° 15′ 18″ W., the sun's apparent altitude of the upper limb was 42° 17′ at $9^h\ 42^m\ 19^s$ on June 16, 1904. What was the azimuth, and what the watch error? 20

10. At mean noon on June 16, 1904, latitude 50° 18′ N., longitude 114° 15′ 18″ W., a sidereal chronometer is fast $4^m\ 17^s$ on local sidereal time, and loses $13.5^{sec.}$ per day. On the same day, what will this chronometer show when the local mean time at a place in longitude 107° 18′ 52″ is $4^h\ 17^m\ 48^s$ P.M.? 20

11. At the same place and date as No. 9, at what time will Sirius rise, and what is the standard time of its passing the meridian?

12. Give all the necessary formulæ for obtaining the latitude of a place from two altitudes of a star, and the difference of time between the observations. 20

ALGEBRA.

(Time, 3 hours.)

Marks.

1. Find the value of $\frac{1}{x-a}+\frac{1}{x-b}$ when $x=\frac{2ab}{a+b}$ 16

2. Reduce to lowest terms $\frac{x^6-a^6}{x^4-a^4}$; $\frac{(a^2-bc)^2-(b^2-ac)(c^2-ab)}{(b^2-ca)^2-(c^2-ab)(a^2-bc)}$

and $\frac{x^3+y^3+z(z^2-3xy)}{x^2-y^2+z(z+2x)}$. 16

3. Solve the equation $\frac{a^2-b^2}{x-c}+\frac{b^2-c^2}{x-a}+\frac{c^2-a^2}{x-b}=0$. 17

4. Solve $\sqrt[3]{1-2x}+\sqrt[3]{1+2x}=\sqrt[3]{4}$. 17

5. The sum of the squares of two numbers is a number whose three digits are consecutive numbers, in the hundreds, tens and unit places respectively. The sum of the digits is equal to half the sum of the numbers. Find the number. 17

6. Find the H. C. F. of $4x^4+2x^3-18x^2+3x-5$ and $6x^5-4x^4-11x^3-3x^2-3x-1$ and the L. C. M. of x^4+4x^2+16, $x^5+2x^4+4x^3+8x^2+16x+32$ and $x^5-2x^4+4x^3-8x^2+16x-32$. 17

XXXIV.

PLANE GEOMETRY.

(Time, 3 hours.)

	Marks.
1. Prove geometrically $a\ (a—x) = x^2$	16
2. Describe a circle about a given triangle.	16
3. Describe a circle passing through a given point and touching a given circle at a given point.	16
4. If ABC be a triangle inscribed in a circle and the angle BAC be bisected by AD, which meets the circle in D, then the diameter through D will bisect BC at right angles.	17
5. The rectangle contained by the diagonals of a convex quadrilateral inscribed in a circle is equal to the sum of the rectangles contained by pairs of the opposite sides.	17
6. Inscribe a regular pentagon in a given circle.	17
7. Prove that the difference of the squares on a diagonal and on a side of a regular pentagon is equal to the rectangle contained by them.	17
8. If two triangles be equiangular to one another, they are similar.	17
9. The locus of a point, the ratio of whose distances from two given points is constant, is a circle.	17

SOLID GEOMETRY.

(Time, 3 hours.)

	Marks
1. Name and describe all the regular solids.	8
2. Define solid or polyhedral angle, frustum of a cone, parallelopiped,, and pyramid.	8
3. Show how to draw through a given point a straight line to intersect two non-intersecting straight lines.	8
4. If two straight lines be parallel, any plane through one of them is parallel to the other.	8
5. A metallic tetrahedron, edge 10 inches, is melted. What is the radius of the sphere that will just be covered with the metal one-tenth of an inch thick ?	8
6. Taking the radius of the earth as 4,000 miles, what part of its surface is visible at a distance of 100,000 miles from the centre ?	8
7. Supposing the air to extend to a height of 100 miles above the surface. What is the ratio of the volume of the air to the earth ?	9
8. What is the whole surface of a right cone, radius of base r and height h?	9
9. In question 8, what is the radius of the sphere of same volume as the cone ?	9

SPHERICAL TRIGONOMETRY.

(Time, 3 hours.)

	Marks
1. Show that $\cos a \sin b = \sin a \cos b \cos C + \sin c \cos A$.	17
2. Show that $\cos^2 \frac{1}{2}A = \dfrac{\sin S \sin (S - a)}{\sin b \sin c}$.	18
3. Show that $\cos \frac{1}{2}c \sin \frac{1}{2}(A + B) = \cos \frac{1}{2}C \cos \frac{1}{2}(a - b)$.	
4. Write down Napier's analogies.	18
5. Given $c = 140°$, $a = 20°$, $C = 90°$; solve triangle.	18
6. Given $b = 120° \ 30' \ 30''$, $c = 70° \ 20' \ 20''$, $A = 50° \ 10' \ 10''$; find a and B.	18
7. Given $A = 135° \ 05' \ 29''$, $C = 50° \ 30' \ 08''$, $b = 69° \ 34' \ 56''$; find a and B.	18

MEASUREMENT OF AREAS AND SUB-DIVISION OF LAND.

(Time, 3 hours.)

	Marks
1. Divide a triangle into two parts in the ratio $a : b$, by a straight line passing through a given point within the triangle.	16
2. The sides of a quadrilateral inscribed in a circle are respectively 10, 12, 14, 16 feet, what is its area ?	16
3. What is the area of a circular half-mile race-course, 40 feet wide, and where the half-mile line is three feet from the inner side of the track ?	17
4. If in question 3 the temperature of the steel band, standard at 62° F., was 84° F., when laying out the track and no correction was applied, what is the true area of the track, assuming the co-efficient of expansion to be ·0000065 per degree Fahrenheit ?	17
5. If a river discharges 1,000 cubic yards of water per minute, what area could be irrigated, allowing 15 inches of water for the surface during the year ?	17
6. The three sides being given, to divide the triangle into three equal parts by lines running from a given point in one of the sides.	17

7. The notes of a survey of a piece of land are as follows :—

1.	N. 58° E.	12·97 chains.
2.	S. 27° 45′ E.	3·30 "
3.	S. 85° 15′ E.	11·65 "
4.	S. 19° E.	15·56 "
5.	S. 66° 30′ W.	14·03 "
6.	N. 64° W.	14·86 "
7.	N. 15° 30′ W.	11·23 "

Required the area. 40

MEASUREMENT OF AREAS AND SUBDIVISION OF LAND—*Con.*

(Time, 3 hours.)

Marks

8. Express the conditions necessary for a closed survey by two equations :

(*a.*) And from them show what missing data in a survey can be supplied.

(*b.*) How does the supplying of missing data in a survey affect "balancing" survey ? 20

9. A quadrilateral is bounded by two parallel sides, by a straight line at right angles thereto, and by the right of way of a railway. The centre line of the latter is the arc of a circle of 1000 feet radius and intersects the parallel sides at 10 and 15 chains respectively from the nearest point of the remaining side, which is 20 chains long. The right of way lies 50 feet on each side of the centre line. What is the area of the quadrilateral ? 20

ASTRONOMY.

(Time, 3 hours.)

Marks

1. Define declination, right ascension, vernal equinox, refraction, parallax, azimuth and prime vertical. 14

2. Define mean, solar, and sidereal time. What is the equation of time ? What causes it to vary ? Why is its greatest value in November ? 14

3. The difference in longitude between two places is 114° 17′ 28″; convert this into time. What "kind" of time is the result ? What would be the difference in sidereal time at mean noon respectively at the two places ? 14

4. On March 31, 1904, the apparent meridian altitude of the sun's lower limb was 46° 10′ 30″. The longitude of the place was 82° 40′ W.; required the latitude. 14

5. On March 31, 1904, in latitude 45° 25′ N., longitude 75° 42′ W., what is the azimuth of Sirius at rising ? 14

6. In question 5, same date and place, what is the standard time of Sirius crossing the meridian ? 15

7. At the same place and date as in question 5, a standard sidereal clock showed 5^h 17^m 18^s, what is the longitude of the place that at the same instant showed the same time on a mean time clock ? 15

ASTRONOMY.

(Time, 3 hours.)

	Marks
8. On March 31, 1904, in latitude 45° 25′ N., longitude 75° 42′ W., the altitude of the sun's lower limb was 27° 38′ at $9^h\ 15^m\ 17^s$; what was the watch error, and what the azimuth of the sun?	20
9. At mean noon on above date and place a sidereal chronometer is fast $4^m\ 17^s.5$ on local sidereal time and loses $3^s.5$ a day. What will this chronometer show on April 10, 1904, when a mean time chronometer in longitude 102° W. shows $5^h\ 17^m\ 38^s$ P.M.?	20
10. Show how the latitude of a place may be obtained by observing two altitudes of a star and the difference of time between the observations.	20
11. On same date and place as question 8, what is the standard time of western elongation of Polaris?	20
12. On same date as above what is the latitude of the place that gives three hours as the hour angle of a Aurigae (Capella) when on the prime vertical?	20

EXAMINATION FOR DOMINION TOPOGRAPHICAL SURVEYOR.

VIII.

ALGEBRA.

(Time, 3 hours.)

	Marks
1. Solve $3^{x+1} + 9^x = 810$.	6
2. If p be greater than unity, then for all real values of x the expression $\frac{x^2 - 2x + p^2}{x^2 + 2x + p^2}$ lies between $\frac{p-1}{p+1}$ and $\frac{p+1}{p-1}$	6
3. If $x, y, z,$ be variable quantities such that $y + z - x$ is constant, and that $(x + y - z)(x + z - y)$ varies as yz, prove that $x + y + z$ varies as yz.	6
4. Sum to n terms $1^2 + 3^2 + 5^2 + 7^2 + \ldots$	6
5. Find the number of permutations which can be formed with the letters comprising the word *examination* taken 4 at a time.	6
6. Sum to n terms $1 + 3 + 6 + 10 + \ldots$	6
7. Find the $(r+1)^{th}$ term in the expansion of $(1 - x)^{\frac{1}{n}}$	7
8. A undertakes with a pair of dice to throw 6 before B throws 7; they throw alternately, A commencing. Compare their chances.	7

PLANE TRIGONOMETRY.

(Time, 3 hours.)

	Marks
1. Express the value of Sin 18° under a finite form.	8
2. Show that area of a quadrilateral inscribed in a circle $=\sqrt{[(s-a)\ (s-b)\ (s-c)\ (s-d)]}$ where a, b, c, d, are the sides and s their half sum.	8
3. Express $(2 \text{ Cos } \theta)^n$ in terms of the cosines of the multiples of the angle.	8
4. Find the sum of the series Sin $a +$ Sin $2a +$ Sin $3a + \ldots\ldots\ldots$ Sin ra.	8
5. Prove that $\theta = \tan\theta - \frac{1}{3}\tan^3\theta + \frac{1}{5}\tan^5\theta - \ldots\ldots$ where θ lies between $-\frac{1}{2}\pi$ and $+\frac{1}{2}\pi$	9
6. In a triangle A and c are constant, the rest of the parts variable, determine the relations between the increments of the variable parts.	9

SPHERICAL TRIGONOMETRY.

(Time, 3 hours.)

	Marks
1. Transform for calculation by logarithms the formula : $\cos A = \dfrac{\cos a - \cos b \cos c}{\sin b \sin c}$	8
2. Find the radius of the circle inscribed in a given spherical triangle.	8
3. Given two sides and the angle opposite one of them, find the third side.	8
4. What are the differential variations in a spherical oblique triangle when a side, c, and the adjacent angle, A, are constant ?	9
5. In a spherical right triangle (the right angle being C) given A and c, find b by means of a series, A being very small.	8
6. If the sides of a triangle are very small compared with the radius of the sphere and a plane triangle be formed whose sides are equal to those of the spherical triangle, prove that each angle of the plane triangle is equal to the corresponding angle of the spherical triangle minus one-third of the spherical excess. (Legendre's theorem.)	9

ANALYTICAL GEOMETRY.

(Time, 3 hours.)

	Marks
1. Produce the general equation of a conic section referred to rectangular co-ordinates.	
2. Determine the species of the locus $y^2 + 2xy + 3x^2 - 4x = 0$.	10
3. Produce the polar equation of the ellipse in terms of the semi-transverse axis and eccentricity.	10
4. Produce the general formulæ for passing from one set of rectilinear co-ordinates to another.	10
5. What is the equation of a tanget to an ellipse referred to its axes ?	10
6. Produce the general differential formulæ for the value of radius of curvature and the co-ordinates of curvature of any plane, in terms of the co-ordinates of the given curve.	15
7. Give the expression for the radius of curvature of the ellipse, also for the radius of curvature at the extremities of the transverse and the conjugate axes respectively.	10

DIFFERENTIAL CALCULUS AND THEORY OF LIMITS.

(Time, 3 hours.)

	Marks
1. Define "Limit." What are the conditions that two varying quantities shall be equal in the limit ?	5
2 Give geometrical examples to show that two quantities each having the limit zero may not be ultimately in a ratio of equality, and that two quantities each indefinitely great in the limit may have a finite ratio to one another.	5
3. Discuss the validity of the following reasoning from a property of rectilinear figure to one of a culvilinear figure. Since the area of a regular polygon inscribed in a circle is equal to one-half the rectangle under the perimeter of the polygon and the perpendicular from the centre of the circle upon one of the sides, therefore the area of a circle is equal to one-half the rectangle under the radius and circumference.	10
4. From the expression for the area of a circle deduce that for the area of an ellipse, and from the expression for the volume of a sphere, deduce that for the volume of an oblate spheroid.	8
5. Find the radius of curvature of an ellipse at any point. Express it in terms of the inclination of the normal at the point to the major axis.	11
6. In a spherical triangle are given two sides AB, BC, and the included angle B, and it is required to determine the angle A. What is the form of the triangle in which a small error in B will have the least effect on the deduced value of A ?	8
7. If the three sides of a spherical triangle are given, what is the form of the triangle when an error in one side will produce the minimum error in (1) the angle opposite to it, (2) one of the other angles ?	16
8. Develop by Maclaurin's Theorem, each to four terms $\log \cos x,\ \tan x,\ \frac{1}{\sqrt{1-x^2}}$	12

PROJECTIONS.

(Time, 3 hours.)

	Marks
1. Prove that in the stereographic projection the angle of two lines on the sphere is equal to the angle of their projections.	12
2. Explain the construction of the gnomonic projection and its characteristics.	12
3. Describe the various kinds of conic projections, their advantages and disadvantages.	12
4. Find the equation of a loxodromic line on the surface of the earth.	15
5. Give formulæ for calculating the co-ordinates of the points of intersection of meridians and parallels in the polyconic and simple conic projections.	12
6. Give the latitudes and longitudes of two points, find by means of a graphic construction the difference between the points, assuming the earth to be spherical.	12

GEODETIC SURVEYING.

(Time, 3 hours.)

	Marks
1. Describe the measurement of base lines by means of steel tapes. How is the length of the tapes ascertained and what corrections have to be made to the measurments ?	35
2. The site of a base line being crossed by a ravine, the part over the ravine is not measured. Explain the procedure in such a case and deduce the formulæ necessary for ascertaining the total length.	30
3. The altitudes of two stations A and B are H and H′ and their distance d. The highest point between A and B is at a distance c from A and its altitude is h. What must be the height of the signal at B in order that it may be visible from A ?	35
4. Find the correction to be applied to an observed angle when the instrument is not set over the station. Also, when the signal observed is a tin cylinder upon which the sun is shining.	30
5. Given the latitude and longitude of A, and the distance and azimuth of B from A, find the latitude and longitude of B and the azimuth of A at B.	35
6. The latitude of station B of a triangulation and the azimuth of station A from B have been observed ; they have also been calculated from the latitude and azimuth at A and distance AB. From the difference between the observed and calculated latitude and azimuth, find the amount and direction of the deviation of the plumb line at B, assuming that no deviation exists at A.	35

ASTRONOMY.

(Time, 3 hours.)

Marks

1. From the following ephemeris of the moon :—

March 5,	0^h	21^h	58^m	$28^s{\cdot}39$	Right ascension.
" 5,	12	22	27	15 ·43	
" 6,	0	22	55	25 ·50	
" 6,	12	23	23	03 ·39	
" 7,	0	23	50	15 ·63	
" 7,	12	0	17	09 ·83	

Find the moon's right ascension for March 5, 6^h. 13

2. Define mean and apparent places of a star, and state fully what constants enter in the reduction from the former to the latter. 12

3. Explain fully the equation of time. At what time of the year has it a maximum or minimum value ? Why ? 13
A graphic representation may be given.

4. The difference, expressed in mean solar time, between Greenwich and Apsley, Ont., is $5^h\ 17^m\ 16^s{\cdot}84$. On Feb. 1, 1905, at mean noon at Apsley the sidereal clock there showed $20^h\ 41^m\ 16^s{\cdot}94$, when the true sidereal time at Centreville was $20^h\ 28^m\ 17^s{\cdot}56$. What is the longitude of Centreville expressed in sidereal time ? 12

5. Express the relationship that exists between the sidereal, tropical and anomalistic years. 12

6. Discuss the selection of a programme of stars for a given latitude for the determination of time by transits, in both positions of the instrument—clamps east and west, and reduction by least squares. 13

7. Contrast the method of noon-culminating stars with that of lunar distances, for longitude, in respect of the instruments employed, and of the intricacy of the calculations involved.
What other celestial signals have been proposed, and what is their disadvantage ? 13

8. Given the declination of Polaris as 88° 48′, what are the limits of its azimuth at elongation as seen from the earth ? 12

SECOND PAPER.

(Time, 3 hours.)

	Marks
9. In determining the thread intervals from transits of a *close* circumpolar star, give formula for obtaining the equatorial intervals from the transits.	10
10. Give formula for finding the azimuthal deviation from the transits of two stars, differing considerably in declination.	10
11. Give expression for correction for inequality of pivots as deduced from the necessary level readings.	10
12. In Talcott's method for the determination of latitude, show that when a star is observed off the line of collimation, the instrument remaining in the plane of the meridian, then the correction for zenith distance is $m = \frac{2 \sin^2 \frac{1}{2} \tau}{\sin 1''} \frac{1}{2} \sin 2 \delta$ where τ and δ are respectively the hour angle and declination of the star.	17
13. Give formula for determining the declination of a star from its transit over the prime vertical, and discuss the effect of an error in latitude as well as one in the hour angle.	17
14. Deduce the general formulæ for the alt-azimuth instrument.	19
15. The corrected horizontal circle readings of two stars at eastern and western elongations respectively were 186°.5673 and 75°.7289. The declinations were 62° 07′ 41″.8 and 58° 51′ 33″.5. What is the latitude of the place of observation ?	13

METHOD OF LEAST SQUARES.

(Time, 3 hours.)

Marks

1. Upon what assumptions as to the errors of observation is the method of least squares based ? Give examples of observations to which the method is applicable, and of others to which it is not. 20

2. The latitude of a place is found by one night's observations to be $50° 27' 13''.85$ with a probable error of .103, and by another night's observations to be $50° 27' 13''.69$ with a probable error of .127. Find the most probable value of the latitude and its probable error. 20

3. The error of a chronometer is found to be
   fast $13^s.85 \pm 6^s.25$ at $13^h\ 50^m$, and
   fast 14.17 ± 0.39 at $16\ \ 30$.
   What is its error at $14^h\ 40^m$, and what is the probable error of the result? 20

4. Observations for longitude having been made by transits of the moon, the mean of 7 transits of the preceding limb of the moon gives a result $5^h\ 54^m\ 27^s.35$, and the mean of 11 transits of the following limb, $5^h\ 54^m\ 32^s.79$. What is the most probable value of the longitude, and what is its probable error, assuming that all the observations are of equal weight, and that the probable error of a single observation is $1^s.00$. 20

5. When the observed quantities are not independent of one another, explain the method of solving by independent unknowns and by correlates. 20

6. Five points are connected by a triangulation, each point being observed upon from every other point, and all the angles read. How many conditions are there? Explain how the condition equations are formed. 20

7. The elevations of three stations B, C, and D are to be determined from a known point A. All the lines in the figure are levelled over with the following results :—

	Observed Elevation.	Weight.
A to B	+17·40	1
A to C	+33·19	2
A to D	+30·00	3
B to C	+15·91	2
B to D	+12·62	3
C to D	— 3·27	1

Find the most probable value of the elevations of B, C and D above A. 30

SYSTEM OF SURVEY.

(Time, 3 hours.)

Marks

1. Show that $\log (R \operatorname{Sin} 1'') = \log a - \log \operatorname{Sin} 1'' - M \left(n + \frac{3n^2}{2} \right)$
$- 3M \left(n \operatorname{Cos} 2\varphi - \frac{n^2}{2} \operatorname{Cos} 4\varphi\right) + \ldots\ldots$ in which $R =$ radius of curvature, a and $b =$ semi-major and semi-minor axes, $n = \frac{a-b}{a-b}$, $=$ latitude, and $M =$ the modulus of the common system of logarithms. 22

2. Give the expression for the difference between the chord and the arc (parallel of latitude) for the southern boundary of a township. 20

3. From the first iron bar on the 4th Base line, R. 1, W. of 4th meridian, a straight line is started with an azimuth of N. 50° W. and continued for 115 miles. What is the position of the western extremity of the line with reference to section, township and range ? 22

4. Compute the difference in latitude between the middle points of the chord and arc of a township side in latitude 49°. 20

5. What is the theoretical width of township 29 along the Correction Line and adjoining the 5th meridian to the east ? 22

6. An exploratory survey is made between two points, several hundred miles apart, and whose geographical co-ordinates are known. The instruments used on the survey were a theodolite for obtaining the angular measures and a Lugeol micrometer for distances. Discuss the adjustment of the survey. Had a compass been used instead of the theodolite, in what would the adjustment differ ? 22

7. Show the derivation of the formula

$$p = P \operatorname{Sin} (t - t') + \frac{P^2}{2} \operatorname{Sin} 2 (t - t') \tan \delta$$

in the method for obtaining time by observing a star in the vertical of Polaris.

$p =$ arc of great circle from the pole and perpendicular to above vertical.
$P =$ polar distance of Polaris.
$=$ declination of time star.
$(t - t') = (a - a') - (T - T')$ in which T and T' are the chronometer times respectively of the time star and Polaris when observed, and a and a' their right ascensions. 22

THEORY AND USE OF INSTRUMENTS.

(Time, 3 hours.)

	Marks.
1. What tests can be applied to an object glass ? What are the effects produced by the various imperfections ? What relation is there between the diameter and focal length of the object glass, the equivalent focal length of the eyepiece, and the brightness of the image ?	25
2. Describe the adjustments of the micrometer miscroscopes of a graduated circle.	25
3. Explain the adjustments of the sextant : adjustment of the index glass, the horizon glass and the telescope, determination of index correction and testing of coloured glasses.	25
4. Find the formula for stadia measurments when the telescope used is not provided with an anallatic lens.	25
5. Determination of the equatorial thread intervals of an astronomical transit. Reduction to mean thread.	25
6. Measurement of atmospheric pressure with a portable mercurial barometer. Corrections for index error, capillarity, temperature of mercury, expansion of scale, altitude, latitude and reduction to sea level.	25

MINERALOGY AND GEOLOGY.

(Time, 3 hours.)

	Marks.
1. State the difference between travertine and marble, gypsum and calcite, galena and graphite, copper pyrites and iron pyrites, gold and iron pyrites.	8
2 Define cleavage, anticlinal, synclinal, unconformable, fault, outcrop, fold, sedimentary deposits, eruptive and metamorphic rocks, veins, lead, country or wall rock, lode and hardness. For last give scale, and example for each.	8
3. Give a general description of the formations lying between Ottawa and Niagara Falls, and name the economic minerals in them.	8
4. Describe the methods for the reduction of ores carrying gold.	8
5. Describe the locations of the various coal areas,in Canada, and the formations in which they occur.	9
6. Describe the various iron and silver ores found in Canada, where found and the methods of reduction.	9

TRIGONOMETRIC LEVELLING.

(Time, 3 hours.)

	Marks.
1. Explain what is meant by the coefficient of terrestrial refraction. How may it be determined ?	5
2. How may the altitude of one station above another be determined by observation of angular altitude ?	
3. To what errors is precise spirit levelling liable, and how are they provided against ? What effect may local deflections of the plumb-line have ?	6
4. Indicate how differences of level are determined by the mercurial barometer, and give formulæ.	12
5. What is the effect upon the time of oscillation of a pendulum of placing weights on the pendulum rod ? What of the attraction by a fixed magnet upon another fastened to the pendulum rod ?	10
6. How is the acceleration of gravity determined by means of the pendulum? What errors must be provided against in the observation and how ? How are the oscillations of a pendulum during a long period counted ?	12

TERRESTRIAL MAGNETISM.

(Time, 3 hours.)

	Marks.
1. Describe "Lloyd's Method" for the determination of total force. Deduce the formula for reduction of the observations.	15
2. Explain what is meant by a magnetic pole (of the earth). Are the poles for the three magnetic elements, declination, inclination and force coincident ? Why does not the magnetic needle at any place point to the magnetic pole ?	15
3. Describe fully the observation for dip with the Kew Dip Circle. What sources of error do the different reversals obviate ?	15
4. Describe the magnetometer observation for horizontal force ?	15
5. What is meant by C. G. S. and by British units ? What is the relation between them ?	15

APPENDIX No. 29 TO THE REPORT OF THE SURVEYOR GENERAL.

Descriptions of surveyed townships submitted by Dominion land surveyors during the year ending June 30, 1905.

TOWNSHIPS EAST OF THE PRINCIPAL MERIDIAN.

Range 7.

Township 9.—The soil in this township is all first class for farming purposes, it consists of a black or sandy loam with a clay subsoil. Every quarter section might be classified as first class with the exception of three or four which are broken with muskegs. The surface is mostly level or undulating, nearly all of it being covered with thick second growth poplar, willow and hazel scrub, and in places poplar bluffs. All along the west boundary is open level prairie. Whatever timber there is, is situated in the northeastern part of the township. However, timber for building purposes and wood can be had a few miles to the east. There is very little hay to be had in the township, although there is plenty of good grazing pasture, and a few hay sloughs. Hay in large quantities can be had a few miles to the west. Water of first quality can be had by digging about twelve feet deep. There are no streams or creeks in the township, but in summer the sloughs contain enough water for stock, and the wells supply enough in winter. The climate is temperate, having no summer frosts. There are no water powers, coal or lignite veins, stone quarries or minerals to be found. Enough stone can be procured, however, for building purposes. Game is plentiful a few miles east, consisting of moose, deer and black bear. Prairie chicken and partridge are found in the township. There are two schools in the township and two more within a few miles, besides post offices and small country stores. The country is well travelled, with good trails going to all parts. Ste. Anne, a village of about five or six hundred inhabitants, is situated on the Canadian Northern Railway, about six miles to the south.—*John Molloy, D.L.S., 1904.*

Range 8.

Township 9.—About one-third of this township is unfit for settlement, being a floating bog covered with bluffs of tamarac and spruce, along the north and east boundaries. The remaining part is nearly all second class land; the soil is principally a sandy loam with clay subsoil. The land is mostly covered with spruce, poplar, tamarac and second growth poplar and willows, being about equally divided throughout the township; the timber averages about eight inches in diameter. The surface is level or undulating. Hay can be had in large quantities in the hay sloughs and in marshes along the edges of muskegs. The greater part of the muskeg is almost impassable without poles to assist in getting over the open parts, when there is no sod to keep from sinking through. Brokenhead river leaves the township on the north boundary of section 36; at this place it is about twenty feet wide and eight feet deep at times, but south of this it seems to lose itself, but comes up again five or six miles to the southeast. All the water in the township is first class. Good water can be had by digging ten or twelve feet. The climate is temperate, having no summer frosts. There are no water powers, minerals, coal or lignite veins or stone quarries to be found in the township. Wood for fuel can be had in unlimited quantities, both in this township and in the townships further east. Timber for building purposes and lumber can be had also. There is a sawmill, situated a few miles east, which saws large quantities of lumber during the winter months. The greater part of the township is very stony, but the land in the western part would be first class if it were not for this. Game consisting of moose and deer are very plentiful all through this section of country.—*John Molloy, D.L.S., 1904.*

Township 10.—The greater part of this township is unfit for settlement at all; it consists principally of a floating muskeg through which Brokenhead river, a stream about thirty feet wide and eight feet deep, passes. The greater part of the township is unfit to be travelled on, and in many places impassable without poles or timbers to keep from going through the sod. The greater part of the township is level. The south and east portions are made up of floating bog covered with bluffs of spruce and tamarac with some small willows. The tiers of sections along the north and west are mostly covered with poplar and second growth poplar and willow scrub and some jackpine. The average diameter of the timber is about eight inches. Hay can be had in large quantities when the season is dry, but at the present time, places where hay was growing are covered with from two to four feet of water. The water is all of first class quality; it can be had in large quantities on the ridges, by digging a few feet. The water in Brokenhead river is excellent. All the land adjoining the river is flooded in the spring or in a rainy summer season. The climate is temperate, having no summer frosts. There are no water powers, minerals, coal or lignite veins, and no stone quarries to be found. Enough stone for building purposes can be had along the ridges in the north and west parts of the township. Tamarac and spruce for wood, fence posts, building purposes or lumber, can be had both in this township and the ones to the south and east. Moose and deer are about the only kind of game to be found, but they are very plentiful. Post offices and a few small country stores are within a few miles, as well as schools. The part fit for settlement is well travelled, wtih good trails leading to the village of Ste. Anne, the city of Winnipeg and other points in the district.—*John Molloy, D.L.S., 1904.*

Range 9.

Township 1.—The soil in this township is mostly second class, being a sandy loam with a sandy clay subsoil and is well adapted for grain growing except the northern row of sections, which is nearly all a large muskeg extending across the township. The land is nearly all covered with thick second growth poplar and thick willow scrub, although there is a good supply of spruce, tamarac, jackpine and poplar, averaging 6 inches diameter, well distributed over the township. There is very little hay to be found; there are a few small hay sloughs but the supply is limited. The water is first class and can be had in good quantities by digging from 10 to 20 feet. There are no creeks or streams. There are no stone quarries or minerals in the township, but parts of the township are pretty well covered with surface stones, especially in the northeast corner. Wood can be had in large quantities both in this township and in the township adjacent. Moose, deer, prairie chicken and partridge are very plentiful. This township can only be entered from the southwest corner on account of the large muskegs to the north and east, which cannot be crossed until after they freeze.—*John Molloy, D.L.S., 1904.*

Township 2.—The soil in the township is mostly third class, consisting principally of a sandy loam averaging about three inches deep, with sand or sandy clay subsoil. The soil in the muskegs and hay sloughs is black clay. This township is not very well adapted for grain growing, on account of the soil being too light. The greater part is covered with tamarac, poplar and jackpine windfall, which will likely all be burned with the first fire. There is very little prairie; the northwestern part is mostly open muskeg; a considerable amount of tamarac, spruce and poplar, averaging about 8 inches in diameter, is still to be found well distributed, but nearly all of this has been killed by fires. Enough hay can be had in the small hay sloughs and in the edges of the muskegs to supply the early settlers until land could be cleared. The water is all of first class quality, and can be had at a depth of from four to twenty feet. The water in the muskegs and swamps is also first class. There are no creeks or streams to be found. Fuel can be had in large quantities all through the township, as well as in the township adjacent. There are no minerals or stone quarries to be found, although surface stone can be had for building purposes. There is a considerable amount of game to be found, moose and deer are plentiful, as well as prairie chicken and partridge. Sandilands, a station on the Canadian Northern Railway, is about twelve miles to the north, and can be easily reached. On account of the nature of the soil, and the scarcity of muskegs, trails can be easily made.—*John Molloy, D.L.S., 1904.*

Township 3.—The greater part of the soil in this township is unfit for grain growing purposes, as it is mostly of a sandy nature, the greater part being a sandy loam to a depth of 2 or 3 inches with a sand or sandy clay subsoil. The land along Rat river which enters the township on the east boundary of section 1 and leaves it at the northwest corner of section 7, is mostly a sandy loam and well adapted when cleared for grain growing. There is very little prairie to be found, nearly all of the township is covered with brush, consisting of tamarac, spruce, jackpine, poplar and thick willow, poplar and jackpine scrub, being equally distributed; the timber averaging about 8 inches diameter. Hay can be had in the small hay sloughs, in the muskegs and along the banks of the river. All the water is of first class quality both in the river and in the small creeks. Good water can be had by digging from 4 to 20 feet in almost any part of the township. There are no water powers to be found; Rat river, being the only stream of a sufficient size for such, is only from 3 to 5 feet deep and from 10 to 20 feet wide. Fuel can be had in large quantities all through the township, both dry and green; tamarac, spruce, poplar and jackpine being the principal kinds to be found. There are no stone quarries or minerals; some surface stones can be found. Moose, deer, wolves, prairie chickens and partridge are very plentiful. The Canadian Northern Railway runs through the township to the north, in which the station of Sandilands is situated, where there is a store, post office and sawmill.—*John Molloy, D.L.S., 1904.*

Township 4.—There is very little land in the south half of this township fit for farming of any kind. The soil is nearly all sand except in the swamps. The greater part of it is covered with jackpine, spruce, tamarac, poplar and scrub, the average diameter of the timber being about 8 inches, and it is equally distributed over the different sections; a great deal of the wood has been cut. The land for the most part is rolling or undulating. There is very little hay to be found, except in a few small hay sloughs; there are no large hay meadows. A few creeks containing good water pass through the township, being about 3 feet wide and 2 feet deep. The water is of first class quality and remains all through the winter. There are no water powers to be found. Wood in large quantities can be had all through this district, consisting of jackpine, tamarac, spruce and poplar. There are no coal or lignite veins, stone quarries or minerals to be found. The principal game to be found is moose, deer and prairie chickens. The main line of the Canadian Northern Railway passes through the southern half of this township, where the town of Woodridge is situated, which has four general stores, post office, school and church. Trails cross the township in all directions, going to and from Woodridge and other stations along the line of railway.—*John Molloy, D.L.S., 1904.*

Range 10.

Township 3.—The soil in this township is mostly third class, and the greater part of it is unfit for farming purposes, as it is either sand or shallow sandy loam with a sand or gravel subsoil. There are, however, a few good quarter sections along Rat river, which crosses the township from east to west. The surface is undulating or rolling, being covered mostly with jackpine, spruce, tamarac, poplar and thick willow scrub, all being equally distributed through the township. The average diameter of the timber is about 7 inches; a good portion of the timber in this township has been cut already, and nearly all that remains has been killed by fire. There is a considerable amount of hay to be found along the banks of Rat river and small creeks, and in a few small hay sloughs which appear here and there throughout the township. All the water in the creeks and sloughs, and what can be had by digging a few feet, is of excellent quality. The water in Rat river and the creeks remains all the year, and in many places does not freeze. The land is not liable to be flooded. There are no water powers available. The climate is temperate, without any indications of summer frosts. There are no coal or lignite veins, stone quarries or minerals to be found. Wood for fuel can be had in unlimited quantity all through this section of country, both dry and green. Moose, jumping deer, wolves, prairie chickens and bush rabbits are very plentiful all through this part of the province. This township is well travelled by trails leading to Pine Valley, Badger and Woodridge. The main line of the Canadian Northern Railway passes through the township to the north, where the town of Woodridge is situated, which has a station, post office, church, school and four general stores. Large quantities of wood are shipped from here every year, giving employment to a large number of men.—*John Molloy, D.L.S., 1904.*

Township 4.—The northern part of this township is useless for farming purposes as it is all sand ridge and there is no loam or subsoil. The surface is undulating or rolling, and a good deal of it is covered with jackpine with some tamarac, spruce and poplar; the average diameter of the timber being about eight inches; it is equally distributed throughout the township. There is very little hay to be found, except in a few small sloughs. There is very little water in the northern part of this township, but what there is is of first-class quality. Good water can be had by digging from twenty to thirty feet. There are no water powers to be found. Wood for fuel can be had in unlimited quantities all through this section of country, both dry and green. The climate is temperate without any indications of summer frosts. There are no coal or lignite veins, stone quarries or mineral of any kind in this section of country. Moose, jumping deer, wolves, prairie chickens and bush rabbits are very plentiful. The township is well traversed by wood trails all leading to Woodridge, a town situated on section 10 of this township, along the line of the Canadian Northern Railway, having a station, post office, church, school and four general stores. A great deal of wood is shipped from here every year, giving employment to a large number of men.—*John Molloy, D.L.S., 1904.*

Range 11.

Township 3.—The greater part of the soil in this township is unfit for grain growing purposes, it being principally sand and light sandy loam with sandy clay subsoil; a few quarter sections in the south-western part, however, could be used for farming purposes, the soil being a black loam with clay subsoil. The greater portion of the township is covered with bush or scrub, jackpine, spruce, poplar and thick willow scrub being equally distributed over the township. The average diameter is about 6 inches. The land is either undulating or gently rolling. There is a considerable quantity of hay in sloughs equally distributed over the township, but there are no very large hay meadows to be found. There are a few small creeks which contain excellent water all the year round. The creeks are from 3 to 5 feet wide and about 3 feet deep. There are no water powers in the township. Fuel can be had in large quantities both in this township and in the other townships in the district. There are no minerals, stone suitable for quarrying or coal or lignite veins to be found. Moose and deer are very plentiful in this district, as well as prairie chickens and partridges. The main line of the Canadian Northern Railway passes through the township entering at the northwest corner, it leaves it at the southeast corner. Trails cross the township in all directions running from Badger and Woodridge to different stations along the railway. Woodridge, a station on the line of the railway, on section 10, township 4, range 11, has a post office, four stores, a school and a church. A large amount of wood is shipped from all these points, giving employment to all the settlers. —*John Molloy, D.L.S., 1904.*

Township 4.—There is very little good land to be found in the south half of this township that would be fit for farming purposes. The soil is nearly all sand, with very little good soil. The greater part of the township is covered with spruce, tamarac, jackpine and poplar, the average diameter being about eight inches. There is very little prairie to be found. The land is mostly rolling or undulating. There are a few large hay meadows in the southwestern part of the township, which produce considerable hay when the rains are not too heavy. The water in the swamps and sloughs is of first-class quality and good water can be found by digging a few feet. There are no water powers. Wood can be had in large quantities all through this district, consisting principally of spruce, tamarac, jackpine and poplar. There are no coal or lignite veins, stone quarries or minerals to be found. Moose, deer and black bear are the principal kinds of game. The main line of the Canadian Northern Railway passes through the township to the south. Trails pass all through the township running to the stations along the line of railway.—*John Molloy, D.L.S., 1904.*

Township 10.—This township can be reached very readily in winter by a trail from Whitemouth station, on the Canadian Pacific Railway, to the northeastern corner of the township, but in summer it is impassable. It is necessary to go along the bank of Whitemouth river a considerable distance and then turn westward into the township. A part of this trail is very wet. The soil is of fair quality and, where not too wet, is well adapted for mixed farming. The high ground is generally scrubby except in the northeastern part, where there is some large poplar. The southern and western parts are swampy and are covered with spruce and tamarac, usually of poor quality. Water of good quality and in sufficient quantities can be obtained by digging from 4 to 10 feet. There is only one small creek, about 4 feet wide and 2 feet deep. The current is not very strong. There is no considerable amount of land liable to be flooded. There are no falls or rapids or water power of any kind. The climate seems to be more moist and less liable to extremes of temperature than the prairie sections. Frosts are common in spring, but not in the after part of the season. Wild hay of good quality is found in small meadows all over the townships chiefly on sections 24, 23 and 26, but the total amount is not large. There is an abundance of wood for fuel in nearly every part of the township, and in the south and west are extensive beds of peat, which would make excellent fuel if properly prepared. No trace of coal of any kind was seen. There are no stone quarries. No minerals of any kind were found in the township. Moose in considerable numbers were seen. also a few lynx, foxes, coyotes, rabbits, partridge, &c.—*A. S. Weekes, D.L.S., 1904.*

Range 12.

Township 8.—This township is all bush, composed of poplar, willow, spruce, tamarac and a few cedar. All the merchantable timber has been cut, lumbering operations having been carried on for some years all along Whitemouth river, which runs through this township, entering it in the southeast corner of section 6 and running through sections 5, 4, 9, 10, 15, 16, 21, 28 and 33. These sections, together with portions of the adjoining sections have been marked on the section boundaries and subdivided into legal subdivisions in accordance with your instructions. There is still a thick growth of bush all over the township, with a few small marshes and tamarac swamps, the greater portion of which could be drained into Whitemouth river and thus made available for cultivation. All along the river the lands are drier on account of the natural drainage by Whitemouth river and are now available for settlement. The soil is mostly clay loam; the southern part of the township is more inclined to be sandy and gravelly, with small ridges of scrubby jackpine. A good winter road runs down along Whitemouth river and renders it accessible to the Canadian Pacific Railway station at Whitemouth, and can easily be made into a good summer road. Moose, about the only big game, are very numerous; one band of cariboo was seen. Foxes and fur-bearing animals such as mink and otter and muskrat are found. The climate is favourable for farming, aand further north around Whitemouth settlement some of the finest crops in the province are raised.—*G. C. Rainboth, D.L.S., 1904.*

Township 9.—This township is reached by trail from Whitemouth, which is about fifteen miles distant. This trail can only be used for loads during the winter time or when the frost is in the ground, otherwise it is too boggy. The soil is generally a rich black vegetable loam and would make excellent farms but that the country is so 'low lying' and level that muskegs and swamps abound, and everywhere the ground is damp and soggy. In the winter it is hard to distinguish all the muskegs as they are often heavily timbered, as is the rest of the country. The whole township is covered with bush varying from light scrub to eighteen-inch timber. The best of the timber has been cut off by local lumbermen, but what remains will be ample for settlers and for 'cordwood' (rather too much). Whitemouth and Birch rivers afford ample water supply, and I would judge from the nature of the country that by digging a few feet, water could be got at any place. There are no water powers or economic minerals. Game is plentiful, moose, deer, foxes and wolves were seen, besides many partridges and rabbits. There were three settlers in the township, all Galicians, with small houses, but no other improvements. The settlement is gradually pressing this way from Whitemouth and this should soon be a prosperous farming country, but at present it is too inaccessible on account of the roads.—*Geo. A. Grover, D.L.S., 1904.*

Township 15 (north and east outlines).—These outlines are rough and hilly, broken by ridges of granite rock and thickly covered with poplar, spruce and tamarac, with tamarac muskegs intervening. The greater portion of the country covered by these outlines is useless for agricultural purposes, but in my opinion this whole surrounding country should be held for a timber reserve.—*E. W. Hubbell, D.L.S., 1904.*

Township 16 (north and east outlines).—These outlines are a series of bare granite rock ridges and knolls, varying in height from 15 to 80 feet. Between these ridges the country is mostly muskeg, covered with tamarac, spruce and poplar, varying in diameter from 4 inches to 14 inches. There is also a little birch and balsam. A considerable portion of these outlines is covered by the waters of lac du Bonnet and its tributaries.—*E. W. Hubbell, D.L.S., 1904.*

Range 13.

Township 2.—There is a considerable amount of good land in this township, the soil being divided between sandy loam with clay subsoil and black loam with sandy loam subsoil. It is very suitable for grain growing purposes as well as for hay. The Canadian Northern Railway passes through section 6, where the station of Vassar is situated, as well as the post office of Vassar. There are well travelled trails leading from this township to Winnipeg and other points in the district. With the exception of part of the southwest corner all of the township is heavily timbered with spruce, tamarac, poplar and cedar from five to twelve inches diameter. There is very little hay to be had in this township, as yet, but it can be procured a few miles to the south and west. The supply of water is good. Mud creek, a stream in the spring about thirty feet wide, and nine feet deep, enters the township in section 33 and flows in a southeasterly direction, leaving the township in the southeast corner. Water can also be had in good quantities at a depth of about twelve feet, all of the best quality. In the spring the land adjoining mud creek is covered with water from one to three feet deep. There are no water powers of any account to be had in this township. The climate is temperate, having no summer frosts. Wood can be had in unlimited quantities, both in this township and in the adjoining townships to the north and east. There are no coal or lignite veins in this township. There are no stone quarries, although enough stone can be had in the district for building purposes for the early settlers. There are no minerals to be found in this township. The supply of game is good, all through this district, consisting of black bear, deer, moose, rabbits, prairie chicken and partridge.—*John Molloy, D.L.S., 1904.*

Township 8.—This township is all bush, comprised of poplar, willow, spruce, tamarac, and a few cedars. All the merchantable timber has been cut, but there is still an abundance of firewood and sufficient building timber for local use, lumbering operations having been carried on for some years all along Birch river, which runs through this township. Birch river is a branch of Whitemouth river and runs northwards through this township, entering it in section 1, and running through sections 1, 2, 11, 10, 14, 15, 16, 29, 32 and 31. There is still a thick growth of bush all over the township with a few small marshes and tamarac swamps, the greater portion of which could be drained into Birch river and thus made available for cultivation. All along the river the lands are dryer on account of the natural drainage afforded by Birch river and are now fit for settlement. The soil is mostly clay loam. Old winter roads used by the lumbermen some years ago are still to be found, but are not fit for summer transportation. A good wagon road could be easily made, joining to the present settlement at Whitemouth station on the Canadian Pacific Railway, and thus making this township convenient for settlement. The climate seems to be about the same as the usual Manitoba climate. Moose are plentiful, some cariboo were seen. Fur bearing animals comprise the usual kind such as mink marten, otter, muskrat, prairie wolves and foxes.—*G. C. Rainboth, D.L.S. 1904.*

Township 9.—This township is about fifteen miles southeast of Whitemouth, Man., but the only road to it is on the ice on Birch river and then over some of the old lumber roads, which are also only passable in the winter. The surface of the township is generally covered with moss, but below that there is in some places a rich black loam, which might make excellent farms, were it drained, but at present muskegs are so numerous and the land is all so low and level that it would not appear to be well suited for anything. Much of the township is quite heavily timbered and there is some good cedar and tamarac in the south and west parts of the township. In the north and east parts the timber is generally lighter and muskegs are more numerous. You could get good water any place by digging a three-foot hole, but there are no water powers in the township. No minerals of economic import were seen, though numerous large bosses of granite protruded from the muskegs. There was plenty of game. Moose, deer, wolves and foxes, besides partridges and rabbits. Birch river crosses the southwest quarter of section 6. This is the only part of the township that might probably be settled in the near future.—*Geo. A. Grover, D.L.S., 1904.*

Range 14.

Township 1.—The soil in this township is mostly first class, being either a black or sandy loam with a clay subsoil. It will make first-class land for grain growing purposes when cleared. The whole township is covered with bush, consisting of tamarac, spruce and poplar from three to ten inches in diameter, with a heavy growth of underbrush, being equally distributed over the township. There is very little hay to be found except on part of sections 24 and 25, where there is a large muskeg containing from two to four feet of water, according to the season of the year. The water is all of first-class quality, both in the swamps and creeks. Excellent water can be had at a depth of from six to twelve feet. Mud creek, a stream about forty feet wide and six feet deep crosses the township flowing in a southeast direction. The land is not liable to be flooded. The climate is temperate, having no summer frosts. Fuel is to be had in unlimited quantities, consisting of spruce, tamarac and poplar. There are no coal or lignite veins. There are no stone quarries or minerals. Game, consisting of moose, deer, black bear, prairie chicken and partridge are to be found all through this section of country. The Canadian Northern Railway passes through the centre of the township from east to west. Sprague, a station on this railway, is situated on the southwest quarter of section 15, where there is a store, post office and school. There are about forty squatters in the township. This part of the country is well supplied with trails, which were in use before the railway was built.—*John Molloy, D.L.S., 1904.*

TOWNSHIPS WEST OF THE PRINCIPAL MERIDIAN.

Range 12.

Township 25.—From Makinak Station, on the Canadian Northern Railway, there is a good trail that goes nearly east to the Indian reserve on the west side of Ebb and Flow lake, and from said reserve there is a trail going north, which crosses the townships from section 2 to section 34. There are also two other trails, one on the west bank of the Ebb and Flow lake, the other across sections 5, 6 and 7, west of Lonely lake; most of these trails run at the edge of hay sloughs, for this reason they may not be practicable in the wet season. The distance from Makinak to the centre of this township by the trails mentioned above would be nearly forty miles. The soil is generally a mixture of clay, sand and gravel covered with a surface of black loam varying from three to eight inches in depth. It should be suitable for agriculture if we compare it with similar soil in township 23, range 14, where settlers have cleared the land and are praising the quality of their homesteads. About three or four years ago the fire ran through the south and west part of the township, and the timber is nearly all fire-killed, but standing; on the north and east part the fire has also run through a few places; nevertheless most of the timber is green; the poplar averages six and eight inches in diameter, of which a good quantity can be utilized for building purposes. There is a large muskeg and hay slough principally around Lonely lake, and east of it, where a quantity of good hay can be made. Part of these large sloughs are covered with thick large weeds seven to nine feet high, and small willow scrub. Lonely lake has an area of little over seven square miles. Ebb and Flow lake, which is a bay of Lake Manitoba, covers only part of sections 1 and 12. The water in the lake is good and fresh; the bottom is gravel and seems to be shallow—at many places of sounding we never found more than seven or eight feet. Good water is easily obtained in any other part of this township by digging a few feet. There are two creeks which empty into Lonely lake; one of them on section 18, coming from west, was dry at the time of the survey; but its bed seems to carry a big body of water when the country is wet. The other creek is on section 22, coming from the north; it is eighteen feet wide and two or three feet deep, with slow current, on account of the dry season and the level surface of the country. Dry poplar is plentiful for fuel. There is no water power, no quarry and no mineral. It is a good country for game: moose, elk and jumping deer were numerous last fall. Partridge and especially rabbits are in abundance: so is the fishing on the lakes, which consists of jackfish and whitefish.—*Paul T. C. Dumais, D.L.S., 1904.*

Range 13.

Township 24.—From Makinak station on the Canadian Northern Railway, there are trails and good roads to Ste. Rose du Lac and Ste. Emélie. From this last place a wagon road continues further, east of the Indian reserve on Ebb and Flow lake, and passes on the southern part of this township, which is at a distance of 22 miles from Makinak station. The nature of the soil is generally a mixture of clay, sand and gravel. with a few boulders here and there, and is covered with a surface of black loam of three to six inches in depth; according to the report of some settlers who are living on similar land, south of this township, they say that the quality of this soil produces the best No. 1 hard wheat. The country is very level and is mostly covered with fire-killed standing poplars, willows and scrub, the fire having passed through this country three or four years ago; however, there are still a few bunches of green poplar of good size, that can be utilized for building purposes. On the north part of section 9 there is a bluff of 150 to 200 green spruce with a diameter of thirteen to sixteen inches and as many fire-killed ones of less diameter and a small quantity of oak trees. There would be a considerable quantity of good hay which could be made in the numerous sloughs spread over this township, but it could be cut only in a dry season on account of the level surface of the country, which is liable to be flooded on its lower part, when it should happen to rain in the harvest season. The surface water is alkaline, but fresh water is obtained permanently by digging ten to twenty feet. There is no stream worth mentioning. The climate is the same as central Manitoba, and summer frosts may be feared. Any quantity of dry poplar can be obtained all over the township for fuel purposes. There is no water power, no quarry and no mineral. It is a good country for game. Moose, elk and jumping deer were numerous last fall; partridge and especially rabbits were abundant. There is no fishing.—*Paul T. C. Dumais, D.L.S., 1904.*

Township 25.—The best route to reach this township would be from Makinak station on the Canadian Northern Railway via Ste. Rose du Lac, a village twelve miles northeast of the station; from Ste. Rose there is a good road as far as section 35, township 24, range 25; from whence there is a trail through the bush which crosses township 25, range 14, in an easterly direction and continues through this township as far as Lonely lake in township 25, range 12. The soil in this township is a mixture of clay, sand and gravel, covered with black loam to the depth of six to eight inches; as there is no prairie the land will have to be cleared and then will be suitable for agricultural purposes, as well as it is in township 23, range 13, where the soil is similar, and is praised by the settlers who are homesteaders there. The surface is very level and is chiefly covered with poplar and willows, poplars averaging from six to ten inches in diameter. The greater part of it has been killed by fire three or four years ago ; however, there are a good many bluffs of green poplar yet. Good hay could be secured in the numerous sloughs, all over this township, but it could be cut only in dry seasons on account of the level surface of the country, which is liable to be flooded on its lower part if it happens to be a rainy season. Surface water is generally fresh and could be obtained permanently by digging eight to ten feet. A creek, which was dry at the time of the survey, comes from the north and crosses section 25, 24 and goes out of the township in section 13. The south end of a lake which extends for a few miles north, comes into this township for a little over a mile on section 34 and is surrounded by swampy land. A trail going northwest from section 12 to section 34 continues north as far as the Indian reserve in township 29. Dry poplar is plentiful all over the township for fuel purposes. There is no water power, no quarry, no mineral in this township. It is a good country for game. Moose, elk and jumping deer were numerous last fall. Partridge and especially rabbits, are abundant.—*Paul T. C. Dumais, D.L.S., 1904.*

Range 14.

Township 24.—From Makinak station on the Canadian Northern Railway there are good roads going northeast to Ste. Rose, a distance of 12 miles, and from this last place the trail to Manitoba House passes through sections 3, 2, 11 and 12 of this township. The nature of the soil is generally a mixture of clay, sand and gravel and is covered with a surface of black loam varying from three to six inches in depth. According to the report of settlers who are living on similar land, south of this township they say that this quality of soil produces the best No. 1 hard wheat. The surface of this country is very level and is mostly covered with fire-killed standing poplars, willows and scrub, the fire having passed through this country three or four years ago; however there are yet a few bunches of green poplar of good size which can be utilized for building and fencing purposes. There would be a considerable quantity of fairly good hay which could be cut in the numerous sloughs through this township, but on account of the level surface of the country it would require a rather dry season to harvest the hay with advantage, because the low lands are flooded when the season is wet. On the south part of the township the surface water is alkaline, but permanent fresh water may be obtained at a depth of ten or fifteen feet. The climate is generally the same as in central Manitoba; summer frosts may be feared in new cleared land close to the bush. Dry poplars are plentiful for fuel purposes all over the township. There is no water power, no quarry and no mineral. Moose, elk, jumping deer, partridge and rabbits are the game of the country; a certain quantity of moose and elk were killed last fall.—*Paul T. C. Dumais, D.L.S., 1904.*

Township 25.—The best route to reach this township is from Makinak on the Canadian Northern Railway to Ste. Rose du Lac, a small village with a R. C. church, convent, post office, three stores and one hotel, at a distance of 12 miles in a northeast direction. From this village, there is a good trail as far as section 35, township 24, range 15, from where I had to travel on winter hay road, which extends as far as section 16, a distance of about ten miles from Ste. Rose du Lac. The soil in this township is a mixture of clay, sand and gravel covered with 6 to 8 inches of black loam, and will be suitable for agriculture after the land has been cleared, as has been done in township 23, range 13, where the soil is similar and praised by the settlers, who are homesteaders in that township. The surface is very level and is covered with poplar and willows, the poplar averaging from 6 to 14 inches in diameter. A few scattered spruce of small size were seen in sections 1, 32, 33, 35 and 36. Good hay could be secured in the numerous sloughs all over this township, but it could be cut only in a very dry season on account of the level surface of the country, which is liable to be flooded on its lower part should it rain in the harvest season. The surface water is generally fresh and could be obtained permanently by digging 6 to 8 feet. There is no important stream in this township. The climate is the same as in central Manitoba and summer frosts may be feared. Any quantity of dry poplar can be obtained for fuel purposes all over the township. There is no quarry, no mineral and no water power in this township. It is a good country for game. Moose, elk and jumping deer were numerous last fall. Partridge and especially rabbits are abundant. —*Paul T. C. Dumais, D.L.S., 1904.*

Range 15.

Township 29.—This township has been subjected to so many fires that there is very little green timber left, and that mostly in isolated bluffs on or near the south boundary and along the north part of the west meridian. On all the remainder where the land is dry, another second growth is growing up, but from the number of standing dead trees and the quantity of timber strewn on the ground it must have been subjected to periodical fires. The land is very stony. One or two small and fairly good farms might be culled out of sections 8, 9, 16, 17 and 20. There are three brothers, 'ranchers' living at the south end of Lake Manitoba, but they do not farm any beyond growing a few potatoes. They have between them some two hundred head of cattle besides horses. There are large hay meadows in sections 5, 6, 7, 8, 17, 18 and 19, where they get enough hay to winter their stock. Although sloughs are numerous and large all over the township they are too wet to grow hay, but around their edges and in the timber bluffs there is abundance of pasture to sustain a large number of cattle. The southwest bay of Lake Manitoba stretches south as far as the centre of sections 16 and 17, and is a little over two and one-half miles wide on the north boundary. I saw no sign of any game other than prairie chicken, muskrat, rabbits and coyotes.—*James Dickson, D.L.S., 1904.*

Township 30.—This township is divided into two parts by Lake Manitoba. There is only an average width of about half a section of land on the west side of the lake. Here there are four squatters. They live chiefly by fishing. They are all half-breeds, and natives of the country. The lake is a little over two and one-half miles wide on the south boundary, and four miles wide on the north boundary. On the east side of the lake the land is worthless, either a mass of stones or wet sloughs. The dry land is all thickly timbered. The timber is small poplar, balm of Gilead and a few birch near the water, and there is a very dense undergrowth of hazel, willow and alders. This as especially noticeable on the boundaries. There is no hay. Steeprock lake is a fine sheet of beautiful clear water, lying nearly between the east boundary and east meridian. Its south end is only a few chains north of the south chord, and it extends north to within a little over half a mile of the north boundary. Pike river enters it at its most southerly point and it discharges into Lake Manitoba on the north. There is only a narrow strip of land between the north boundary and Lake Manitoba. I saw a few signs of moose; rabbits and partridge were very plentiful, also muskrats and coyotes. There are no roads, but it is easily accessible from the south.—*James Dickson, D.L.S., 1904.*

Range 16.

Township 15.—The villages of Springhill and Franklin are situated in this township, the former being a station on the Clan William branch of the Canadian Northern and the latter a station of the Minnedosa branch of the Canadian Pacific Railway. From these villages any section in the township can be reached. The roads throughout the township are mostly all opened up and in good condition. The soil in the township is a deep rich loam, underlaid by a clay subsoil, and can be classed as first. It is suitable for mixed farming. The surface of the township is mostly gently rolling. The sections have been cleared and are cultivated, with the exception of a few in the northwest part of the township, which will be described below. No timber of any account exists in this township, with the exception of some small poplar, probably up to eight or ten inches in diameter, occurring in the north halves of sections 31 and 32, and the northeast quarter of section 19. A few small poplar bluffs occur in the two northern tiers of sections, in various places, but they are preserved for wind-breaks only. The water in the township is fresh, and is supplied mostly from Stony creek, which crosses sections 31, 7, 8, 9, 4, 3 and 2. This source of supply is permanent. Another small spring creek flows through sections 33, 34, 27, 26 and 25, which, however, dries up in the summer season. Another small creek flows easterly through sections 17, 16, 15, 14, 11 and 12, and this also dries up in the summer time. There is no fuel in this township, but it can be procured in township 16, range 16.

No hay exists in this township. No water power, no stone quarries and no indications of minerals are found. The climate is very good and of recent years the settlers state that no summer frosts have occurred. The only game is prairie chicken. The

Clan William branch of the Canadian Northern Railway traverses this township in a southwesterly direction, passing through sections 24, 23, 22, 15, 16, 17 and 18; and the Minnedosa branch of the Canadian Pacific Railway crosses through sections 1, 2, 3, 4, 5 and 6. The east half of the township and sections 4, 5, 6, 7, 8, 9, 16, 17 20, 21 and 28, are mostly gently rolling land. Patches of willow scrub occur about some of the sloughs and near and along some of the road allowances; with the exception of this, these sections are all cleared and cultivated. Section 18 is gently rolling. The east half and southwest quarter are cleared and cultivated. The northwest quarter is covered with scrub. Sections 19 and 30 are rolling land. Considerable scrub exists on these sections, though they are cleared and cultivated in some parts; poplar trees up to ten inches in diameter were found on the northeast quarter of section 19. Sections 29 and 30 are rolling; some scrub and small poplar bluffs occur on these sections; with the exception of this, they are pretty well cleared and cultivated. Section 31 is very rolling. It is broken by Stony creek. Some poplar up to ten inches in diameter were found on this section and plenty of heavy willow scrub. Some clearing has been done on the southeast quarter. Section 32 is rolling and covered in the north half with heavy willow scrub and some poplar up to ten inches in diameter. The south half is partly cleared and cultivated.—*Lennox T. Bray, D.L.S., 1904.*

Township 16.—This township can be reached from Eden very easily, being only about 3 miles west of it; roads are opened up leading into the township. The soil of this township varies from a deep rich loam to a clay and is suitable for mixed farming. The surface is gently rolling in some parts and very rough and broken in others as will be described below. Considerable scrub remains throughout the township, but this is being gradually cleared off as the settlers proceed in breaking up their land. Poplar is the chief timber , but the best of it has been pretty well cut out. Trees of varying sizes up to 16 inches in diameter can be obtained on most of the sections, with the exception of sections 1, 2, 3 and 4; these sections are mostly cleared. Hay of a very good quality is found in the valley of Stony creek, also on the eastern part of section 30 and the northern part of section 31. It is also harvested from around every small slough throughout the township. These sources, however, do not furnish sufficient feed for the settlers purposes. The water in this township is fresh and is supplied mostly from Stony creek, which flows southwesterly through sections 33, 28, 21, 17, 8, 5 and 6. Hazel creek, which flows southeasterly through sections 22, 15, 10, 11, 12 and 1, and Snake creek , which flows through sections 35, 36, 2 and 24. There are other small spring creeks flowing out of various sections into these large creeks. The climate is very changeable. A heavy frost occurred on June 21. The settlers state that the portion of the township lying west of Stony creek is more or less subject to frosts, while that portion east of the creek is seldom touched. But as a rule summer frosts occur more in the valleys than on the higher lands. The only fuel is poplar, which can be secured to a certain extent from off most of the sections. There are no water powers in this township, no stone quarries and no traces of minerals were found. The chief game is wild duck and prairie chickens, but both are scarce. —*Lennox T. Bray, D.L.S., 1904.*

Township 17.—This township is best reached from Eden by roads which are opened up into it. The soil of this township is comparatively good, being mostly a rich loam underlaid by a clay subsoil and would be suitable for mixed farming. The surface is mostly all timbered with the exception of where clearing has been done. It is more or less rolling and in the eastern part of the township it is very rough and broken by ravines. Poplar is the chief timber, though spruce and birch are found to be fairly plentiful. Poplar was found throughout the township and measures up to 24 inches in diameter. The spruce is scattered about in the northern part of the township; it will measure up to 18 inches in diameter, though most of the larger spruce has been cut out. Hay of a good quality was found on parts of sections 4, 6, 7, 17, 18, 20, 22, 27 and 29. The water in this township is fresh and is obtained partly from Kerr lake, which covers a portion of the northwest quarter of section 30 and the southwest quarter of section 31, and Grassy river, which enters the township at the northwest corner of section 34 and flows southeasterly through sections 34, 27, 21, 22, 23, 24 and 13. Numerous small spring creeks were observed flowing easterly out of the eastern tier of sections. The only fuel is wood and can be procured from off any section in the township. Partridge, elk and moose are found, all of which seem plentiful. The climate is very good, but the country is subject to summer frosts. No water powers, no stone quarries and no indications of minerals were found in the township.—*Lennox T. Bray, D.L.S., 1904.*

Township 29.—This township is all either timbered land or sloughs. The timber is poplar and balm of Gilead, with thick underbrush and a few small spruce, mostly mere poles. The largest I saw was near the southeast corner of section 16. The timber was tall, but none more than ten inches in diameter. The trees had all been killed by fire two years ago and the grove had an area of about three acres. There is no hay to be got west of the centre meridian, the sloughs being too wet. East of that line there are large meadows of good hay and a large quantity was cut last season. Most of the township has been burned over more or less, but it is all covered again with a vigorous second growth. The land is mostly stony and not fit for farming. I was not able to run the north boundary of section 19, owing to a large and very wet slough filled with tall reeds. None of the sloughs I saw can be drained. Spence lake occupies a part of sections 25, 26, 36, nearly the whole of section 35, and a small portion of section 34. There are two half-breed families located on the northeast corner of section 34. They have cleared enough land for their buildings, and a small patch for potatoes, but have each a good herd of cattle. They said they did not wish to locate, so I took no declarations. There is no road to the west except the trail I cut to get in by, but there is a good trail from there south to Ste. Rose du Lac. Moose, elk, jumping deer and partridge are all fairly plentiful.—*James Dickson, D.L.S., 1904.*

Township 30.—This township is all bush land and wet sloughs alternating. The timber is poplar and balm of Gilead, with a dense undergrowth all over. I saw three small groves of small spruce. None of the timber is of any commercial value. Many of the sloughs (and this remark will apply to all of the townships in my contract) are full of very tall reeds, which had to be mown down by brush hooks before the lines could be either run or chained. I found this very tedious, as in the majority of cases it meant wading also. The land is nearly all stony, and even where it is not so, it has not sufficient elevation above the sloughs—none of which can be drained—to fit it for farming. This also applies to the other townships. There is one half-breed rancher living on the shore of Lake Spence, near the south boundary on section 3, but he did not desire to locate. There is another, an Icelander, on the northeast quarter of section 36. I took a declaration from him. With the exception of the east one and three-quarter miles and six chains of the north boundary of section 36, which is in Lake Manitoba, the north boundary is all in Lake Winnipegosis. A good wagon road a little south of the boundary, locally known as the 'Meadow portage trail,' extends between the lakes, striking Lake Manitoba about three-quarters of a mile south of the boundary, from which the Ste. Rose du Lac trail starts and runs south only across the township between Lakes Manitoba and Spence. Lake Spence is a fine body of sweet, pure, spring water. There is not a single stream flowing into it. It abounds with fish and water fowl, and extends north into sections 23 and 24. On the district map it is shown as a bay of Lake Winnipegosis. This is an error; there is no connection whatever between those two lakes. It discharges into Lake Manitoba through a fine creek a short distance north of the south boundary. North of this lake there are some good hay meadows and a large quantity was taken off them last season by the Meadow portage settlers. There are moose and jumping deer, partridge and rabbits. The township is easy to reach either from Ste. Rose du Lac or Winnipegosis village.—*James Dickson, D.L.S., 1904.*

Range 17.

Township 29.—In the season of 1898, I subdivided the south part of this township and all I did now was to run the east three miles of the north chord, the north two miles of the west meridian, the north half mile of the next, and the north two miles of the other three, also the north boundary, seventeen and one-half miles in all. This part of the township is all thickly timbered, alternating with very wet sloughs, with bluffs of willow, alder and spruce, scattered through them. There is a large and very wet slough through which the east boundary runs for three miles, which prevented me from running the east part of the north boundary of section 24. It is a perfect quagmire and full of tall reeds. I waded into it until the men sank over the waist. The timber is poplar and balm of Gilead, a few clumps of small spruce and still smaller tamarac and a very dense undergrowth. Very little of the timber is large enough for house logs. The sloughs are very wet, producing little hay, and are not capable of being drained. The dry land is stony. There is one squatter on section 30. I found a newly-opened road from Fork river station into the northwest quarter of section 20, where a new settler was starting. There are no other roads in that part of the township. Moose and partridge are plentiful.—*James Dickson, D.L.S., 1904.*

Township 30.—This township is all either heavily timbered or open marsh. The timber is poplar and balm of Gilead, with a dense undergrowth of hazel, willow and alder. With the exception of some spruce on sections 2, 3 and 10, the timber is only fit for firewood and fencing. What spruce I saw is of fine quality but not large. The land is stony. The marshes are mostly too wet to produce hay and are not capable of being drained. This township is bounded on the north by Lake Winnipegosis, about one-third of it being in the water. Most of the shore is marsh, the water only approachable in summer at isolated points. There were twenty squatters, all Galicians, except three, a father and two sons, who are Canadians. The land is not such as is likely to attract any settlers except those from those parts of the old world where the ownership of even a moderately sized farm is a boon to only the few, and enough hay can be cut around the sides of the sloughs to maintain for each a small herd of cattle. The squatters (they are mostly on the west side of the township), have made a road to Winnipegosis village, but the only means of access to the east half during summer is by water. Moose and jumping deer are plentiful in the woods, with muskrat, duck and geese on the lake shore.—*James Dickson, D.L.S., 1904.*

Range 21.

Township 11.—This township is about six miles due north of Alexander, a station on the main line of the Canadian Pacific Railway, and about two miles due south from Westwood, a station on the Lenore branch of the Canadian Northern Railway. Roads are opened up leading into this township from both these places. The soil of this township on the higher lands is a sandy loam underlaid by a clay and gravel subsoil. While on the lower lands, that is in the valley of Assiniboine river, it is a mixture of loam and white clay. The surface of the township is open gently rolling prairie, with the exception of those sections adjoining the valleys of Assiniboine and Little Saskatchewan rivers. Those sections are broken by ravines which contain scrub poplar and oak. No timber exists in this township, with the exception of scrub poplar and oak. The fuel used is whatever can be bought at the neighbouring towns. Hay of a good quality grows on the south halves of sections 7, 8 and 9, and the north halves of section 4, 5 and 6. Some of these meadows are drained and farmed. They, however, contain a certain amount of alkali. The water of the township is fresh, its source being Assiniboine and Little Saskatchewan rivers. The latter flows southeasterly through sections 34, 35, 26, 25 and 24, while the former flows easterly, winding around through sections 6, 5, 4, 3, 10, 11, 2 and 1. A creek with source in section 30 flows southerly through sections 19, 18, 7, 8 and 5 into the Assiniboine. A couple of small creeks flow southerly out of section 16. No water powers occur in this township and no stone quarries or indications of minerals were found. The game is prairie chicken. The climate is very good. No summer frosts occur. Sections 4, 5 and 6 are broken by Assiniboine river. They are open rolling prairie south of the river, while north of the river they are open, nearly level, meadow lands. Willows grow all along both sides of the river, and on the northeast quarter of 4, some elm and maple up to ten inches in diameter were noticed. Sections 7, 8 and south half of 9 are open, nearly level meadow lands. The north half of 9 is rough and broken by hills and ravines, containing scrub. Section 16 is very rough and broken by hills and ravines containing scrub poplar. The central northern part is less broken and can be farmed. A trail crosses the west half of this section in a northerly direction. A couple of spring creeks flow southerly out of this section. Section 17 is rough and broken by hills and ravines containing poplar scrub in its east half and northwest quarter. The southwest quarter is nearly level meadow land. Section 18 is broken in its northern part by hills and ravines; the remainder of the section is nearly level meadow land. Section 19 is high rolling prairie; it is broken on its southern side and its east half by hills and ravines, some of them containing scrub poplar. Section 20 is broken on its western and southern sides by hills and ravines, some of them containing scrub; the remainder of the section is open, gently rolling cultivated land. Section 21 is slightly broken in its eastern part by a ravine containing scrub poplar; the remainder of the section is open, gently rolling cultivated land. Section 27 is slightly broken in its northern half by ravines; the remainder is open, gently rolling cultivated land. Sections 28 and 29 are gently, rolling cultivated land; some small poplar bluffs occur on the southwest quarter of section 28. Section 30 is rolling prairie; it is broken by a ravine which leads from the southeast corner of the section into the northwest quarter. Sections 31, 32, 33 and 36 are open, gently rolling cultivated land. Sections 34 and 35 are broken by Little Saskatchewan river and ravines leading to the same. Some of these ravines contain scrub. Willows grow along the edges of the river. The central western part of section 34 and the northeast quarter of section 35 are open, gently rolling cultivated land.—*Lennox T. Bray, D.L.S., 1904.*

Range 22.

Township 3.—This township lies in southern Manitoba. The soil is a rich black loam with clay subsoil. Whitewater lake occupies a large part of the township. This lake is a shallow body of alkaline water with extensive marshes and low hay lands on the west side. The water in the lake some seasons being high, floods the low lands, and in dry seasons there is a great increase of land on which hay is cut. The lines in this township are very irregular. I found most of the mounds, which were in a good state of preservation. There is no timber in this township and the settlers have to go some ten miles for fuel. There are no minerals or stone quarries. The settlers go in chiefly for wheat growing and appear very successful. There are no streams of any account. It is a difficult matter to get good water, as nearly all the well water is alkaline. The Deloraine branch of the Canadian Pacific Railway runs through the southern part of this township.—*W. J. Deans, D.L.S., 1904.*

Township 36.—The Prince Albert branch of the Canadian Northern Railway passes within a few miles west of the southwest corner of this township. There are no summer trails through the township. The soil is very poor, being principally sand, with gravel and stones, and with a very light deposit in some places of a few inches of black loam. It would be difficult to say for what kind of farming or other industry such a combination would be suitable. The whole surface is covered with a light growth of jackpine, spruce, tamarac and scrub, small jackpine predominating. The spruce and tamarac are about equally distributed. All the timber is small, rarely attaining seven inches in diameter, although a few small bluffs containing some eleven-inch timber were met with. The whole township has been burned over at some past date and a good many of the dead trees are still standing. There is no running water. The water in the sloughs and ponds is generally fresh. There are no water powers. Hay may be cut around some of the sloughs but in no great quantity. There are no large hay marshes. I have had no experience in this part of the country as to climatic conditions during the summer months. During the winter it was exceedingly cold, but the air was clear and dry. Very little snow fell during the time engaged on the survey. In the fall of 1904 the snow fell to the depth of one foot before the frost was on the ground. Fuel consists of small spruce, tamarac and jackpine, both dry and green. No minerals were seen. Game consists of moose, which are numerous. —*H. B. Proudfoot, D.L.S., 1904.*

Township 37.—The southwest corner of this township is about three miles from the Prince Albert branch of the Canadian Northern railway at a point about midway between Cowan and Fishers stations. There are no summer trails leading through or into it. The soil is principally sand, gravel, stones, with, in a few places, a slight deposit of black loam. It is very poor, and I do not think it would raise any kind of crop and being so stony cultivation would be very difficult. The surface, level, rolling and undulating, is mostly covered by spruce or tamarac swamps and small timber, separated by low jackpine ridges. The timber is all small, three inches to five inches in diameter; trees as large as ten inches were seen but are very scarce. Spruce, tamarac, jackpine predominate, and some small birch, balm of Gilead, poplar and balsam were met with near the north boundary. Hay can be cut around the sloughs or grass swamps, but there are no large hay meadows. The water is generally fresh in the swamps, a few small creeks were crossed in the northwesterly part of the township but they as well as the sloughs, were frozen to the bottom. There are no water powers. I have had no experience of the weather in this immediate locality during the summer, but I am informed that summer frosts are not generally prevalent. During the time of survey, January, 1905, there were no storms of any kind, the days were generally clear; the thermometer never registered higher than 8 degrees below zero. There are large quantities of spruce, tamarac and jackpine, both dry and green, but of small size. No stone quarries or minerals were seen. Game consists of moose principally. These are in large numbers.—*H. B. Proudfoot, D.L.S., 1904-5.*

Range 23.

Township 12.—The villages of Kenton and Harding, stations on the Lenore branch of the Canadian Pacific Railway, are situated in this township. From them any of the sections can be reached. The soil of this township is exceptionally good, being a deep rich loam underlaid by a clay subsoil, and is suitable for mixed farming. With the exception of the northeastern and southern part of the township, considerable willow and poplar scrub exists, becoming heaviest in the northwestern part of the township. The timber in this township is small. It is chiefly poplar and measures up to three or four inches in diameter. Some timber on the northeast quarter of section 9, the north half of section 19 and on section 31, will measure up to six and eight inches in diameter. Hay in limited quantities grows on the south halves of sections 32 and 33, the east half of section 34 and the west half of section 35. The water of this township is inclined to be alkaline. The chief source of good water is from wells. A creek flows southeasterly through sections 34, 35, 26, 24, 13, 12 and 1; the water of this creek, however, is strongly alkaline. The fuel used is chiefly poplar procured throughout the central and northwestern part of the township. The supply, however, is very limited. No water powers exist in this township; no stone quarries and no indications of minerals were found. The game is prairie chicken, which seem to be very plentiful. The climate is very good, no reports of summer frosts were heard. Sections 1, 2 and the east half of section 3 are gently rolling. Scrub grows on the northern parts of these sections; the southern parts are broken by small ravines. The west half of section 3 and section 4 are nearly level, the southern parts are open prairie; the northern parts contain scrub in patches. Section 5 is very rolling; considerable scrub grows on the east half; the west half is open rolling country. Sections 6, 7 and 8 are mostly open rolling country. Sections 9, 10, 11 and west half of 12 are gently rolling counary; scrub grows on various parts of these sections. Poplar up to eight inches in diamter occurs on the northeast quarter of 9. The east halves of sections 12 and 13 are rolling and contain considerable scrub. The west half of section 13, sections 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 30, 29, 28, 27 and west half of 26 are gently rolling land. Considerable scrub occurs throughout these sections. The south half of section 18 is open rolling prairie. Sections 24, 25 and east half of section 26, are gently rolling, with considerable scrub. Traces of alkali are found on these sections. Sections 34, 35, 36 and east half of section 33 are mostly open rolling land. Traces of alkali occur on these sections. The east half of 34 and southwest quarter of 35 are broken by a muskeg. Good hay grows around this muskeg. The west half of section 33 and section 32 are rolling. Scrub grows on the northern parts of these sections, and good hay grows on the southern part. Section 31 is gently rolling; heavy willow scrub and poplar up to eight inches in diameter grow on this section. The Lenore branch of the Canadian Pacific Railway traverses through the south half of section 12, southeast quarter of section 11, the north halves of sections 2, 3, 4, 5 and 6. The village of Kenton is situated on the northwest quarter of section 6, and the village of Harding on the southeast quarter of section 11.—*Lennox T. Bray, D.L.S., 1904.*

Township 37.—The Prince Albert branch of the Canadian Northern Railway is a few miles south of the southwest corner of this township. Fisher's siding is the nearest station. There are no summer trails however. The soil is very poor, being sand, gravel, &c., with a very light deposit of black loam in some places. The swamps are very soft. The whole of the township is timbered with spruce and tamarac, averaging between five inches and six inches in diameter, in swamps—which comprise about three-quarters of the area—with ridges of jackpine, and some poplar, birch and balm of Gilead. The different timbers are about equally distributed. Some few bluffs of large timber were encountered, but their areas are small. Hay can be cut around most of the grass swamps and sloughs but there are no large marshes. There are a few small brooks, but at the time of survey they were frozen to the bottom so the quality of the water could not be ascertained, ice being always fresh. In the ponds the water is slightly alkaline. There are no water powers. The climate was exceedingly cold at the time of survey, but there were no storms. Snow did not fall between January 1 and February 18 in this district. On account of the large amount of swamp lands I should surmise that summer frosts would be very prevalent. Wood for fuel is in abundance. No stone quarries or minerals were seen. The game consists of numerous moose, jumping deer and small fur-bearing animals, and chicken and partridge.—*H. B. Proudfoot, D.L.S., 1904-5.*

Range 24.

Township 20.—This township is situated on what is commonly known as Riding mountain and is located about fourteen miles north of Kelloe station on the northwestern branch of the Canadian Pacific Railway. It may be easily reached by good wagon roads, either from Shoal lake, Solsgirth or Kelloe. The village of Rossburn is situated immediately adjacent to the southwest corner of the township and therefore affords the most convenient post office and local supply station. The Canadian Northern Railway is at present being constructed through it. The soil of this township is chiefly a black loam from six inches to twelve inches in depth, with a clay subsoil and is apparently well suited for general farming purposes. The raising of cereals has not yet been undertaken to any extent, but the Galician settlers raise all kinds of garden produce very successfully. Almost the whole of this township is situated on what is known as Riding mountain and is of a rolling and hilly character and much broken by numerous large and small lakes. The township is almost entirely covered by poplar woods and in many places a heavy growth of hazel and willow scrub. Small tracts of prairie land were noted on sections 6, 10, 11 and 25. As above intimated this township is well covered with poplar timber, varying in size from three inches or four inches up to one and one-half feet in diameter and such may be found in almost every section of the township. No spruce or other variety of timber suitable for manufacturing into lumber occurs upon this township. Numerous small hay meadows are scattered everywhere throughout this township, affording an abundant natural supply of this useful commodity. This township is exceptionally well watered by the numerous lakes which are scattered over its surface and at least one creek which forms the outlet of the largest of the lakes (Gundy lake) and flows in a southwesterly direction through sections 8, 5, and 6. Gundy lake covers a large part of sections 9 and 10 as well as parts of 15 and 16, whilst Fishing lake, which is the second largest body of water in the township, covers a large portion of sections 23, 24 and 26. Other smaller lakes occur upon sections 2, 3, 4, 5, 15, 16, 17, 21, 22, 24 and 28 and the water of all the above lakes is quite fresh and some of them, particularly Fishing lake, are said to contain abundance of fish. No water powers occur upon this township. As this township was surveyed between September 24 and October 21, the climate was cool and autumn-like and one or two flurries of snow were experienced and frosts usually occurred during the nights. As to summer frosts I have no definite information except that it was observed that very fine crops of wheat and oats were grown and harvested upon section 6 of township 21, range 24, which immediately adjoined this township. The poplar forests occurring upon this township furnish an abundant supply of fuel for many years to come, provided it is protected from the ravages of forest fires, which too frequently sweep over this western country. No stone quarries are known to exist upon this township. No minerals of economic value are known to occur upon this township. Several varieties of game are found: moose, jumping deer, black bear, mink, duck, prairie chicken and ruff grouse.—*J. W. Tyrrell, D.L.S., 1904.*

Township 21.—This township is situated about twenty miles due north of Kelloe, on the Northwestern branch of the Canadian Pacific Railway, and may be easily reached from either Shoal lake, Solsgirth or Kelloe, by good wagon roads; that from Solsgirth perhaps affording the shortest and best connection with the railway. Ranchvale post office is situated within a mile of the southwest angle of this township, and is only about six miles north of the village of Rossburn, where there is not only a post office and telephone station, but several general stores. The Canadian Northern Railway is at the present time being constructed through this village. The main Dauphin trail following up the valley of Birdtail creek passes diagonally through this township from section 6 to 35. The soil of this township varies from first to second class, and consists chiefly of a good black loam from six inches to eight inches in depth, with clay subsoil, and is evidently well suited for the raising of all kinds of ordinary farm produce, including oats and wheat, for, during the time that I was in the locality of this township, I saw exceptionally fine crops of oats and wheat harvested upon sections 6 and 16, large portions of which sections were under cultivation. This township is largely composed of very hilly timber country, but it is intersected in a northeasterly and southwesterly direction by the valley of Birdtail creek, from a half to two miles in width, which is chiefly prairie land of apparently very fine quality. The whole of this township, excepting the valley of Birdtail creek, is covered with timber, chiefly poplar, but a few groves of spruce occur in the more northerly and easterly sections of the township. An old sawmill was located upon section 13, but it has now been removed as nearly all of the timber suitable for the manufacture of lumber has been culled out. The surface of this township being somewhat drier than the average in this district, the occurrence of hay marshes is not as common as elsewhere, however several may be found in various parts of the township, notably upon sections 1, 5, 9, 16, 25 and 34. Although few lakes occur upon this township, it is particularly well watered by Birdtail creek, which flows in a southwesterly direction through sections 35, 26, 27, 22, 21, 16, 17, 18 and 7. The water of this stream is fresh and good and contains large numbers of fine fish. In addition to this stream and some small tributaries, there is a large lake in the southeast part of the township covering portions of sections 1, 2, 11 and 12; also another lake covering portions of sections 24 and 25, and still another of considerable size chiefly upon section 32, all of which are composed of fresh water. Birdtail creek, which is a stream averaging about thirty feet in width, two or three feet in depth, with a velocity of about two miles per hour, affords a certain amount of water power, though comparatively limited in extent. The remains of an old mill dam were found upon section 35, showing that the water power of this stream has already been recognized as available in the manufacture of lumber. This township having been surveyed chiefly during the month of October, cool autumn weather was of course experienced, but judging from the fine crops of grain which were harvested upon sections 6 and 16, the climate must be such as to admit of the growing and ripening of these crops, and it may be taken as the best evidence that no severe summer frosts had occurred. Everywhere upon the higher hilly portions of this township may be found abundance of good poplar woods for purposes of fuel. Spruce is also found in some places though in quite limited quantities. No stone quarries are known to exist upon this township, although in some places, particularly upon sections 22 and 23, very rough rocky hills occur, and it is possible they may contain good stone for building purposes. No minerals of economic value are known to occur upon this township. This township being situated immediately to the south and adjoining the timber reserve, it is the frequent haunt of several varieties of wild animals, notably moose, elk and jumping deer. Prairie chicken and ruff grouse are also quite numerous.—*J. W. Tyrrell, D.L.S., 1904.*

Township 26.—From township 26, range 26, we followed the Grand View trail till we come to a road running north along the east boundary of section 3, township 26, range 24. This road we followed north as far as the northeast corner section 22, where we camped. The soil in the part of the township surveyed by me was very light and of poor quality. The surface is very rolling and uneven and covered with a heavy growth of poplar and willow scrub with large poplar and spruce to the north and west. There are a few hay sloughs but good hay is not very plentiful. A few streams of very good water flow through the township in a southeasterly direction. These streams are fed by springs and do not dry up during the summer. The land is not liable to be flooded. No water power is available in the township. The climate is dry and subject to summer frosts. Poplar and spruce for fuel can be had in the northern part of the township, but no coal or lignite exists. No stone suitable for quarrying nor minerals of economic value exist in the township. Moose, elk, black bear and jumping deer are very plentiful, as are also partridges, prairie chickens and rabbits.—*Charles Harvey, D.L.S., 1904.*

Range 25.

Township 7.—This township is in southern Manitoba and is well settled. The settlers are engaged in mixed farming. The soil generally is a sandy loam and produces wheat of a very superior quality. The southern part of the township is occupied by extensive marshes. These marshes occasionally dry up, but at the present time the water is from four to six feet in depth. There is quite a large body of open water in sections 4, 5, 8 and 9, known by the name of Maple lake. I am told that some five years ago this lake also dried up and that it was possible to drive where there is now seven and eight feet of water. Extensive marshes also occupy sections 25, 26, 35, 36. There is a body of open water on sections 25 and 36, known by the name of Plum lake This lake and the surrounding marshes occasionally dry up. There is a great quantity of hay made from the grass in these marshes. I was informed that one man pressed and shipped in 1903 over eight hundred tons, but this season owing to the mild winter there is no market for hay. The Arcola branch of the Canadian Pacific Railway runs through the southerly part of this township and the Canadian Northern Railway runs through the township, entering it near the southeast corner and leaving it near the northwest corner. There is no timber in this township. The settlers bring in by railway lumber and fuel. I found quite a large number of the mounds destroyed. Owing to the wet nature of the country it was necessary for me to do some 16 miles of this work in winter.—*W. J. Deans, D.L.S., 1904.*

Township 21.—This township is situated about twenty miles north of Solsgirth station on the northwestern branch of the Canadian Pacific Railway and about six miles north of Rossburn, through which the Canadian Northern Railway is at the present time being constructed. Ranchvale post office is situated within one mile of the southeast angle of the township and the main trail following the valley of Birdtail creek towards Gilbert plains leads from Solsgirth on the Canadian Pacific Railway, through this township by way of Rossburn and Ranchvale. The soil of this township is chiefly that of a rich black loam, becoming more sandy in character in certain sections toward the valley of Birdtail creek, where the subsoil is of a sandy or gravelly character, although the prevailing subsoil of the township is clay. The land in the township is well suited for the raising of general farm produce. Wheat and oats as well as other varieties of grain are already successfully raised upon some sections, which for years have been occupied by Canadian settlers. The greater portion of this township is quite hilly in character and covered with poplar timber together with hazel and willow scrub, although some prairie is found in the valley of Birdtail creek upon sections 1, 2, 11, 12 and 13. The timber of this township having been largely consumed by fires some years ago, the surface is chiefly covered by a young growth of poplar and in some cases the growth of willow and hazel scrub is very heavy. Large timber is still found upon some sections, notably on portions of sections 9, 10, 14, 15, 20, 21, 22, 23, 25, 33, 34, 35 and 36. This township is abundantly provided with natural hay in the many sloughs which occur upon its surface. It is scarcely necessary to enumerate the sections upon which these hay meadows occur since they may be found upon almost every section in the township. There are no large bodies of water occurring upon this township, but it is exceptionally well supplied with fresh water streams, three of which flow in a southeasterly direction through the township and discharge into the main stream of Birdtail creek, which passes through sections 1, 2 and 12. The water of these creeks is fresh, and in Birdtail creek are to be found plenty of good sized jackfish as well as some other varieties. No water power of any consequence occurs in this township. Judging from the number and extent of the farm products now grown upon this township it is evident that the climate must be not unsuited for their production, excellent crops of wheat, oats, &c., having been harvested under my own observation. The poplar and spruce timber growing in various sections of this township form an abundant local fuel supply.

No stone quarries are known to exist upon this township. No minerals of economic value are known to occur upon this township. This township being much more settled than others adjoining it, game is now somewhat less abundant than formerly, but even yet it is no uncommon occurrence to meet with moose or jumping deer, whilst prairie chicken are very numerous.—*J. W. Tyrrell, D.L.S., 1904.*

Township 38.—The trail from Swan lake to Fort Pelly passes directly through this township, but is in very bad condition southwest of the south boundary. Eventually another route will be found from some point on the Canadian Northern nearer than Swan River station. The soil is generally clay with an alluvial deposit of black or clay loam of varying depth. It is well adapted for all kinds of farming. This township is timbered throughout. Near Swan river the timber is principally poplar, cottonwood and some spruce, all of large size. More or less large timber, poplar chiefly, is scattered throughout the township. In the northwesterly portions the greater part of the timber is small poplar. The timber is good for all purposes. I have been asked several times for a description of it by parties intending to erect sawmills. With the exception of that in and around the sloughs, hay is very scarce. Swan river flows from south to north through the township and there are also numerous brooks of from a few links to 20 feet in width. These waters are all slightly alkaline, but not to any appreciable extent. At the time of survey the water in Swan river was very low, the current strong and the water shallow. On account of the height of the banks there is no great danger of flooding any large area of land. Power could be developed on Swan river, but to what amount I cannot state, being ignorant of the storage facilities up stream and the spring flow of water. Frosts were experienced several times during the summer, but there is no doubt that with the clearing of the land and the drainage of the country they will discontinue. Wood is the only fuel available, but there are large quantities of that. No stone quarries or minerals exist. There are large numbers of moose, bear and partridge.—*H. B. Proudfoot, D.L.S., 1904.*

Township 39.—The cart trail between Fort Pelly and Swan lake passes through the southeasterly portion of this township, crossing the Prince Albert branch of the Canadian Northern Railway near Swan River station. This trail south of the township is in very poor condition for travelling. Another trail leaves the above railway about one mile south of Birch River siding, and runs into the northwesterly portion of the township. This road is in fairly good condition. The soil is very variable, changing continually from sand to clay in the subsoil and from black and clay loam to sandy loam in the alluvial, but it is all suitable for general agricultural pursuits. There is a small area of prairie in sections 19 and 30; the remainder of the township is timbered principally with small poplar; but along the numerous streams large poplar, cottonwood, spruce, tamarac and some maple, elm and ash occur. Hay can be cut around most of the sloughs and grass swamps and at places in the willow swamps. No large hay marshes were encountered. The township is very well watered with numerous streams, principally the Swan, Woody and Birch rivers, which are all fresh water streams, not alkaline, and are in well defined valleys, and all have strong currents. No water power is available without extensive artificial works. The district is very subject to summer frosts. The fall of 1904 was very mild and fine, with no wet weather Wood is the only fuel, but it is abundant. No minerals or rock exposures were noticed. Moose, bears, beaver, chickens and partridge are found.—*H. B. Proudfoot, D.L.S., 1904.*

Township 40.—This township lies east of the Canadian Northern Railway, between Birch river and Novra station. An old trail, in fairly good condition, leaves the railway about one mile south of Birch River station and passes through township 39, range 25, about one and a half miles south of the south boundary of township 40, range 25. From this trail, I have cut a road running northeasterly, crossing the south boundary near the southwest corner of section 5, and terminating about the centre of the northeast quarter of section 22. The soil is principally clay, with an alluvial deposit of black and clay loam of a few inches in depth. With the clearing of the country and the drainage of the land lessening thereby the liability of summer frosts, this section will be well adapted for mixed farming. The surface is undulating and timbered throughout with poplar, cottonwood, spruce, birch and tamarac, and underbrush very thick. The first four varieties of timber mentioned occur principally in the northwesterly portion of the township, while the large swamps in the easterly part are almost wholly timbered with spruce and tamarac. All the different kinds of timber are well distributed as to size, running from a few inches up to 30 inches in diameter. The path of a cyclone, which passed over this country a few years ago, is clearly marked across sections 3, 4, 5, 6, 7 and 8, leaving a bad windfall about half a mile in width. There are a few small hay meadows scattered throughout the township, but no large marshes. Numerous small brooks were noticed, the largest flowing almost due east along the chord between sections 19, 30, &c. The water in these brooks is only slightly alkaline, hardly perceptible to the taste. No water powers exist. Frosts occurred several times during the month of September, and at this writing (October 3) snow is falling. For fuel there is wood in large quantities. There are no stone quarries or minerals. Large numbers of moose and bears are found. Partridge are very plentiful.—*H. B. Proudfoot, D.L.S., 1904.*

Range 26.

Township 10.—In this township is situated the town of Virden, a station on the main line of the Canadian Pacific Railway and from it any section in the township can be reached. The soil of this township varies, from a poor sand to a deep rich loam; most of the sections, however, are cultivated and mixed farming is carried on. The surface of the township is mostly open, gently rolling prairie as will be described below. There is no timber of any account in this township, with the exception of a bluff of small poplar measuring up to about six inches in diameter located on halves of 10, 11 and 12. The source of the water supply of this township is Bosshill creek through section 25. Hay of a good quality exists on sections 1, 2, 3 and south halves of 10, 11 and 12. The source of the water supply of this township is Bosshill creek, which flows through sections 19, 20, 17, 16, 15, 14, 23, 26 and 25. This water is fresh. A small creek flows northerly across the east half of section 4. There are no water powers in this township. No stone quarries and no indications of minerals were found. The fuel used is mostly coal, which can be procured in the town of Virden. The only game is prairie chicken. The climate is very good. There were no reports of summer frosts. Sections 1 and 2 are open, nearly level meadow lands; there are a number of sloughs on these sections and hay may be cut. Section 3 is meadow lands to the north; the south half is open, nearly level prairie. Sections 4, 5, 6, 7, 8 and 9 are open, gently rolling prairie. Sections 10, 11 and 12 are meadow lands in their south halves; the north halves are open, nearly level prairie. Section 13 and east half of section 14 are nearly level. Small poplar and willow scrub occur in the northern parts of these sections. The west half of section 14 and sections 15, 16, 17, 18, 19 and 20 are open, gently rolling land. The north halves of sections 14, 15, 16 and 17 are broken by Bosshill creek, which also diagonally crosses section 20 and the north half of section 19. Section 21 is open, gently rolling prairie. Section 22 is gently rolling. The town of Virden is situated about the centre of this section. Section 23 is rolling; it is broken by Bosshill creek and is covered with considerable scrub. Section 24 is gently rolling in its west half and southeast quarter. There is some small scrub on the south half. The northeast quarter is broken by the slope leading to Bosshill creek. Considerable scrub grows on this slope. Section 25 and east half of section 26 are broken by Bosshill creek. Considerable scrub grows throughout the ravine of the creek and in the northeast quarter of section 25. There are loose stone on the north half of section 25. The west half of section 26 and sections 27, 28, 29, 30, 31 and 32 are gently rolling, open prairie. There are small patches of scrub on the east half of section 31 and the west half of section 32. Sections 33, 34 and 35 are open, nearly level prairie. The west half of section 36 is gently rolling. Considerable scrub grows on this half. The east half is very rough and broken by ravines, some of them containing scrub. No traces of the old Fort Ellice trail were observed. The Canadian Pacific railway crosses this township in a northwesterly and southeasterly direction passing through sections 12, 11, 14, 15, 22, 27, 28, 29, 32 and 31. Grading has recently been done through the east halves of sections 4, 9 and 16 on the proposed branch of the Canadian Northern railway leading to Virden.—*L. T. Bray, D.L.S., 1904.*

Township 21.—This township is situated about 20 miles north of Solsgirth on the Northwestern branch of the Canadian Pacific Railway and about eight miles northeast of the village of Rossburn, where there is a post office and several general stores and through which a branch of the Canadian Northern railway passes. This branch will pass close to the southern boundary of this township and will therefore render it very easily accessible by rail, as it is already by wagon trails from Rossburn, Solsgirth and other points. The soil of this township consists of a rich black loam, varying from 6 to 18 inches in depth, with clay subsoil, and is well suited for general farming purposes. The surface of this township, or rather the eastern half, which only was surveyed by me, is of a rolling rather than a hilly character and is chiefly covered by poplar and willow scrub, although big poplar timber occurs upon some sections, notably numbers 1, 10, 11, 15, 22, 23, 24 and 36. This township though not very abundantly provided with natural hay, yet contains many small hay marshes scattered throughout the various sections of the township. Those noted being upon sections 1, 3, 10, 11, 12, 13, 14, 15, 22, 27 and 36. Several lakes of considerable size occur in the eastern half of this township, the largest being upon section 3 and covering the greater portion of same. Other smaller lakes are found upon sections 12 and 13, 11 and 14, 22, 25, 34 and 35. All of these lakes consist of fresh water. That upon sections 34 and 35 is said to contain an abundance of good fish. No water power occurs upon this township. The climate of this township must be such as to admit of the successful raising of wheat, oats and other ordinary farm products of that district since upon the western portion of the township, several very fine farms were observed to be in a high state of cultivation and producing excellent crops of grain. An abundant supply of wood for fuel exists everywhere throughout the township in the poplar forests which cover its surface. No stone quarries are known to exist upon this township. No minerals of economic value are known to occur upon this township. The land being now pretty well settled, game is not as abundant as formerly, but it is still not an uncommon occurrence for moose and jumping deer to be seen, whilst prairie chicken are quite numerous. As before intimated, the timber of this township consists chiefly of poplar and willow scrub, although large poplars occur upon sections 1, 10, 11, 15, 22, 23, 24 and 36. The larger timber varies from 6 inches to a foot and a half in diameter.—*J. W. Tyrrell, D.L.S., 1904.*

Township 26.—The soil is generally a clay loam with clay subsoil, and when cleared it will be suitable for mixed farming. The surface is heavily timbered with poplar and spruce. The surface is rolling. In the lakes the water is very alkaline. No stone were seen suitable for quarrying, and no minerals were found.—*C. F. Aylsworth, D.L.S., 1903.*

Township 26.—The road from township 27, range 27, runs from Clarke's ranch southwesterly as far as Shell river; thence along the river valley until it joins the main road running to Grandview. The road is in good condition all the way to township 26, range 26. The soil is a clay loam four to twelve inches deep with a clay subsoil.

The surface is very rolling and uneven and covered with a light growth of poplar and willow scrub. A few patches of open country are found along the north side of Short creek and some spruce extends along the northern part of sections 13, 14 and 15. Hay meadows extend along each side of Short creek, from which about two hundred tons of very good hay might be cut. Valley river, which flows southerly through sections 12 and 13 is about fifty feet wide, from two to three feet deep and flows about four miles an hour. The water in it is very fresh and good. Short creek, which flows easterly through sections 7, 8, 9 and 10, is about six feet wide and two feet deep. The valley through which it flows is low and flat and covered in many places by muskeg and hay sloughs. The land, except in Short creek valley, is not liable to be flooded. No water power is available in the township. The climate is dry and liable to summer frosts. Spruce and poplar for fuel can be had in any part of the township, but no coal nor lignite exists. No stone for quarries nor minerals of economic value exist in the township. Partridge, prairie chicken and rabbits are plentiful, and a few deer are found in the northern part of the township.—*Charles Harvey, D.L.S., 1904.*

Township 38.—A wagon road from Bowsman station on the Prince Albert branch of the Canadian Northern Railway, passes along the west boundaries of sections 30 and 31. The road is not in good condition. The soil is principally sand with an alluvial deposit of black or sandy loam of varying thickness, and is a good light agricultural land. The surface of that port of the township which I had surveyed is timbered mostly with small poplar. There is a little fair-sized poplar near the railroad, but it is not of any extent. Hay can be cut around most of the sloughs and grass swamps, but there are no large hay areas. Woody river runs through this township, and several small streams empty into it, in all of which the water is fresh and good. No bad or alkaline water was found. There is no water power. Until the land is cleared and drained summer frosts will be very prevalent. The fall of 1904 was very open and free of storms. Wood is the only fuel available. No minerals or exposed rock exists. Moose and bear, beaver, otter, marten, lynx, prairie chickens and partridges are found in the township.—*H. B. Proudfoot, D.L.S., 1904.*

Township 39.—Birch River siding on the Canadian Northern Railway, Prince Albert branch, is situated on section 35 of the township, and by rail to that point is the best means of reaching the northerly part of the township. There is also a road from Bowsman station, on the same railway, to section 36, township 38, range 27, west, and from which place old railway tote roads lead to various parts of the southerly portion of the township. As a rule, the soil is poor and very light, sand in most parts, with a slight alluvial deposit. With the exception of a small area of prairie in section 24, this township is all timbered. Most of the timber east of the railway and in some parts of the westerly portion is small poplar with a few swamps of tamarac and spruce; while in the northwesterly portion some large poplar and cottonwood occur, and a few ridges covered with jackpine and several large areas of windfalls. There are no large hay marshes, but a few small swamps afford a limited supply of fair hay. Good fresh water is found in the numerous brooks, but still water is scarce except in the spruce and tamarac swamps. Sloughs are not numerous. There is no water power. Fine weather was experienced during the whole of the time of survey. Frosts are frequent in summer. For fuel there is wood only, but in large quantities. There are no minerals and no rock exposures. There are bears, moose, elk, prairie chickens and partridge, while indications of beaver were seen on Jackfish brook. The Prince Albert branch of the Canadian Northern railway crosses the township from south to north.—*H. B. Proudfoot, D.L.S., 1904.*

Township 40.—The Prince Albert branch of the Canadian Northern railroad passes through the easterly part of this township from south to north. Birch River siding is about half a mile south of the south boundary and Novra station is about two and a half miles north of the north boundary. There are some old logging roads leading westerly from an abandoned mill site in section 14, but they are impassable in summer. The soil is sandy—in some places clay— with a fair deposit of black loam on the surface and where not too much broken by hills and ravines it is adapted for raising all kinds of grain, although it could not be called a good soil. The whole of the township is timbered. East of the railroad and for about a mile to a mile and a half west of it the surface is undulating and rolling and timbered principally with poplar, balm of Gilead, birch, spruce and tamarac. The Porcupine mountains cut well into the north and west parts of the township causing the surface to be very broken and hilly. This part is timbered principally with spruce, jackpine, poplar and birch. The best of the spruce has been cut out, what is left being stunted and knotty. I understand that part of this township was included in a timber berth at one time. There are no large hay meadows and very few sloughs or grass swamps where hay can be cut. Numerous spring brooks take their rise in the foothills of the Porcupine mountains and flow easterly through the township. The water was fresh. No alkaline water was met with. The streams are not large enough to furnish water power. Frosts were experienced in this locality during the summer, but there is no doubt that with the clearing of the land and drainage they will disappear. There is wood in abundance for fuel. There are no stone quarries. There are no minerals. The following game was seen: moose, jumping deer and a few elk, bear and small fur-bearing animals, partridge and prairie chicken. Some few years ago a tornado visited this locality and laid down a belt of timber from one-half to one mile and a half in width across this township from east to west and extending into ranges 25 and 27. That part will be impassable until visited by fire.—*H. B. Proudfoot, D.L.S., 1904.*

Range 27.

Township 26.—There is a siding on the Canadian Northern Railway on section 32, township 25, range 27 ; from there trails lead northerly and northeasterly into this township, passing up through Shell river valley to the north boundary, and along, parallel to the railway, to the eastern boundary. The soil is sandy loam in the southwest corner; clay loam for the rest; some stony hills in the northeast. The soil is suitable for mixed farming. Surface is heavily rolling prairie in the southerly half, and scrubby in the north, with old stubs and windfall. There are fringes of spruce, tamarac and poplar around some of the ponds and lakes which are large enough for building logs and fence posts. Most of the sloughs are too wet for hay; a period of dry seasons would give much more than exists this season. Several lakes have good water; Shell river flows through the westerly half of the township, and Takwa creek through the easterly. Shell river, averaging 125 links in width and 2 feet deep, gives a sufficient and permanent supply all the year round for all purposes. No place was noticed suitable for water powers along this river in this township. The season was moderately dry, with some light frosts on and after August 20. Large quantities of old stubs and windfall for fuel may be procured in the north half of the township; the young growing poplar, in a few years, will supply sufficient for the needs of the township. We saw no rock in place; but plenty of boulders, both limestone and granite, exist in the north corner of the township. Partridge and rabbits are very plentiful. There were only two settlers resident, but many of the homesteads are taken up.—*John Francis, D.L.S., 1904.*

Township 27.—From township 28, range 27, we moved back over our old trail as far as section 16, where we found a road running southeasterly into township 27, range 27. This road goes around the east side of Clarke lake and then runs in a southwesterly direction as far as Shell river, where it joins Shell river road. The soil in this township is light and of poor quality. The surface is very rolling and uneven and covered with a heavy growth of poplar and willow scrub, with windfall and burnt timber in some places. Some spruce and black poplar, 15 to 20 inches in diameter, was found in the southeastern part of the township, but the best timber has been all logged out already. Many lakes and hay sloughs are to be found in all parts of the township. About six hundred tons of hay are available. A rancher by the name of Clarke, who lives on section 26, cuts all the available hay for wintering his cattle. A few small streams flow through the township and Shell river cuts across the southwest corner of it. The water in the lakes is fresh. The land is not liable to be flooded at any time of the year. No water power is available in the township. The climate is dry and subject to summer frosts. Spruce and poplar for fuel can be had in any part of the township, but no coal nor lignite exists. No stone for quarries nor minerals of economic value exist in the township. Moose and black bear, partridge, prairie chicken and rabbits are plentiful.—*Chas. Harvey, D.L.S., 1904.*

Township 28.—To get to township 28, range 27, from township 31 range 29, we had to come back over our old road as far as section 15, township 29, range 29, where we found a good road going in a southeasterly direction as far as Shell river, where there is a good ford. On the east side of the river there are old timber roads running in all directions, and we had no difficulty in finding a road leading into the centre of township 28, range 27. The soil in this township is light and of poor quality. The surface is very rolling and uneven and covered with a heavy growth of poplar and willow scrub, with windfall and burnt timber in some places. Some spruce and black poplar 15 to 24 inches diameter were found in the northeastern part of township, but the most of the good timber has already been removed. There is no hay of any account in this township. A few streams of very good water flow through the township and many lakes are to be found in all parts of it. The water in the lakes is fresh, and in Angling lake pike and mullet are plentiful. The land is not liable to be flooded. No water power is available in the township. The climate is dry and subject to summer frosts. Spruce and poplar for fuel can be had in any part of the township, but no coal or lignite exists. No stone for quarries nor minerals of economic value exist in the township. Moose and black bear, partridge and rabbits are the only game found. In sections 24, 25, 26, 35 and 36 some spruce and black poplar 15 to 24 inches diameter exist. These would supply building logs for settlers or a limited quantity of timber for lumber could be got from them, but the best of the timber has already been removed. A few spruce are to be found also in swamps in different parts of the township, but they are only 6 to 10 inches diameter.—*Charles Harvey, D.L.S., 1904.*

Township 34.—We left Swan river on May 9 and followed a settler's road in a southerly direction keeping to the east side of Roaring river, which we crossed on a good bridge about the north boundary of section 33, township 35, range 27, west of the principal meridian. The road was in good condition for the time of year, and we had no difficulty in reaching our work on the same night. Our first camp was in section 20 by the side of a small stream of very good water. The soil, generally speaking, is very well suited to agriculture, having a depth of from two to ten inches of black clay loam with a heavy clay subsoil. The first twelve sections, however, are somewhat hilly, and in some places rather stony. The whole township, with the exception of a few acres west of Roaring river, is covered with young poplar and willow scrub, with considerable large dead standing and fallen timber, killed by the fire which went through about six years ago. The only live timber of any size is a spruce bluff of about fifty acres extent which extends along the east boundary of section 24. In this bluff the spruce are from eight to thirty inches in diameter. There are not enough of them, however, to make it of any value as a timber limit, although some fine logs for building purposes might be got here. There was no hay land at all nor even grass for the horses. We had to get hay from the nearest settlers to feed the horses. The water is fresh and there are a number of small streams which would supply enough water for the stock and for house use of farmers. Roaring river, which flows through the western side of the township, is a swift-flowing stream about a chain wide and two feet deep. In spring it contains abundance of pike and mullet, and the water is fresh and good. It has no falls or rapids from which power could be developed and the fall of the stream is too gradual and the valley too wide to develop power by construction of dams. There is considerable rainfall and the climate is well adapted for grain growing, although occasionally the older settlers tell me they have frosts in August which damage the crops to some extent. No coal or lignite veins exist, but there is abundance of dry dead standing timber for fuel at present, and in a few years the young poplar will be large enough for use as fuel. There is no rock of any kind that would do for stone quarries. In some places there are a great many granite boulders and also some limestone boulders which the settlers burn to get lime for building purposes. No minerals of any kind exist in the township. Game is very plentiful. Moose and jumping deer were seen almost every day by some of the men. Black and brown bear are also found occasionally. Partridge and rabbits are also very plentiful, also an occasional prairie chicken.—*Charles Harvey, D.L.S., 1904.*

Range 28.

Township 22.—The regular centre meridian road allowance through this township leads into the village and station of Russell, Manitoba. It is more or less improved and graded by the municipal corporation of Shell River. The soil is mostly a black loam, resting on a clay subsoil, admirably adapted for grain raising. The surface is gently rolling, mostly prairie, interspersed with bluffs of poplar and willow scrub, presenting a beautiful park-like country. No timber of any value now remains, but if no fires are allowed to run, in a few years some of the bluffs will supply fuel. No hay sloughs of any extent exist. All the water is fresh and good. Shell river touches the township on the north boundary of section 32. A small creek crosses the township from east to west, but will dry up during the summer. There is no land liable to flooding. No water powers exist. So far this season the regular Manitoba weather prevailed. There is at present very little fuel in the township, wood may be procured north and northwesterly in the adjoining township. No coal or other minerals have yet been found. Some gravel and boulder stones may be had on section 31. Duck and prairie chicken are plentiful. This township is fairly well settled and raises large quantities of grain and stock. Not a single monument existed to show the numbers of sections, save and except the iron bar on the correction line governing the northwest corner of this township.—*John Francis, D.L.S., 1904.*

Township 23.—The main road from Russell to Tumbell and Goose lakes, passes northerly through this township; it is more or less improved by the local authorities, thus giving easy access to any part of the township. The soil is in general first class, except along the crests of the valleys, where it is inclined to be stony. The surface is gently rolling, except where broken by valleys of Bear creek, Shell and Assiniboine rivers; these latter making the land hilly. Some poplar trees fit for building logs may be got along the western side of Shell river valley, especially adjoining the central meridian of the township. No hay sloughs of any size are to be found. All water is fresh and good. Shell river traverses the township from north to south, dividing it nearly equally. Bear creek coming from the east along or near the north boundaries of sections 1 and 2, joins the former near the south boundary of section 10. There is considerable wood fit for fuel growing along the sides of the valleys and lateral ravines, that are to be found in the township. These places are not fit for much else being very sloping. The current of Shell river is very rapid in places, affording plenty of head for water powers no particular place was noted superior to the several which abound. No coal or other minerals have yet been found. Plenty of granite and limestone boulders may be got along the valley of the river. A few deer and bear were seen, but no other game. A good many settlers are living in this township. East of

Shell river nearly all the monuments have been destroyed by the fires which have taken place since it was first surveyed.—*John Francis, D.L.S., 1904.*

Township 24.—A good trail, improved along the road allowance in places, leading from Russell on the Canadian Northern Railway to Roblin, on the Canadian Northern Railway, gives easy access to this township. The soil is mostly a black or clay loam on a clay subsoil, suitable for the raising of grain or mixed farming. The surface is rolling, except along the valleys of Assiniboine and Shell rivers, where it is more or less heavily sloping. This township is largely prairie and scrub equally intermixed. There is no timber in this township. There is very little hay, but all the sloughs and ponds are liable to dry up. Shell river gives a permanent supply of fresh water at all times. This river, averaging one chain in width and two feet in depth, with a current three miles per hour, gives a volume and strength of current sufficient for the running of sawlogs, in the early summer season, for which it has been utilized more or less for some years. The land along this river is subject to flooding only at extremely high water, and then only for a short time. There were no water powers observed. The usual Manitoba summer prevails, inclined to be slightly drier and cooler than ordinary. There are no summer frosts. Plenty of young growing poplar scrub in bluffs more or less on every section will, in the future, give plenty of fuel if not too much fire-killed. There is no coal. No stone quarries exist, but there are plenty of boulders along the valleys of Shell and Assiniboine rivers. There were no minerals observed. There was not much game seen while surveying this township. This township is largely taken up and the western half is well settled.—*John Francis, D.L.S., 1904.*

Township 25.—Trails from Roblin station, section 8, township 26, range 28, on the Canadian Northern Railway lead south and southeasterly into this township, giving easy ingress to any part of it. The soil is mostly a clay loam, suitable either for grain growing or mixed farming. The surface is rolling, except along the valley of Shell river, where it is broken into steep slopes. Scrub alternates with open places or prairie all over the township. There is no timber of any kind. There are a few sloughs. Hay is not very plentiful. Some half dozen lakes in the north half with Shell river are all fresh and good water, and give a plentiful supply at all times. Shell river, about one chain wide and the depth varying as to the season, has a current of from three to four miles per hour. The flats along its banks are not subject to flooding, except occasionally in the spring after a heavy winter's snowfall. No place naturally fitted for water power was noticed, but by dams the fall and volume of water in Shell river might be utilized for small power purposes. The season is drier and cooler than ordinary. Plenty of young growing scrub, if not fire killed, will give considerable fuel in a few years. There is no coal. There are no stone quarries, but there are plenty of boulders along Shell river valley. No minerals were observed. Duck, chicken, partridge and rabbits are plentiful. Homesteads are all taken up and mostly settled on the west side of the river. The Canadian Northern Railway passes through sections 25, 26, 27, 33, 34 and 36.—*John Francis, D.L.S., 1904.*

Township 26.—Roblin station on the Canadian Northern Railway is in section 8 of this township, from there trails radiate in all directions. The soil is mostly class 1 and 2, a clay or black loam on a clay subsoil, and will be suitable for raising grain, of which some has been grown by the present settlers. The surface is rolling. The west half of the township is mostly open prairie, the east half has considerable scrub. There is no timber of any size, but plenty of young growing poplar on the eastern two tiers of sections. Hay sloughs are numerous, and many of the wet ones could easily be drained. All water is fresh, mostly in ponds, sloughs and lakes. There are no streams and no water powers. There were some light frosts on and after August 20. Considerable young poplar, fit for firewood, may be procured on the east half of the township. There are no stone quarries, but plenty of boulders for the requirements of settlers exist. No minerals were seen. Partridge, duck, prairie chicken and rabbits are plentiful. All the homesteads are taken up in this township.—*John Francis, D.L.S., 1904.*

Township 27.—This township can be reached by a good trail from Roblin, a small village located on the Canadian Northern Railway, township 26, range 28. The western half of this township is of a second class for farming purposes. The land is gently rolling with a subsoil of black loam quite suitable for grain growing, and at present produces a dense growth of wild peas in the openings. During the year 1903 and 1904 all the good available land for homesteading has been squatted upon in this township. The western half of the township is badly broken by Shell river, the valley of which averages about a mile in width and two hundred and twenty-five feet deep. The river enters the township in section 36, passes through section 35, 26, 27, 22, 15, 10, 11, 14 and 13. Throughout the river valley in this township there is considerable prairie, but it is mostly of a third class, being somewhat gravelly and stony. There are no hay meadows found in the valley. That portion of the township lying to the east of the river valley is quite rolling and inclined to be rough. The soil is of a much poorer class than the eastern half. Forty per cent of the township is covered with poplar, and willow scrub, while twenty per cent is covered by young poplars up to four and five inches in diameter and is distributed somewhat evenly through the township. Small sloughs are somewhat numerous, but there is only a moderate amount of hay to be secured. The water found is fresh and somewhat permanent. Shell river contains good water and has an average cross section of one hundred and forty square feet at a rate of one and one-half miles per hour. There are no water powers along this river. From general indications the summer season is short but growth is rapid, being aided by the dense heavy dews, which are quite prevalent during July and August. Summer frosts may occur but do no damage. Fuels, other than poplar wood, are not available within the township. There are no stone quarries, neither are there found minerals of economic value. There is no game other than a few duck and prairie chicken.—*R. H. Knight, D.L.S., 1904.*

Township 28.—This township can be reached by a good trail from Roblin, a small village located on the Canadian Northern Railway in township 26, range 28. The western half of this township is of a second class for farming purposes. The land is gently rolling, with a soil of black loam of good depth and quite suited for grain growing. At present the openings are producing a dense growth of hay and wild peas. The eastern half of the township is badly broken by Shell river, the valley of which averages about a mile in width and two hundred and twenty-five feet in depth, The river enters the township in section 34, passes through sections 35, 26, 25, 24, 13, 12 and 1. Throughout the river valley in this township there is considerable prairie, but it is of a third class, being somewhat gravelly and stony. The lands lying between Shell river and the centre meridian of the township are quite rolling and inclined to be rough. The soil is of a poorer quality than that of the western half of the township. A few quarters are second class, but fully seventy per cent is third class. This township is about eighty per cent covered by poplar and willow scrub or poplars up to five inches in diameter. There are but few openings wider than twenty chains. A large quantity of hay is produced in this township, the best of which is from sections 7, 8, 9, 10, 15, 16, 17, 18, 19 and 20. Sections 2, 3, 4 and 5 are covered with poplars up to five inches in diameter, and also seventy-five per cent of sections 9, 10, 11, 14, 15, 22, 23, 30, 27 and 28 are likewise covered. There are numerous sloughs., most of which grow hay. The depth of water contained ranges from one to two feet; a few are four feet and deeper. Very few are dry. The water is fresh and apparently is permanent. Shell river water is first class. This stream has an average cross section of about one hundred and forty square feet, at a rate of one and one-half miles per hour. It contains no water powers of commercial value. From general indications the summer seasons are short, but growth is rapid, being aided by the dense heavy dews, which are quite prevalent during the months of July and August. These dews often keep the heavy growth of hay and peas damp until midday. Summer frosts may occur but do no damage. Fuels, other than poplar wood are not available. There are no stone quarries, neither are there found minerals of economic value. Game is apparently scarce. A few duck and prairie chicken appeared in this township, these being the first seen during the season.—*R. H. Knight, D.L.S., 1904.*

Township 29.—This township can be reached by a good trail from Roblin, a small village located on the Canadian Northern Railway in township 26, range 28. This township is badly cut up by Shell river, the valley of which averages about a mile in width and 225 feet in depth. The river enters the township in section 36, passes through sections 35, 26, 27, 22, 21, 28, 29, 20, 19, 18, 17, 8, 9, 5, 4 and 3. From the main valley of Shell river numerous small ravines run inland for a distance of a mile, and from the influence of the presence of this river valley with its ravines fully 70 per cent of the township is rendered too rough for economical grain growing. There are numerous prairie openings within the river valley which make excellent grazing ground, but none are producers of hay. That part of the township lying to the south, west and north of Shell river is the most open part, but it is quite hilly and covered with considerable poplar and willow scrub, together with scattered poplars up to 6 inches in diameter. The soil is inclined to be of a poor quality. That part of the township lying to the east of the river is generally level or gently rolling, but is covered with a thick growth of poplars from 3 to 7 inches in diameter. There are numerous sloughs, swamps and small lakes and as a whole that portion of the township is quite wet. Spruce and tamarac up to 10 or 12 inches in diameter grow on most of the swamps. Sections 14, 15 and 16 contain considerable spruce, but this is not valuable because the best timber has been taken off and nothing but culls remain. The water in lake No. 2 is somewhat alkaline. At present, it has no outlet and the existing high water mark is fully 3 feet lower than the bed of the old outlet some 10 or 12 years old. The inlet is irregular, being but the overflow at high water from lake No. 5. All lakes excepting No. 2 contain good fresh water, as does Shell river. At low water, Shell river has an average cross section of about 140 sq. feet at a rate of 1½ miles per hour. There are no water powers along this river. From general indications, the summer season must be short, but growth rapid. Light summer frosts occurred. Fuels, other than the various kinds of woods above mentioned, are not apparent. There are no stone quarries, neither are there found minerals of economic value. Game is apparently scarce. Shell river contains fish that are common to all Manitoba rivers. Lake No. 2 until about 4 years ago, contained fish in abundance, but at present none are to be found.—*R. H. Knight, D.L.S., 1904.*

Township 30.—The most accessible route to this township from any railroad is from Roblin, a small village, on the Canadian Northern Railway, in township 26, range 28. From Roblin a good trail runs to within a few miles of the township. This township is suitable only for mixed farming, and is of a third class for such a purpose, the tillable soil averaging a poor quality. The western half of the township is somewhat open, but is quite hilly and inclined to be gravelly, while the eastern part is covered by poplar, spruce and jackpine bush, and is badly broken by numerous swamps and muskegs, together with Shell river and its many adjacent ravines. The best timber is found in sections 24, 25, 36 and 31, and is principally spruce of a good size and quality. In sections 9, 10, 15, 21 and 22 there is much swamp land which is timbered with spruce up to 12 or 14 inches diameter with some tamarac. All the timber of this township is included in the Hanbury timber limits, and the best timber is being cut. Shell river valley does not produce hay as would be expected, and but little grows elsewhere in the township. Fresh water is found in an abundance in many small lakes and creeks. Shell river has an average cross-section of about 140 square feet flowing at rate of 1½ miles per hour at low water. This river is very crooked and has numerous rapids. At a great expense a small water power could be developed, but the apparent natural resources of the surrounding country do not warrant the development of such power. There were two light frosts during the month of July. The nights are always cold. and from general indications early fall frost might be expected. The only fuel available is poplar, spruce and tamarac wood, of which there is abundance. Stone quarries and minerals of economic value are not apparent. Deer and black bears are quite abundant. The bear at times becoming an annoyance about camp. Fish similar to those found in the rivers of Manitoba are plentiful in Shell river, also in lakes Nos. 1 and 4.—*R. H. Knight, D.L.S., 1904.*

Township 31.—The most accessible route to this township is from Roblin, a small village in township 26, range 28, and located on the main line of the Canadian Northern railway. From Roblin a good trail runs to within six or eight miles of the township. Along the western side of township 30, range 28, there are openings enough to get through without cutting a road. Township 31 is useful only to the lumberman. Where large timber does not exist, a dense growth of small poplar accompanied with windfall and hazel is always to be found. The township, being so extremely rough, is quite useless for any class of farming, even if it were cleared. Sections 7, 8, 16, 17, 18, 20, 21, 22, 27, 28 and 29 are rough beyond description. Spruce timber of a second and third grade and ranging from one to three feet in diameter is found on sections 5, 6, 7 and 8: from 1 to 2 feet in diameter on sections 15, 16, 17, 20, 21, 22 and 28. The remainder of the sections throughout the township contain considerable spruce to 18 inches diameter, but is somewhat scattered and chiefly found in swamps and muskegs. The timber of this township is included in the Hanbury timber limit and is being cut. Small creeks or lakes containing good water are frequent, but hay is not to be found, not even in the valley of Shell river as might be expected. From general indications, the summer season is short. Frost remained in the ground until the middle of June, and summer frosts are frequent. Fuels, other than wood, are not apparent. There are no stone quarries, neither are there minerals of economic value to be found. Moose are very plentiful and are the only game that survive.—*R. H. Knight, D.L.S., 1904.*

Township 32.—From Pretoria post office, situated on section 31, township 33, range 28, there is a good wagon trail to the town of Swan River. A branch of the Canadian Northern Railway from Swan River via Pretoria is now under construction. From Pretoria southward through township 33 there is but a poorly constructed surveyor's trail through the bush. There is no prairie to be found in township 32, range 28,, and very little scrub. Sections 25, 26, 35, 36, 28, 29, 32 and 33 contain the lightest bush and is the easiest portion to be cleared. The north half of the township is rough, rising towards the south about 300 feet (to almost the summit of Duck mountains). The northern slope is covered by poplar up to four inches diameter with great quantities of dead spruce trees or windfall, which is in many places almost impassable. Upon the southwest portion of the township is a great deal of spruce up to 6 inches diameter mostly scattered through the growth of young poplar. On sections 19, 20, 16, 17 and 18 there is a large quantity of spruce up to 24 inches diameter, though somewhat scattered and broken by small swamps and muskegs. This timber is contained in a timber limit held by Mr. Hanbury, a lumberman. Sections 14, 15, 22, 23 and 24, are composed of considerable swamp and muskeg lands, covered with small spruce and tamarac up to 12 or 14 inches in diameter. The land, generally, is rolling and inclined to be rough or broken by spruce swamps. There is abundance of good water, obtainable from numerous small streams throughout the township. There are few sloughs or hay marshes. The soil is good, and if once cleared would be easily worked and quite suitable for mixed farming. Frosts at the date of survey (May) were quite frequent. Small sloughs were covered by ice on May 22. The only fuel obtainable is the wood upon the land. There are no water powers, stone quarries or economic minerals. The only game found is moose and black bear. These are in abundance and quite tame.—*R. H. Knight, D.L.S., 1904.*

Township 33.—After finishing township 34, range 27, we followed a settlers' road back to section 32, where we found a very good ford across Roaring river. Thence we went south through fairly open country as far as the west boundary of section 6. It was necessary to go this far south before turning west in order to get around a long stretch of marshy land over which we could not go with the wagons. In section 6 we found an old trail going west which we followed for a mile and a half, when we came across a lumber trail going up to Sara lake. This trail we followed into section 34, township 33, range 28, where we camped. The road, with the exception of a few soft places, was fairly good. The soil is not rich, there being only about two inches of clay loam, with a heavy clay subsoil, but with proper treatment it would be suitable for agricultural purposes. It is covered with a growth of young poplar with a willow scrub and burnt timber except in sections 23 and 14. These sections have some spruce of fair size (eight to sixteen inches), and, together with the timber that is in the other parts of the township around Sara lake, would be worth reserving for a small timber limit. There is a sawmill at Sara lake which supplies the country to the north of there with lumber. There are a few hay sloughs, but generally speaking hay is very scarce. With the exception of two or three small streams, good water is scarce, although it could probably be had by digging. The land is high and not liable to be flooded. There are no streams large enough for the development of water power. The climate is moist and suited to grain growing, although occasionally summer frosts occur. Dead timber for fuel can be had in any part of the township, but no coal, rock for stone quarries, nor rock of any kind, exist. Deer, moose and bear are plentiful, and rabbits and partridge are in abundance.—*Charles Harvey, D.L.S., 1904.*

Range 29A.

Township 27.—The soil in this township is of excellent quality, except in the extreme south end where sections 11, 12. 13 and 14 are broken by Boggy creek ravine. The greater portion of the land in this township was scrubby prairie. There was no timber worthy of mention. I do not believe there would be much more than would suffice for temporary fencing and one winter's supply of wood. There is scarcely any available hay. Only a small percentage of the water is alkaline and a permanent supply of good water may be had in abundance by going down from twenty to forty feet. There are no stone quarries nor economic minerals.—*C. F. Aylsworth, D.L.S., 1903.*

Township 28.—The soil in this township is excellent, except in the north end where the surface is somewhat damaged by some large muskegs and sloughs. There is no timber worthy of mention. There are no stone quarries. There are no economic minerals. There is very little available hay.—*C. F. Aylsworth, D.L.S. 1903.*

Township 29.—This township is easily reached by a good trail from Roblin, a small village on the main line of the Canadian Northern railway and in township 26, range 28. This township is but one mile and a quarter wide. It is mostly covered with young poplars up to 5 inches in diameter or poplar and willow scrub. Sections 13 and 24 are the best sections for farming purposes. The land is gently rolling and soil mostly black loam with a clay subsoil. These sections have a few prairie openings. On sections 1 and 12 there is considerable wet land, large sloughs or muskegs, together with a thick growth of young poplars. There are also a few swamps with young tamarac and spruce. Sections 25 and 36 are inclined to be rough and are covered with young poplars up to 4 inches diameter. The soil is poor, being generally a light sand loam or gravel. The summer season is short but growth is rapid, being aided by the dense heavy dews of July and August. Light summer frosts occur. There are no fuels available other than the woods mentioned above. No stone quarries nor minerals of economic value are found. Game is scarce, there being but few duck and prairie chicken.—*R. H. Knight, D.L.S., 1904.*

Township 30.—This township is easily reached by a good trail from Roblin, a small village in township 26, range 28. This township is but one and a quarter miles wide. It is quite rough throughout and covered by poplar bush or scrub. The soil is light and is not a grain producer. There are numerous small sloughs and marshes but no hay meadows. The only available fuel is poplar and spruce. Sections 35 and 36 contain considerable spruce bush, which is included in the Hanbury timber limit. Stone quarries or minerals of economic value are not found. The summer season is short and light summer frosts occur. The only game of importance in this township is the jumping deer and the black bear.—*R. H. Knight, D.L.S., 1904.*

Range 29.

(Part) Township 25.—This township is easily reached by a good trail from Roblin, a village on the main line of the Canadian Northern Railway, in township 26, range 28, or by a good trail from Russell, a town on the Canadian Pacific Railway about thirty miles southward. Assiniboine river, running through sections 32, 29, 20, 17, 8, 5, 4, 3 and 2, makes these sections useless for grain growing. On the other hand some portions of the river valley are excellent hay producers. The best portions being that part of section 3 lying to the south of the river and in the valley; those portions of sections 4 and 5 lying to the north of the river; that portion of the north half of section 17 lying in the river valley; the east half of section 20, together with that portion of the southeast quarter of section 29, which lies to the east of the river. The west half of sections 31 and 7, together with sections 30 and 6, are about the only portions of apparently good lands contained in my work. namely, the western two tier of sections and sections 2, 3, 4 and 9. Poplar bush ranging from five to ten inches in diameter is found as follows: Upon the side-hill contained in the east half of section 2, on the side-hill of those portions of sections 4 and 5 lying to the south of the Assiniboine river; and on the side-hill to the west of the river throughout the township, excepting that portion of side-hill on the southwest quarter section 20 and the northwest quarter section 29. The ravines on sections 18 and 19 are also covered with large poplar trees. The climate is considered equally as good as most settled portions of Manitoba. If summer frosts occur they are light and do no damage. The only available fuel is poplar wood, of which there is a lasting supply if protected from prairie fires. Minerals and stone quarries of economic value are not found. The only game in the township is prairie chicken and deer, both of which are scarce.—*R. H. Knight, D.L.S., 1904.*

Township 26.—This township is easily reached from the village of Roblin by a good graded road, which enters the township along the north boundary of section 1. Roblin is but six or eight miles from the centre of this township, and is located on the main line of the Canadian Northern railway. This township is badly broken by Assiniboine river and by Big Boggy creek, whose valleys are from one to one and a half miles in width, and from two hundred and fifty to three hundred feet deep. Fully one-third of the township is rendered useless for farming by these valleys. About one-sixth of the sections of the township is occupied by recent settlers and a few sections are patented and unoccupied. The best quantity and quality of land is that portion lying south of the creek and east of Assiniboine river. The soil ranges from a black loam to a rich clay loam. The lands lying to the north of Boggy creek are of a second quality but are covered by considerable scrub and large poplar. Throughout the township the land is generally level or gently rolling. The southeast quarter of the township is mostly covered by poplar and willow scrub, with poplars up to three inches in diameter. Sections 8 and 17 are somewhat gravelly and mostly prairie. Sections 21, 28, 29 and 5, are covered with large poplars from six to ten inches in diameter. The only hay found is in Assiniboine river valley, the most of which is on sections 6, 18 and 19. The Assiniboine, during the spring floods, rises some ten or twelve feet, and thereby floods the whole valley at many points. Water is apparently scarce, other than the streams abovementioned. There are not more than a dozen sloughs throughout the township. Bodies of water which were considered small lakes a few years ago are no longer such but have dried up considerably and are now turned sloughs. The settlers obtain good water from wells at a depth of about twenty-five feet in many places. The climate is considered equally as good as any part of Manitoba. If summer frosts occur they are very light and do no damage. There are no water powers. The only fuel available is poplar wood. Economic minerals and stone quarries are not apparent neither is there any game other than prairie chicken, of which there are few.—*R. H. Knight, D.L.S., 1904.*

Township 29.—From section 27, township 29, range 30, we followed the Shell river road up the valley of Little Boggy creek as far as the north boundary of section 26. Here we bridged the creek and cut a road easterly as far as the southwest corner of section 32, township 29, range 29, where we made our first camp. We had considerable difficulty in getting up the south bank of the valley of the Little Boggy with the outfit, as the valley is very deep here and the banks very steep. Otherwise the road is in fair condition. From this camp we cut a road southeasterly across sections 29 and 28, southerly through section 21 and easterly through section 15, making our second camp in the northeast quarter of section 15. The soil for the most part is a clay loam 4 to 12 inches in depth with a clay subsoil. It is very rich in quality and is suitable for agricultural purposes. The surface in the northern part of the township is very uneven and much broken with sloughs and muskegs. It is covered with poplar and willow scrub and windfall. In the southern half of the township the surface is gently rolling and is about half prairie, the remaining part being covered with scattered poplar trees 6 to 12 inches diameter with poplar and willow scrub. There are a few small spruce bluffs in the western tier of sections with spruce 10 to 15 inches diameter, but these are not extensive enough to be valuable as a timber reserve, although a number of fine building logs could be secured here. Many large hay sloughs exist in the two southern rows of sections. The hay is of good quality and would yield about 100 tons per section. There are many lakes in the township and the water in them is fresh, but the streams are small and mostly dry up during the summer season. There is no water power available in the township. The land is not liable to be flooded except in the hay sloughs. These are flooded to a depth of about 2 feet in the spring but dry up during the summer. The climate is very changeable and summer frosts are very frequent. Wood for fuel may be had from any part of the township but no coal nor lignite exists. No rock for stone quarries exists nor any minerals of economic value. A few elk, moose and deer are to be found and many partridge, prairie chicken and rabbits.—*Chas. Harvey, D.L.S., 1904.*

Township 30.—To get to township 30 we followed our old road back as far as section 32, township 29, range 29, and from there we cut a road northerly into section 9, township 30, range 29, where we camped in the valley of Little Boggy creek. From this camp we surveyed the south half of the township and then made a road north into section 28, from which place we finished the township. The road, with the exception of a few short steep hills, is very good. The surface of the township is very uneven and covered with poplar scrub and windfall. The soil in the hollows is a clay loam 6 to 12 inches deep with a clay subsoil. On the ridges the surface loam has been worn off by the action of the weather and a heavy bluish clay is left. Sections 13, 24, 25 and 36 and parts of sections 26 and 35 have a heavy growth of spruce 10 to 20 inches diameter which would make a timber limit large enough to keep a portable sawmill going for several years. There is no hay in the township. The only stream of any size is Little Boggy creek, one branch of which has its origin in a series of muskegs in section 10, 11 and 12, the other branch rises in a lake in section 20. The two branches join near the west boundary of section 10 whence it flows west into section 8, thence southwest crossing the boundary in section 6. It is 6 or 8 feet wide and about 2 feet deep and flows about 4 miles an hour. There are a few other small streams but these dry up during the summer. The water in the lakes and streams is fresh, but the margins of the lakes are so boggy that cattle or horses could not reach the water. Good water may be had in any part of the township by digging wells. The land is not liable to be flooded at any time of the year. There is no water power available in the township. The climate is dry and summer frosts are very common. Tamarac and spruce large enough for fuel are to be found in muskegs in all parts of the township, but no coal nor lignite exists. We saw no stone for quarrying nor any minerals of economic value to be found in the township. A few deer, elk and moose are to be found and partridge and rabbits are abundant.—*Charles Harvey, D.L.S., 1904.*

Township 31.—From section 28, township 30, range 29, we made a good road north into section 27, township 31, range 29, where we camped near the southwest corner of the section. The soil in this township is a heavy gray clay with a few inches of surface loam in some places. The surface, which is rolling and uneven, is covered with poplar and willow scrub, except along the eastern tier of sections, which have a heavy growth of spruce 10 to 20 inches diameter. There are a few small hay sloughs, but not large enough to supply more than a few tons of hay. A few small streams flow through the township, but these dry up late in the season, and water is scarce, although it may be had by digging wells. No water power is available in the township. The climate is dry and subject to summer frosts during the whole season. Small spruce for fuel may be had from muskegs in many parts of the township, but no coal nor lignite exists. No stone for quarrying nor any minerals of economic value are to be found. The game consists of a few deer and elk with abundance of partridge and rabbits. In sections 13, 24, 25 and 36 and parts of 14 and 23 are some fine spruce 10 to 20 inches diameter. A belt of this spruce extends along the east side of townships 30 and 31, and the southern two miles of township 32 in this range. This belt of spruce would make a very fair timber reserve and would keep a small sawmill employed for a number of years. The rest of the township is covered with poplar scrub, with a few muskegs, in which are to be found spruce 4 to 6 inches diameter.—*Charles Harvey, D.L.S., 1904.*

(Part) Township 32.—There is a settlers' road running into the township through section 35. A branch of this road runs down into section 16 to a settler's house. From this house a hay trail runs into section 10. We followed this trail into the northwest quarter of section 10, where we camped. The road this far is in good condition, but is here cut off by a large slough. The soil in this township is a light sandy loam two to six inches deep. The surface is rolling, the ridges being somewhat stony and the hollows containing either sloughs or muskegs. Sections 2, 3, 10 and 15 are covered with small poplar and willow scrub with a few small spruce in some places. Sections 1, 11, 12, 13 and 14 are about half scrub and small poplar, the remaining half being covered with spruce and poplar from ten to sixteen inches in diameter. On sections 3 and 10, some hay sloughs are to be found from which fifty or sixty tons of very good hay might be had, but there is no hay of any account in the other sections. A few small streams of very good water were running in the early part of the summer, but these all dry up later on in the season, with the exception of one stream about five feet wide and two feet deep, which enters the township on the south boundary of section 3 and flows westerly into section 6, and thence northerly into Bearshead lake. This stream flows about two miles an hour; the water is good and the supply unfailing. Good water can be got in any part of the township by digging wells. There is no water power available in the township. The climate is dry and subject to rapid changes, and summer frosts are very common. Wood for fuel can be procured in any of the sections surveyed by me in this township, but no coal or lignite exists. No rock for stone quarries nor any mineral of economic value was found. A few black bear are to be found and many partridge, rabbits and duck. Prairie chicken are also to be seen occasionally.—*Charles Harvey, D.L.S., 1904.*

Township 37.—When I received your telegram of November 23 last, ordering me to discontinue the subdivision of this township, I had then finished the survey of the western and northern limits and also the eastern limits of sections 2 and 11 of same township. The distance from this township to the town of Swan River is in the neighbourhood of twelve miles. The road leading thereto is fairly practicable. The soil of the township is generally composed of sandy clay of good quality and fairly adapted to the cultivation of all kinds of cereals. Said township is lightly undulating and appears to be thickly covered with poplar and spruce bush from ten to twenty inches in diameter. Much the greater proportion is poplar. There is very little hay, and where found was in the eastern part of the township. Woody river, having a width of about sixty feet and a depth of about two feet with a current of about two miles an hour, flows along the western limit of the township for two miles. Extending beyond its southern limit by about half a mile, it then follows this limit at a short distance from it, up to its eastern limit which it intersects very near the southeastern corner of said township. Another stream about twenty feet in width, having a depth of about six inches, with slow current, flows from north to south and traverses the township in its western portion and empties itself into Woody river. Many small streams were met but at the time the survey was made they were nearly all dry. Water is everywhere of good quality. The lands watered by these small streams do not appear to be submerged by the floods. There are neither falls nor rapids which would permit of their being used as water powers. The autumn has been remarkably fine. The first cold weather came with the first snow storm, on the last days of November. I have neither met with any stone quarries nor minerals of any kind. Game is scarce. We met moose and bear.—*J. F. Richard, D.L.S., 1904.*

Township 38.—I have made the survey of the four miles south of the western limit of that township and the survey of one mile of its eastern limit; that is to say the survey of the eastern limit of section 24. To reach this township from the town of Swan River, a distance of about twenty-four miles has to be covered. The first half of this route is fairly good; but the road bordering on the south and west limits of township 37, range 29, is hardly practicable for a rig half loaded. The soil, composed of a sandy clay, is of a good quality and appears to me to be favourable for the cultivation of all kinds of cereals. This township is heavy undulating, nearly mountainous especially in its eastern portion. It is heavily covered with a forest of spruce and poplar from ten to twenty inches in diameter. A few small streams of good water, having a width of from five to ten feet, and a depth of six to ten inches, flow here and there. There are no water powers, cascades nor rapids in the portions I have surveyed. The autumn has been very fine. The cold weather and snow started in about the end of November. I have neither met any stone quarries nor minerals of any kind. Game is scarce. We met moose and bear.—*J. F. Richard, D.L.S., 1904.*

Range 30.

Township 29.—From section 3, township 30, range 30, we cut a road southeasterly and camped in the valley of Little Boggy creek in section 27 of township 29, range 30. We had some difficulty finding a way down into the valley, as the banks are very high and steep for several miles each way from here. Even on the easiest grade we could find it was necessary to tie a long rope to the back of each wagon by means of which the men assisted the horses to hold the wagons back on the way down the hill. As the south bank of the valley was inaccessible to the teams, we had to survey the whole township from our camp in section 27. The soil in the part of this township which we surveyed is of poor quality, being, for the most part, a very shallow coating of clay loam with a clay subsoil and in many places stony. The surface is very uneven and in many places rough and hilly. The ridges and higher places are covered with poplar and willow, scrub and windfall, while the hollows are muskegs and sloughs with a few spruce from two to ten inches in diameter, some of which would make good building logs. There is no hay of any account in this part of the township. The water is fresh and abundant. Little Boggy creek is the only stream of any size. It is about fifteen feet wide and one to three feet deep. The current is about six miles an hour. It has no falls or rapids, but by the construction of a dam in section 36 about 50 or 60 horse power could be developed from it. The climate is somewaht dry and subject to summer frosts, making it difficult to grow wheat, although barley and oats might be grown successfully. There is a plentiful supply of fuel for present use in the dead timber which exists in nearly all parts of the township, and for future use the green timber around the edges of the sloughs and muskegs will afford an abundant supply. There is no coal or lignite. There is no rock for stone quarries nor any mineral of any kind. Bear, moose, elk, and jumping deer are to be found and partridge and rabbits are plentiful. The valley of Little Boggy creek, which runs diagonally across the northern part of the township, is a deep gorge with banks three hundred to four hundred feet, which are very steep and rough. Shell river road follows along the bottom of this valley. It is in good condition in this township, but in range 29 it is impassable on account of sloughs and soft places which it crosses. It is evidently a winter road and is not fit for summer use.—*Charles Harvey, D.L.S., 1904.*

Township 30.—From section 34, township 31, range 30, we cut a road around the east side of Madge lake, crossing the correction line on the south boundary of section 13 and entering township 30, range 30, through section 35. We made our first camp near the northeast corner of section 26. Thence, after surveying the north-eastern part of the township, we cut a road around the south side of Madge lake to section 28, where we made our second camp. From this camp we surveyed the north-western part of the township and then moved west into township 30, range 31, which we surveyed before moving southeast into section 7, township 30, range 30. From our camp in section 7 we surveyed the southwestern part of the township and then moved east to the northwest corner of section 3 from which camp we finished the township. The soil is of fair quality consisting of from two to six inches of clay loam with a heavy clay subsoil. The surface is rolling and in some places on the eastern and southern sides is rough and hilly. It is covered with a growth of young poplar from two to six inches in diameter with a few scattered spruce around the shore of Madge lake and in some of the muskegs. The sloughs, which are numerous, are surrounded by a dense growth of willow scrub. There is no hay in the township as the sloughs are too deep to dry up during the summer. There are two streams of fresh water flowing into Madge lake, one about fifteen feet wide and two feet deep flowing about three miles an hour, and the other about six feet and one foot deep, also flowing about three miles an hour. Both the above mentioned streams have abundance of pike and mullet in them during the early part of the summer. These two streams are the only ones that do not dry up during the summer. Good water can be had in any part of the township by digging wells. Madge lake extends along the northern side of the township. It is a beautiful lake with clear water and sandy and stony bottom, and is much frequented by the Indians of the Coté reserve, who come there on fishing expeditions. A very good wagon road runs from Coté to the southwestern side of the lake. There is no water power available in the township. The climate is subject to summer frosts making wheat growing very uncertain, although oats and barley are grown successfully in the neighbouring settlements. The green poplar which, when cut and allowed to dry makes very good wood, is the only fuel to be had in the township. No coal, lignite, mineral, nor stone for quarries are to be found. Bear, moose and jumping deer are plentiful and partridge and rabbits are in abundance.—*Charles Harvey, D.L.S., 1904.*

Township 31.—From section 10, township 32, range 29, we cut a road through the bush past Mayer's ranch in section six as far as the north boundary of section 34, township 31, range 30, where we camped. We had some difficulty getting a road into this township on account of sloughs and muskegs which had to be crossed and which were too soft to hold the horses and loads from sinking. By putting a layer of willow brush about two feet deep across these places we got access with no more inconvenience than the loss of time involved. The soil in this township is rather poor in quality; about two inches of clay loam with a clay subsoil. The surface is somewhat uneven and covered with poplar from two to eight inches diameter. It is much broken up by sloughs, muskegs and lakes which are surrounded by a heavy growth of willow scrub. There are a few scattered spruce around the shore of Madge lake, but not enough to make a timber limit, although some good building logs could be got there. There is no hay in the township, the banks of the sloughs being too steep and the water too deep in them to dry up during the summer. The water in these sloughs gets very stagnant as the season advances, but the water in the lakes is fresh and good. A creek which flows out of Madge lake is the only stream of any size in the township. It is about fifteen or twenty feet wide and three or four feet deep and flows about three miles per hour. It has a stony and sandy bottom and the water is clear and fresh and abounding with pike and mullet. It does not dry up during the summer, but has not sufficient fall for the development of water power. The land is not liable to be flooded at any time of the year. This township, like all the land through Duck mountains, is liable to summer frosts, making it difficult to grow wheat, although oats and barley might be grown. The only fuel available is the poplar, which grows in every part of the township and which would have to be cut and allowed to dry before using. There is no coal or lignite in any part of it. No mineral nor fixed rock of any kind is to be found in the township. Bear, moose and jumping deer are plentiful and rabbits and partridge are in abundance. Madge lake, which extends across the southern part of the township, is a beautiful lake from three to four miles across, with a sand and stony bottom and beautifully clear, fresh water. There are many small islands in the lake most of which are covered with spruce. The shore line is very irregular and on the northwest side is low and swampy. On the east and south sides the shore is higher and is dry. Fish of the pike and mullet variety are very abundant in the lake and it is a favourable fishing lake with the Indians from Coté reserve. Two streams flow in at the south and one flows out at the north, all of which are full of fine pike and mullet. We found a very good boat on the south side of the lake which much facilitated the traversing of it.—*Charles Harvey, D.L.S., 1904.*

Range 31.

Township 24.—The southern part of this township can be reached by a good trail from either Saltcoats or Churchbridge. These towns are located on the Yorkton branch of the Canadian Pacific Railway. The soil of this township is a rich black loam from 4 to 20 inches deep and averaging about 10 inches throughout. The subsoil when found near sloughs is a sticky reddish blue clay. On the whole, the land is well suited for grain growing. The surface of the township is gently rolling or nearly level. A few quarters are class 1; the balance being class 2, or grading from 2nd to 1st class. Sections 16, 17, 20, 21, 27, 28, 29, 30, 31, 32, 33 and 34 are about 70 per cent covered with young poplars up to 6 inches diameter, with large willows; about 20 per cent poplar and willow scrub; the balance being small prairie openings about 20 acres being the largest opening. Sections 1, 2, 3, 4, 12, 13, 24, 25, 26 and 36 are prairie with a few small bluffs. The balance of the township will average about 50 per cent prairie, the greater part of which is adjacent to the last mentioned sections; the other 50 per cent being poplar and willow scrub up to 6 feet high. Hay grows in fair quantities, the most of which is to be had in the southern part of the township in the numerous dried sloughs. The water found is good. Sloughs are numerous. The water apparently is permanent, yet there seems to be many sloughs that have dried during recent years. There are no water powers, neither are there stone quarries or minerals of economic value. The climate is good. From general indications, summer frosts do not occur. Game is scarce, being confined to a few duck. There are about 25 homesteaders in this township, being Icelanders or Galicians. Nearly all the patented lands are now unoccupied and nothing remains but the ruins of old buildings.—*R. H. Knight, D.L.S., 1904.*

Township 25.—The southern part of township 24, range 31, is reached by a good trail from either Saltcoats or Churchbridge. Through township 24, range 31, there are poorly made new trails into township 25. The soil of this township is a rich black loam of depths varying from four to twenty inches and averaging about ten inches throughout. The subsoil is a reddish blue clay and very sticky. If dry this quality of subsoil would be very hard to cultivate where necessary. On the whole the soil is very rich and is exceedingly well adapted for grain growing. The surface of this township is nearly level and if it were not for the numerous small sloughs and lack of drainage for wet seasons, seventy-five per cent of the land would be of class one instead of being class two, as is shown by the field notes. A few quarters are class three and twenty per cent is class one. Sections 3, 4, 5, 9, 15, 16, 17, 20, 21, 22 and 23 are covered with poplar bush up to five inches diameter. The balance of the township is covered with a growth of small poplars and willows from five to six feet high, such as is common to a heavy black soil. There is but little prairie that is over half a mile square, and but little bush that has not a few small openings of either prairie or light scrub which could be easily cleared. The most prairie and lightest scrub is in the north and northeast portions of the township. There is but a limited supply of hay to be had on account of there being so much scrub. What there is, grows in the recently dried sloughs. There are numerous sloughs yet to dry. The water found is good and apparently permanent, yet there seems to have been many sloughs dried during recent years. There are no water powers, neither are there stone quarries or minerals of economic values to be found. Poplar wood is the only fuel to be had. From general indications the climate is good and summer frosts do not occur. Game is scarce, being confined to a few duck on lakes Nos. 1 and 2. There are about fifty homesteaders in this township, all of whom are Galicians. Only 480 acres of land are patented, and is is not occupied. —*R. H. Knight, D.L.S., 1904.*

Township 30.—After cutting a road through the bush around the south side of Madge lake, in township 30, range 30, we came to a road in section 29 running from Madge lake to Coté. This is a road which has been cut out by the Indians who go to Madge lake on fishing and hunting expeditions. This road we followed into township 30, range 31, where we camped near the southwest corner of section 36, the road here becoming too soft to go any farther with our heavy loads. The land in this township is more or less rolling and is covered with small poplar and willow scrub, with a few prairie patches and many hay sloughs. The soil is a heavy clay loam from four to six inches deep with a clay subsoil. It is suitable for agricultural purposes but is much broken up by small sloughs. There is no timber of any size, the poplar being all less than four inches diameter. Hay sloughs are numerous in all parts of the township, but are small and many of them are wet in the centre, so that not more than fifty or sixty tons per section can be procured. The quality is good. The streams are all small, and dry up during the summer. The water is fresh and good while the streams are running, but becomes stagnant later on. The land is liable to be flooded except where hay sloughs occur. These are flooded about two or three feet deep in the spring, but dry up during July and August. There is no water power available in the township. Summer frosts are frequent. On the night of June 22 came a frost heavy enough to form ice half an inch thick on water standing in pails at our camp, and between that date and July 5 several lighter frosts occurred, any of which was heavy enough to kill potato tops. The only fuel to be had in the township is the green poplar, which would have to be cut and allowed to dry, and in most parts even this is too small to use as fuel. No coal, lignite, mineral nor rock for stone quarries exists in the township. Bear are plentiful and a few deer are to be found. Rabbits and partridge are to be found in abundance.—*Charles Harvey, D.L.S., 1904.*

Range 32.

Township 35.—This township can be reached by a road leading from Yorkton to Fort Pelly. The road is sufficiently good to permit the transportation of an average load. The soil is composed of a sandy clay of good quality for the cultivation of all kinds of cereals. The surface is generally undulating. Wood can be found everywhere. This wood is poplar and spruce. The poplar averaging three to eight inches in diameter predominates. Spruce of about the same size, is found either scattered or in clumps, here and there. Poplar and willow brush is mixed with spruce and poplar, and can be found nearly everywhere. Hay can be found bordering the marshes and the streams; but the quality is middling and in small quantities. This township is watered by three or four small streams from three to five feet in width and four to ten inches in depth, the water being of good quality. No cascades nor rapids are to be found. The summer season has been warm and dry. Frost has been felt in nearly every summer month. I have not met with any stone quarries nor minerals of any kind. Duck and prairie fowl can be seen.—*J. F. Richard, D.L.S., 1904.*

Township 36.—This township can be reached by the route from Kamsack to Fort Pelly, or again by the one from the village of Swan river. Both routes are equally good and permit transportation of a moderate load. The soil generally undulating is a sandy clay, of good quality, and favourable to the cultivation of all kinds of cereals. This township is entirely covered with poplar and spruce, varying from five to twenty-four inches in diameter, amongst which can be found a large quantity of poplar and willow brush. This township has been ravaged by fire, so much so, that the greater half of the wood left standing is dry. Hay is in very small quantity and of medium quality. It can be found here and there around the marshes and along the streams. Three or four small streams, having a width of from four to eight feet and a depth of six to eighteen inches, flow from the northwest towards the southeast or the south. The water is of good quality. The land traversed by these streams suffers little, if at all, from floods. There are no falls nor rapids. The summer has been hot and dry, the autumn splendid. Frost has been felt in nearly every summer month. Winter has set in during the last days of November. I have not met with any stone quarries nor minerals of any kind. The game consists of wild duck, prairie fowl, moose, deer and bear.—*J. F. Richard, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SECOND MERIDIAN.

Range 1.

Township 36.—The route to be followed to reach this township is the one leading from Yorkton, Assa., to Fort Pelly, Assa. It can also be easily reached and in less time by the route coming from the small town of Swan River. Both routes permit of transporting an average load. The soil consists of a sandy clay, of excellent quality for cultivation of all kinds of cereals. This township is, in general, slightly undulating. It is entirely covered with poplar and spruce from three to ten inches diameter, which is for the greater part mixed with poplar and willow brush. Spruce is in small quantity. Hay is scarce, although it is found along the streams and marshes, which are not very numerous. Many small streams, varying from three to ten feet in width and from three to twelve inches in depth, can be seen everywhere throughout the township. Swan river traverses the western portion of the township from north to south. Its average width is from sixty-six to one hundred feet, depth varying from two to six feet and current about two miles an hour. It flows through a valley about one-half mile wide. The banks of the valley are about three hundred feet high. There is no water power nor falls of any consequence. The summer has been remarkably warm and dry. The autumn was magnificent. Frost has been felt in nearly every month. There are no quarries nor minerals of any kind. The game consists of duck and prairie fowl.—*J. F. Richard, D.L.S., 1904.*

Range 2.

Township 22.—This township is easily reached from Saltcoats by three good graded roads. One at either the northeast or northwest corner of the township and one entering the township along the east boundary of section 33. Saltcoats is a town having a population of about 400, situated in township 24, range 2, and is on the Yorkton branch of the Canadian Pacific Railway. The soil of this township is quite suitable for grain growing, which has been proved by the present settlers. There is generally from four to eight inches of black loam with a clay or sandy subsoil; about eighty per cent of the township has a sandy subsoil. The surface throughout is gently rolling. A few sections are first class for farming purposes. The greater part of the land is second class and only a few quarters are third class. There is considerable poplar bush and scrub in this township, which is found on sections 11 to 29, inclusive. The poplar bush is quite thick and continuous. The trees range in size from six to ten inches in diameter. The most of the bush is found as follows: On sections 14 and 15, the north half and southeast quarter of section 16; the north half of sections 10 and 11; the southeast quarter of section 20; the legal subdivisions 1 to 12 of sections 21, 22 and 23, and the southwest quarter of section 24. Any of these lands that are not patented or entered for, should be reserved as a wood supply for the settlers. The amount of hay found is somewhat limited. On an average there are about two hundred tons of hay harvested during a season from the southwest quarter of the township, to which the hay ground is confined. The township has a limited supply of water. There are but few sloughs. Wells about forty feet deep are the chief supply of water. A reservoir has been constructed by the provincial government on section 33, a portion of which is also on section 28. The reservoir has an area of about ten acres and an average depth of about ten feet. There are no water powers in the township. The township is favourable for grain growing. One settler who has been in the township for fourteen years says he has not yet had his wheat frozen. The only available fuel is poplar wood, of which there is a permanent supply if protected from prairie fires. There are no stone quarries, neither are there minerals of economic value to be found. Game is limited to prairie chicken and rabbits.—*R. H. Knight, D.L.S., 1904.*

Township 36.—This township is very nearly equidistant from Kamsack and the small town of Swan River. From these two places the township can be reached with equal facility. These two roads are about in the same condition. Both routes permit of transportation of a moderate load. The soil, composed of a sandy clay, appears to be of an excellent quality for the cultivation of all kinds of cereals. This township is very slightly undulating. It is entirely covered with willow and spruce from six to twenty-four inches in diameter, mixed with very thick growth of poplar and willow brush. The southeasterly portion of the township is more thickly wooded. It is this portion which contains nearly all the spruce and the wood of larger diameter. The marshes are relatively numerous in the west and northwest portion of township. The hay is of mediocre quality and scarce, although there is some around nearly all the marshes. Many small streams, from four to ten feet in width, having a depth of six to eighteen inches, and a slow current, water this township, flowing generally towards the east and northeast. The water is of good quality. The lands, traversed by these streams, appear not to suffer by their overflow. There are no water powers, nor falls nor rapids. This summer has been excessively dry and warm; the autumn has been excellent; winter and snow have made their appearance during the last days of November. Frost has been felt in nearly every month. There are no quarries nor minerals of any kind. The game consists of wild duck, prairie fowl, bear, deer and moose.—*J. F. Richard, D.L.S., 1904.*

Range 13.

Township 46.—This township is most easily reached by following my trail (as described in report of township 46, range 14, west of the second meridian) from Tisdale to its intersection with the north boundary of section 22, township 46, range 14, thence following more or less along the north boundaries of sections 22, 23 and 24 to the east boundary of the township (fording Trappers creek at about the middle of section 27). Thence along the north boundaries of sections 19, 20 and 21 and the east boundaries of sections 28 and 33 in township 46, range 13 to the correction line. The soil is mainly sandy loam or black loam on a subsoil of clay or sandy clay, and though slightly light in places is excellent soil and suitable for growing all the ordinary cereals and vegetables that can grow in the district. Except along the banks of Crooked river the surface is covered with a dense growth of large and small poplar, willow and some spruce. A few small areas are covered with spruce and tamarac, but generally the timber is small and suited only to the needs of settlers. A little coarse hay found on the banks of Crooked river is all that is to be had in the township, though sufficient good pasturage can be found in many places. In the vicinity of Crooked river and its tributaries good water can be procured on or near the surface. In other parts of the township it will have to be dug for. The water is slightly alkaline, due doubtless to concentration during the dry summer. No part of the land is liable to be flooded. No falls or rapids occur on the streams and consequently no water power could be made available. Crooked river flows northerly through the western part of the township and averaged at the time of the survey, sixteen links wide, and one foot deep and flows with a current of about one-half mile per hour. The climate is moderate; a few light summer frosts occurred which, however, did not appear to do any harm. Abundance of wood for fuel is readily obtainable in all parts of the township. No coal or lignite veins were encountered. No stone in place was seen. A few limestone boulders were encountered. Traces of bear, moose and small deer were encountered along the banks of Crooked river, and a few ducks were seen.—*H. S. Holcroft, D.L.S., 1904.*

Township 47.—This township may be reached by following my trail through township 46, range 13, to the quarter post of the south boundary of section 3 of township 47; thence along the correction line to the east boundary of section 3; thence northerly and westerly along the east boundary of sections 3 and 10 and north boundary of sections 16, 21, 28 and 33 to the north boundary of the township. The soil is mainly black loam from two to eighteen inches in depth on a subsoil of clay and is suitable for growing all the ordinary cereals and vegetables. The surface is mainly covered with small trees. A few patches of prairie occur in the northern part.. The township contains a great many small marshes scattered all over the surface, with the exception of sections 1 and 2, which are high ground and sandy. The only timber of economic value is a bluff of spruce and large poplar of about thirty acres in extent situated in the northern parts of sections 34 and 35. The timber averages about sixteen inches in diameter. The dryer marshes produce a large amount of coarse hay. Abundance of water exists in the various marshes throughout the township and water may be obtained in the vicinity of these marshes by digging down a few feet. The water in many places at the time of the survey was slightly alkaline, due doubtless to concentration caused by evaporation during the dry summer. The land is not liable to be flooded. No water power is available. Crooked river at the time of the survey was a stream averaging sixteen links wide and one foot deep, with a current of about one-half a mile per hour. The climate is moderate; a few light summer frosts occurred but did no apparent damage. Abundance of wood for fuel may be obtained in all parts of the township. No coal or lignite veins were seen. No stone in place was encountered, a few limestone boulders were seen in the eastern half of the township. No minerals of economic value were seen. Signs of bear were plentiful and some signs of moose and small deer were seen.—*H. S. Holcroft, D.L.S., 1904.*

Township 48.—This township is reached from township 48, range 14, by my trail, which enters the township at the northwest corner of section 7, whence it proceeds northerly and easterly to the left bank of Carrot river, which it crosses on the east boundary of section 17, over a bridge built by me; thence easterly along the north boundary of section 9; thence southerly along the east boundaries of sections 9 and 4 to the south boundary of the township. The soil is mainly black loam of thickness from two inches to eighteen inches over a subsoil of clay. On the north of Carrot river, in the eastern part of the township, there is an area of sand and sandy loam. The soil of this township would grow all the ordinary cereals and vegetables that grow in the district. About ninety per cent of the surface north of Carrot river is covered with a dense growth of trees, the remainder being marshes mostly covered with hay. A large marsh extends over the northeast quarter of section 35 and northwest quarter of section 36. North of Carrot river the land is very nearly level. South of the river there is a valley extending from within half a mile of Carrot river on the north, to within half a mile of the south boundary, being about two miles in width. . The depth of this valley is about thirty feet, thus putting it on a level with the water of Carrot river. This valley is covered with a thick growth of white poplar, willow and black poplar, interspersed with an occasional open space of a few chains diameter. The open spaces are covered with either marsh or upland grasses growing luxuriantly. South of Carrot river the surface is covered approximately in the following proportions: Wood and heavy scrub, ninety per cent; prairie and light scrub, two per cent; marsh, eight per heavy scrub, 90 per cent: prairie and light scrub, 2 per cent; marsh, 8 per cent. The only timber in the township comprises patches of spruce forming a fringe extending along both banks of Carrot river, from within a mile of the west boundary to the east boundary of the township, and parts of a bluff of spruce near the south of sections 2 and 3. These measure up to twenty-eight inches in diameter and will average twelve inches; there are about eighteen acres of spruce in each of sections 2 and 3. Nearly all the marshes are covered with good marsh hay and all the open spaces with a fine grade of upland hay. The only permanent body of water is Carrot river and a small part of Leather river. The water is brownish yellow in colour and holds considerable clay in suspension. Several small streams flow into the Carrot. These contain clear water but they nearly all dry up in dry weather. Good fresh water can be had almost any place by digging a few feet into the ground. Carrot river averages about one chain in width and about eight or ten feet in depth, with current from one and one-half to two and one-half miles per hour. The land is not liable to floods. No water power is at present available, nor is it probable that the construction of dams for generating water power would be feasible. The climate is moderate. No summer frosts occurred during the time of survey. Fuel in the shape of small dead poplar and the larger dead willow can be readily obtained in all parts of the township. No coal or lignite veins were encountered. No stone in place was encountered. In sections 10, 11, 2 and 3 a few boulders of limestone and the archean rocks were seen. No minerals of economic value were seen. Traces of bear and moose were quite plentiful, other game is very scarce.—*H. S. Holcroft, D.L.S., 1904.*

Range 14.

Township 46—This township is reached by a trail from Tisdale, following the road allowance between ranges 14 and 15, as far as section 18, township 46, range 14, where it turns east across Presbyterian creek over a bridge built by me. In dry weather the trail is very fair, but becomes very soft and heavy when wet. The soil over the whole township is black loam from 2 to 8 inches in depth on a subsoil of clay, and is suitable for growing any kind of produce which the climate will permit of. The surface is, with the exception of a few small areas, covered with poplar and willow varying from scrub to trees 6 inches in diameter. The banks of Trappers creek, through section 34, are quite open, being covered with light scrub. The balance is up to about 85 per cent of the surface thickly covered with bush and about 15 per cent is marsh and wet; the marshes varying from 1 to 20 acres and in all cases surrounded by dense willow. The only timber is poplar, which is scattered over the township, but none of it large enough for lumber, and it should be reserved for settlers' use. The only hay is found in the marshes which are scattered throughout. The water of the township is all fresh. Presbyterian creek runs across the southwest corner and the northwest corner, and Trappers creek, which takes its rise in township 45, range 14, runs from the southeast through the east part of the township. Both these creeks are very high in spring, but do not overflow their banks to any extent; both are permanent and evidently do not dry up in a dry season. Presbyterian creek averages 18 links wide and 3 feet deep at the time of survey (May, 1904), and is running with a current of about 2 miles per hour. Trappers creek is much smaller, being at the time of the survey about 8 links wide and 2 feet deep and running at about 1 mile per hour. No falls or rapids occur on these creeks and consequently there are no water powers. The climate is moderate with cool nights. A light frost occurred on the night of June 13, which, however, did not do any harm. The days are generally warm, but not extremely so. The only fuel is the poplar and larger willows, which may be found everywhere in the township. Only a few stones were encountered, and these were mostly boulders of the older rocks, granite, &c., and an occasional fragment of limestone; no stone in place was discovered. No minerals were encountered at all. The game seen was ducks, geese, chickens and ruffed grouse, but not in large numbers. Traces of moose, antelope and bears are quite plentiful.—*H. S. Holcroft, D.L.S., 1904.*

Township 47.—This township may be reached from Tisdale on the Canadian Northern railway by following the road up the range line between ranges 14 and 15 to Presbyterian creek, thence by trail through township 46, range 14, thence northerly it follows the bank of Trappers creek until near its junction with Leather river, where the trail turns west and north and crosses Leather river by a bridge made by me in the northeast corner of section 10, thence it follows closely the line between sections 14 and 15 and sections 22 and 23, thence along the high ground west of Leather river to the north boundary. The soil all over this township is black loam to a depth of from three inches to fifteen inches overlying a subsoil of clay, and should prove suitable for growing the ordinary cereals and vegetables. Away from the narrow valley of Leather river, the land to the north and west would have to be drained before it could be cultivated to any considerable extent, but this should prove to be a task comparatively easy of accomplishment since the level of Leather river is twenty or twenty-five feet below the level of most of the land. Small willow and poplar cover about fifty per cent of the surface of the township, while about thirty per cent is marsh made up of small low-lying patches surrounded by dense willow; about five per cent is covered with scrub, poplar and willow and the remainder about fifteen per cent is timbered with poplar and spruce. In sections 7, 8, 9 and 10, are some bluffs of spruce from six inches to eighteen inches in diameter and averaging in sections 9 and 10 twelve inches in diameter, while in sections 7 and 8 it averages about nine inches. These bluffs, being practically all the spruce in the township, occupy about sixty acres of land. There not being much timber suitable for building purposes in the locality, I would advise that this spruce be reserved for the general use of the settlers in the township. Scattered along the banks of Leather river and in the central northern portion of the township is some poplar up to twelve and fifteen inches in diameter. A few marshes containing marsh hay were encountered in the portion of the township lying north of Leather river; this is the ordinary course marsh hay. The only running water in the township are portions of Presbyterian creek, Miners creek, Trappers creek and Leather river. The supply is sufficient and permanent for all ordinary requirements and is all fresh water. The creeks are small and may become almost dry in a dry season. Leather river averaged from thirty to forty feet in width at the time of the survey, with a depth averaging eight feet and a current of from one to two miles per hour. In dry seasons the volume of water is very considerably diminished. It is very crooked and winds its way through steep banks of solid clay, averaging fifteen feet in height above water level at the time of survey. Except around the banks of the streams and during the spring freshets the land is in no danger of being flooded. No falls or rapids occur where water power may be utilized. No power could be developed by the use of dams as the river would too easily cut out new channels for itself through the clay. The climate is moderate, the nights being cool and the days moderately warm, with usually a wind blowing; the season of 1904 was moderately dry, with the prevailing wind from the northwest or west. A few light summer frosts occurred, which apparently did no harm. There is fuel in abundance, consisting of poplar, spruce and the larger willows. An immense amount of dead windfall was encountered which makes excellent fuel. No coal or lignite veins were encountered. No minerals of economic value were seen. The clay may, however, be suitable for brickmaking. A few prairie chicken and ruffed grouse (commonly called partridge) were seen. Bear and moose are quite plentiful, there are a few jumping deer, also a few geese and a considerable number of duck.—*H. S. Holcroft, D.L.S., 1904.*

Township 48.—This township may be reached by following my trail through townships 46 and 47, range 14. It enters this township in section 2. Through the centre of this section it runs due north to Carrot river, which is crossed by a bridge built by me, thence northerly and westerly to the northeast corner of section 16, where it ends. A branch of the trail goes eastward to range 13, leaving the above mentioned trail near the quarter post on the north boundary of section 11 and section 12 as far as the east boundary of the township. This trail should be dry at all times of the year having been cut through dense small poplar, willow and windfall. The eastern part crosses a stream and some adjoining low ground, which may be wet in the spring of the year. Carrot river may be forded with difficulty in a few places in extremely dry seasons, but one wishing to cross it with wagons in an ordinary season will have to build a bridge. The soil throughout is first class, a black loam with occasional patches of sandy loam upon a subsoil of clay. The soil should grow all the agricultural and garden products of the Canadian Northwest. Except in the immediate vicinity of Carrot river, which is somewhat broken, the country is level, the northern part being especially very level. In sections 2, 3 and 12 a few acres are covered with light scrub, the rest of the township being covered with a dense growth of small poplar and willow and in the northern part poplar bush. The country having been largely burnt over some years ago, the second growth has come up very densely and is interlaced with dead trees and a great deal of deadfall is lying. The northern part of the township has some large marshes, one in the northwest corner being nearly two and a half miles in length and varying from, a few chains to a half a mile in width, and covered with a luxuriant growth of excellent hay. The surface is covered approximately as follows: Woods and heavy scrub, eighty per cent. marsh, twenty per cent; prairie and light scrub, a very small part. Along the banks of Carrot and Leather rivers an occasional spruce was seen, but nowhere else in the township were any noted. Along the banks of the Carrot groves of poplar up to ten inches in diameter were encountered and a considerable bluff of poplar up to twelve inches occurs in sections 21, 22, 27 and 28. The northern half of the township contains some large marshes, covered with hay—both marsh hay and red top—the latter growing to a height of six feet. All water encountered was fresh and the supply is sufficient and permanent. Leather river passes through a mile or two of the southeast corner. Carrot river averaging at the time of the survey a little over a chain in width and ten feet deep, winds through the township from west to east. The current averages from one and one-half to two and one-half miles per hour, with a considerable volume of water. The river has cut its way through the solid clay and has banks from twenty to thirty feet in height. The banks show evidence that the water has risen to the top in high water, but there is little or no danger of the country being flooded to any serious extent by the spring freshets. Carrot river through the township is about eleven miles in length. The rivers contain no falls or rapids, suitable for the generation of water power, nor is it likely that the construction of dams for the purpose of supplying power would be feasible. The climate is moderate, cool nights with occasional light summer frosts. Plenty of poplar of sufficient size to make good firewood can be procured nearly all over the township. No coal or lignite was discovered. No stone was seen in place. No economic minerals were seen. Traces of moose and bear were plentiful; an occasional partridge was seen, but no prairie chicken. The wet portions of the township can doubtless be drained through some small creeks which flow into Carrot river.—*H. S. Holcroft, D.L.S., 1904.*

Range 15.

Township 27A.—This township lies on the eastern slope of the Little Touchwood hills, and is about sixty miles north of Qu'Appelle, on the main line of the Canadian Pacific Railway. The Qu'Appelle and Prince Albert trail passes through this township. Lipton, the nearest station on the Kirkella or Pheasant hills branch of the Canadian Pacific Railway, is expected to be open for business some time this fall, and is about thirty miles southward and a little west of the trail above-mentioned. The soil generally is a sandy or clay loam with clay subsoil, and is suitable for raising grain and vegetables, also grasses for pasturage purposes. The surface is rolling and about one-quarter covered with scrub and timber, most of which has been scorched by fire. Sections 6 and 7 might be reserved for fuel and fencing timber, there being a considerable supply in those sections, and if protected from fires they will soon be again covered with green timber, as at the present time there is a large quantity of young poplar growing up. The timber in these sections is from three to ten inches in diameter. Much of it has been scorched by fire and a considerable amount of it has fallen but is in good condition for fuel. Along the west side of section 5 and at the northeast corner of section 8 and northwest corner of section 9 there is a quantity of green poplar four to eight inches in diameter suitable for building purposes, about ten acres of good timber on each of these sections. Three-fourths of the remainder of the surface is open, the balance is covered with scrub and small timber. There are some large hay meadows in northeast quarter section 5 and northwest quarter section 4, also in southwest quarter section 10 and south half of section 2, also in northeast quarter section 11 and northwest quarter section 12, besides many small hay meadows scattered over the township; in ordinary seasons a large quantity of hay can be cut in the township. The water is generally of good quality in the ponds and sloughs, but in Lac Michel in section 6, it is not very good, and in Pelletier lake in sections 5 and 8 it is rather alkaline. Two creeks flow into this lake, one from the west reported to come from Bittern lake, in township 27A, range 16, and one from the north from Reserve lake, in northwest quarter section 8, the former being about four feet wide and one foot deep, and the latter fifty feet wide and of the same depth in the beginning of June last. The water in both creeks is of good quality. From Pelletier lake a creek flows southward and must cross the south boundary of section 6, but I did not follow its course. There are no water powers. The climate is similar to other parts of Assiniboia, with liability to summer frosts. Fuel can be obtained in abundance in sections 6 and 7, also further west in township 27A, range 16, consisting of scorched poplar, three to ten inches in diameter. There is also in most of the sections a small quantity of timber which could be cut and used for the purpose. No stone quarries and no minerals were observed. Game consists of jumping deer, prairie chicken, partridge and rabbits. All of which are plentiful. Four settlers were found and others were about to locate in the township as soon as survey was completed. I consider this township well suited for stock raising and farming on a small scale.—*Wm. T. Thompson, D.T,S., 1904.*

Township 27.—This lies north of Muskowekwun's reserve, and is fractional, comprising only 18 sections, the remainder being in the reserve above-mentioned. The Hudson's Bay Company's trading post, 'Touchwood Hills,' is situated on the west side of a lake in section 29, and has been in operation for many years. There is a post office here and weekly mail to and from Qu'Appelle, on the Canadian Pacific Railway, which is about 65 miles distant via the Qu'Appelle and Prince Albert trail, and this is at present the best route to follow to reach this township, but later in the season when the Kirkella branch of the Canadian Pacific Railway is in operation to Lipton station on the north side of the Qu'Appelle valley, that will be the nearest railway point being about 35 miles distant to the south. The soil generally is a clay loam or sandy loam and subsoil clay, and is suitable for growing grain and vegetables. Surface is generally rolling and about one-third covered with scrub and timber, most of which has been scorched by fire, but there is some green poplar 2 to 10 inches in diameter in north halves of sections 32, 33 and 34, and along the west boundary of section 19. Some very fine green timber for building purposes 3 to 12 inches diameter and scattered bluffs of second growth poplar in most of the sections. Sections 28, 29, 30, 31, w½ 32, e½ 36, east halves of sections 22, 23, and 26 are about three-fourths open, and remainder of township about half open and half covered with scrub and timber. There are a few settlers in the township. In ordinary seasons a large quantity of hay can be cut in the township, there being numerous hay meadows, but this spring, owing to the ususual snow fall last winter, these are mostly covered with water and have the appearance of ponds and lakelets, and it will only be possible to cut hay around the margins. The largest of these meadows extends across section 28 and parts of sections 21 and 22 and in former years a large quantity of hay has been cut in it. There is also a large meadow in the north half of section 23 and south half section 26, while in nearly every section there are small sloughs around the margins of which hay could be cut in ordinary seasons. The water is generally of good quality in lakes, ponds and sloughs. There is a lake covering about 180 acres in sections 29 and 32, part of another in south half section 19, covering about 60 acres, and small portions of another extend into northwest quarter 19 and southwest quarter 30. These were the only lakes of sufficient size to traverse—and the water supply in them is, I believe, permanent. No creeks were noticed, but I am informed that in high water the lake first mentioned has an outlet to the southwest. The flat lands and hay meadows only are liable to be flooded, the remainder of township being high and rolling. There is no water power. The climate is similar to the southern part of Assiniboia generally, but with a probability of summer frosts, and for that reason oats would be a safer crop than wheat. A small quantity of poplar and willow can be obtained on most of the sections, and a considerable amount of timber for fuel can be had in northeast quarter 32 and north halves of 33 and 34, as well as a small quantity of green poplar suitable for building purposes and along west side of section 19 there is some very fine green poplar timber 3 to 12 inches in diameter, excellent for the latter purpose. No stone quarries nor minerals were noticed. Game consists chiefly of a few jumping deer, rabbits, geese, ducks, prairie chickens and partridge, all the last mentioned being plentiful. Fur bearing animals, muskrats, badgers and foxes, also some coyotes or prairie wolves. In conclusion, I may state that the projected line of the Grand Trunk Pacific Railway passes through this township, and that I consider the land well suited for stock raising and mixed farming on a small scale.—*Wm. T. Thompson, D.T.S., 1904.*

Township 37.—This township is situated about six miles from the Canadian Northern Railway. A good wagon road has been opened out lately; it strikes about the middle of section 6. The soil is composed of black loam from five to eighteen inches in depth; the subsoil is of yellow, white and gray clay; it is suitable for general farming and stock raising. The surface is covered with small poplars and high willows, and just a few patches of prairie of very little importance. Timber is poplar, from two to four inches in diameter. Hay is plentiful especially on the following sections: 5, 6, 7, 8, 18, 17, 19, 20, 4, 3, 9 and 10. Hundreds of tons of good hay can be cut on every one of these sections. Water is plentiful and fresh, and is found on every quarter section; there are two large coulees running through the township, one through the centre, the other through the two western tiers of sections. Water is permanent. There is no water power. The climate is good; there are no summer frosts. Fuel is plentiful. There is no coal or lignite. There is no stone quarry. There is no mineral of any kind. Game is plentiful. Bear, antelope, deer, moose, muskrat, cranes, duck, pelican, swan, geese, pheasant, snipe, of all kind. There are also two large lakes with fish.—*C. E. Lemoine, D.L.S., 1904.*

Township 38.—This township is situated about fifteen miles north of the Canadian Northern Railway, Quill Lake station. There is a good road to reach it. The soil is composed of black loam from five to eighteen inches, with clay for subsoil; sand and gravel is also found in a few places. The surface is covered with poplar from two to eight inches diameter, and is level. The lakes in this township are large, and contain many fish. There are no hay meadows. The water is plentiful, fresh and permanent. The timber is poplar from one to six inches diameter, and is no good for timber purposes. In my opinion it ought to be reserved for settlers. The climate is good, and there are no summer frosts. There is no water power. Fuel is plentiful over all the township. There are no signs of coal or lignite or mineral of any kind. There are no stone quarries. Game is plentiful, consisting of deer, antelope, fox, badger, lynx, bear, mink, muskrat and all kinds of flying game. This is not a good farmnig land. It is situated on the height of land. There is a good road leading north to Melfort, and south to Quill lake.—*C. E. Lemoine, D.L.S., 1904.*

Township 39.—This township is situated about twenty miles north of the Canadian Northern Railway, Quill Lake station There is a good road to reach it. The soil is composed of black loam from five inches to eighteen inches deep with clay for subsoil; sand and gravel is also found in a few places. The surface is covered with poplar from two to eight inches in diameter, and is generally level. There are no hay marshes. One-third of the surface is covered by large lakes, two of which were found to be eight to twelve feet deep, and contain fish. They are situated, one of them on the following sections: 32, 33, 28, 29, 20, 21 and 16, the other on sections 15, 22 and 27; the others, of less importance, are from four to six feet deep. The water is plentiful, fresh and permanent. The timber is poplar, from one to six inches in diameter, and is no good for lumber purposes. In my opinion, it ought to be reserved for settlers. The climate is good, no summer frosts. There is no water power. Fuel is plentiful. There are no signs of coal or lignite. There are no stone quarries. There are no signs of minerals of any kind. Game is plentiful—deer, antelope, fox, badger, lynx, bear, mink, muskrat and all kinds of birds. This township is situated on the height of land. There is a good road leading north to Melfort and south to Quill lake.—*C. E. Lemoine, D.L.S., 1904.*

Township 40.—This township is situated about half way between the two branches of the Canadian Northern Railway. There is no road to reach it from the south, except in winter time, on account of a long chain of deep lakes and a large muskeg, impossible even for men to get through. The soil is not suitable for farming. It is entirely covered by small poplar and high willows. About one-fourth of its surface is occupied by large marshes. There is also one large lake and five smaller ones. The soil on the east half is very rocky with a few inches of black loam, gravel, stones, with sand as subsoil. Clay is found in a few places. The township is entirely unsuitable for farming. There is no timber worth mentioning. There are no hay marshes. The water is fresh and permanent. There is a deep coulée running through the township, from seventy-five to one hundred feet wide, containing a stream three feet deep, with a current of four miles an hour. There is no water power. The climate is good with no summer frosts. There is no sign of coal or lignite. There are no stone quarries. There is no sign of mineral of any kind. Game is plentiful and consists of deer, antelope, bear, fox, badger, lynx, mink, muskrat, and all kinds of birds. I believe that the only way possible to reach this township in summer time would be by coming from the north.—*C. E. Lemoine, D.L.S., 1904.*

Township 42.—I proceeded to the survey of this township by the Canadian Northern Railway to the village of Melfort, and from Melfort by wagon, southerly over a road towards Nut lake, to township 43, range 17. I made surveys of the latter township and others south of it, going in over roads made by myself, I then returned to Nut lake road and continued along it to the southern side of this township. The township is accessible from either of the villages of Melfort or 'Star City' by roads to Nut lake directly, passing on the way a sawmill near the township. The surface soil is black loam of good depth, with a subsoil of clay. The uplands are suitable for grain or general farming and the lower parts would be good for grasses and ranching. The township is covered with scrub and a small growth of timber, some good sized trees of poplar and balm of Gilead occur mixed with the others in many places. Some patches of prairie break into the scrub from the south, considerable areas of prairie are found in the township to the west, but these do not reach to this one. Some spruce was met with as well as tamarac swamp, much more of the surface is covered with scrub than with large timber. But little hay lands exists. In dry seasons some hay might be gathered around the lakes. Water would usually be found everywhere at all times, but no streams worth noting were seen. The water is all fresh. No streams exist to flood the land. Frosts in the neighbourhood injured the grain crops in the early fall before harvesting, during the summer of 1904; these summer frosts occur only some years. Poplar wood for fuel is plentiful everywhere, but no coal or lignite was seen and no stone suitable for quarrying was found. No economic minerals were discovered. Bears are numerous, deer of various species would appear to be not uncommon; ducks frequent the ponds and marshes; but few partridges or prairie chickens were seen during the season.—*G. B. Abrey, D.L.S., 1904.*

Township 46.—This township lies six miles north of the village of Tisdale, a station on the Prince Albert branch of the Canadian Northern Railway. The soil is a heavy black loam with clay subsoil; the surface of the township is undulating and covered with a thick growth of willows and small poplar. There is no timber in this township but there is considerable fallen willows and poplar, which makes good fuel. The township is well watered by Leather river, Doghide river and a number of smaller streams The water in all of these streams is fresh. There is plenty of hay in the sloughs, of which there are quite a number in the easterly and northerly part of the township. There are no minerals or stone quarries in this township. The streams become very small in dry seasons, so that they are not available for water power. I think though in the driest season there would always be plenty of water for cattle in the pools. The climate is about the same as Manitoba. I think though that the rain and snow fall is greater. There is any amount of poplar timber east of this township, so that a settler can get logs for buildings within a few miles. Small game such as wild ducks and prairie chickens are numerous, and small wild fruit is plentiful.—*W. J. Deans, D.L.S., 1904.*

Township 47.—I went out by the village of 'Star City' on the Canadian Northern Railway northwesterly to township 47, in range 16, going over settlers roads to near the southern boundary of that township. I then cut and made roads through that range and into the township now being described, fording Carrot river with my outfit near the centre of the township in section 28. The soil is a deep rich black loam underlaid with clay. Some portions would be suitable for grain farming and probably a considerable portion of it, if drained. Carrot river runs in a deep valley and would afford drainage to land not too far away. As it now stands the country is too wet for general farming, but might be utilized for ranching. No prairie lands appear; the whole is covered with scrub timber with, in many places, a thrifty growth of timber too large to be called scrub. In some places large timber is found; the patches of large timber are found at intervals over the whole township. The timber is usually composed of poplar, but patches of spruce occur in the valleys of the rivers, and though large timber is not in sufficient quantity for lumbering purposes, enough is available for settlers uses in building. Much of the township is flat and wet, and marshy; this, with some clearing and preparation, would make good pasturage and hay land. The water is all fresh. The marshes and sloughs are not deep and would occasionally dry up, but generally, water is in sufficient quantity for all purposes required. No lakes were met with requiring to be surveyed. Carrot river crosses the northwesterly portion of the township within a deep ravine. Leather river runs along the eastern part of the southern boundary. These streams might be made available for water power. There are no water powers, but both rivers run with strong current. The ravines are too deep for these streams to flood large areas of land. No parts would be subject to the flooding except locally from excessive precipitation outside of the comparatively narrow valleys of the streams. Frosts are liable to occur in early fall to injure grain crops. Poplar wood for fuel purposes may be obtained in all parts of the township. No coal or lignite was seen. No stone quarries exist. No economic minerals were discovered. Very little game was obtained; bears are common, duck frequent the waters. A few Indians were met with hunting for deer.—*G. B. Abrey, D.L.S., 1904.*

Township 48.—This township was reached from Toronto by way of the Canadian Pacific Railway to Winnipeg, thence by the Canadian Northern to the village of Melfort. I outfitted at Melfort and after subdividing some townships south of that village, I went northerly, crossed the Canadian Northern Railway at the village of 'Star City,' and continued northerly through the settlements as far as trails were made, then made our own roads, and forded Carrot river and camped in the townships being described. The upper soil is black loam of good depth, underlaid, generally, with clay. When drained the township would be suitable for mixed farming. In the meantime, after clearing of timber and scrub, it would be adapted to ranching.

There is no prairie. The whole township is covered with a thick growth of scrubby timber, there is but little large timber. Some spruce and tamarac is found in the valley of Carrot river and jackpine occurs on the sandy ridges in the northerly part of the township. Some of the marshes grow grasses which would furnish hay. At present good pasturage is quite limited. The water is all fresh. The ponds and marshes are quite shallow, and their areas would fluctuate much upon changes of the precipitation. The water would be permanent for all practical purposes. Carrot river crosses the township in a deep valley of no great breadth, this river flows with a strong current and might be dammed and developed for water power. This stream is subject to considerable fluctuation in volume during the season. All streams found run in ravines, having cut their way towards Carrot river. This river was traversed across the township. No other waters were surveyed. No large areas would be subject to flooding. The climate is subject to early autumn frosts. Poplar wood for fuel can be obtained everywhere. No coal or lignite was seen. No stone or stone quarries were found. No economic minerals were discovered. Game was not found to be plentiful. Bears are common. Indians were met with hunting deer. A few ducks and partridge were seen.—*G. B. Abrey, D.L.S., 1904.*

Range 16.

(Part) Township 26.—This township lies in the Little Touchwood hills and has been heavily timbered with poplar and balm of Gilead trees from four to twelve inches in diameter, but a few years ago a very destructive fire swept over this tract of country and left it covered with brulé and windfall, with some patches of green standing timber. Among all this, young trees are now growing up and in the course of a few years, if protected from fires, the whole will again be well timbered. There is a large quantity of scorched timber from two to twelve inches in diameter suitable for fuel and building purposes on every section, and a considerable amount of green timber of the same dimensions on sections 25 and 36 adjoining Wolf lake and Lac Michel. The route for reaching this township is at present via the Qu'Appelle and Prince Albert trail, which passes about three miles east of it and the distance is about sixty miles from Qu'Appelle, but when the new Canadian Pacific Railway branch line is open for traffic, which will probably be this fall, the new station called Lipton will only be about thirty miles distant to the south. The soil is generally of very good quality, but the surface is so hilly and broken by small ponds and marshes that I consider it better adapted for the growth of timber than for agricultural purposes, especially as there are no prairie openings and the land would require to be cleared of windfalls and underbrush before it could be made available for cultivation. There will be in seasons of low water a considerable amount of hay in marshes or meadows adjoining Wolf lake in section 23, 24, 25, 26, 35 and 36, but in times of high water as at present, little or no hay can be cut in the portion of this township surveyed by me. The water is not very good, a good deal of decaying vegetable matter around the margins of ponds and lakes gives it a strong unpleasant odor, but it is quite likely that there may be springs of good water, which were not observed by us, as in winter these would not be so readily noticed. There are only a few small creeks, one of these crosses the west boundary of section 27, and is three feet wide and one foot deep and flows eastward. Another of same size and flowing in same direction crosses the west boundary of section 34. Another creek ten links wide and about one foot deep crosses the north boundary of section 35, flowing north and there are creeks of about the same size and flowing in the same direction in section 36, connecting Wolf lake with lake No. 5 and the latter with Lac Michel. The land is not liable to be flooded, except around the margins of ponds and lakes and connecting marshes. The water supply is permanent. There are no water powers, but it may be mentioned that lake No. 2 in section 34 is about fifteen feet above lake No. 3, and that there is a connecting high water channel by deepning which the former could be drained into the latter and water power on a small scale be developed. Also from lake No. 4 in same way by deepening high water channel this lake could at small expense be drained eastward, there being a rapid fall in that direction; of course these lakes being very small would not produce power of much value, but by regulating the height of water in them it may be noted that hay can be grown to advantage around their margins. The climate is similar to other parts of Assiniboia with a probability of summer frosts. There is an abundant supply of scorched poplar and balm of Gilead on every section. There is no coal or lignite. There are no stone quarries. There are no minerals. Jumping deer are numerous, also prairie chicken, partridge and rabbits. Muskrats are plentiful, also badgers, wolves (coyotes) and foxes.—*Wm. T. Thompson, D.T.S., 1904.*

Township 27A.—This township lies in the Little Touchwood hills to the east of Gordon's Indian reserve and south of Muskowekwun's reserve. Its surface is rolling and hilly with numerous small ponds and marshes, most of which are connected in high water. A portion of Bittern lake lies in sections 10 and 11; this lake, by soundings taken at northeast angle of section 10, was found to be thirty feet deep and the water of good quality. The entire land surface has, until recently, been covered with a thick growth of large poplar and balm of Gilead trees, but a few years ago a very destructive fire swept over this section of country and damaged the greater part of the timber, leaving it covered with brulé and windfall and a few bluffs of green trees, and among this there is now growing up a large quantity of young timber, so that in a few years, if fires are kept out, the whole will again be well timbered. The route for reaching this township is at present via the Qu'Appelle and Prince Albert trail, which passes about three miles east of it and the distance from Qu'Appelle on the Canadian Pacific Railway is about sixty miles, but when the Canadian Pacific branch line is opened for traffic on the north side of the Qu'Appelle valley, the new station named Lipton will only be about thirty miles distant to the south. The soil is of very good quality, well adapted for the growing of timber and for agricultural purposes. The surface is rolling and hilly and covered with brulé, windfall and second growth and a few bluffs of green standing timber six to twelve inches in diameter. The green large timber is chiefly in the north half of section 11, where there are about thirty acres of it. Hay is to be had in small quantity only in some small hay meadows scattered over the township and around the margins of ponds; in time of high water, as at present, there would be no hay available. The water is generally alkaline and in most of the ponds has a strong odor of sulphureted hydrogen. The water of Bittern lake was found of very fair quality, but is slightly alkaline. There are no streams of any consequence. Two small creeks cross the south boundary of section 1. They were each about three feet wide and 1 foot deep at the time of survey (Dec., 1903). There are no water powers. The climate is similar to other parts of Assiniboia, with a probability of summer frosts. There is an abundant supply of fuel on every section, of scorched poplar, balm of Gilead and large willow. No coal or lignite was observed. There are no stone quarries or minerals. Jumping deer, both white and black tailed, are numerous. Prairie chicken and partridge are also plentiful and quite a number of rabbits were seen. Muskrats are plentiful and quite a number of signs of coyotes, foxes and badgers were noticed. In conclusion I may say that as timber is not plentiful to the eastward, it might be advisable to make this township a timber reserve, for which it is well adapted.—*Wm. T. Thompson, D.T.S., 1904.*

Township 27.—This is a fractional township situated in the Little Touchwood hills and adjoining Gordon's and Muskowekwun's Indian reserves. The route for reaching it is via the Qu'Appelle and Prince Albert trail leading north from Qu'Appelle on the main line of the Canadian Pacific Railway and passes through section

36. This trail is well travelled and generally in fair condition. Another route is via the Pheasant hills branch of the Canadian Pacific railway to Lipton and thence north by the trail above mentioned, a distance of about forty miles by wagon. The soil generally is of good quality but the surface is so much broken by hills, ponds and lakelets that it is best suited for stock raising and mixed farming on a small scale. Fractional sections 1 and 2 are partly covered by Bittern lake and other water, the remainder of the surface being thickly wooded in these sections; but most of the timber, which is from three to eight inches in diameter, has been scorched by fire, and a thick second growth is springing up. The following sections on the north side of the Indian reserves are mostly covered with green and scorched poplar, three to eight inches in diameter and second growth, viz., sections 7, 18, S. ½ 19, 8, 9, 16 S. ½ 17, S. ½ 22, 23, 24, S. ½ 25. While in N. ½ 25, also sections 26, 27, E. ½ 34, 35 and 36 there are some good bluffs of poplar with scattered scrub covering about one-quarter of their surface. Sections 31, 32, 33, W. ½ 34, also 28, 29, 30, N. ½ 19, and N. ½ 17, are mostly open and being very hilly it was noticed that during the winter there was but little snow on the southern exposure of these hills, so that stock could pasture on them much earlier than upon the more level land. Mr. Charles McNab, the only settler in this township, informed me that his stock were out feeding on these hills about two weeks earlier than elsewhere in the district, and I consider this renders the locality desirable for stock raising. There are small hay meadows of good quality in nearly every section. There is an abundant supply of water in ponds, lakes and sloughs; in some of these the water is alkaline. Bittern lake covers part of sections 1 and 2 and extends south into township 27A, range 16. This lake was found by sounding at the southeast angle of section 2, to be thirty feet deep and the water to be of good quality. No streams were noted; the land being high and hilly is not liable to be flooded. There are no water powers. The climate is similar to other parts of Assiniboia, with a liability to summer frosts. There is an abundant supply of fuel on the timbered sections already mentioned. No coal or lignite was seen. There are no stone quarries. There are no minerals. Jumping deer, rabbits, prairie chicken and partridge are abundant. I consider this township well adapted for stock raising and mixed farming on a small scale. It might be advisable to reserve the land adjoining the Indian reserve for fuel supply for there is but little to the north and fractional sections 1 and 2 together with the following lands might be reserved for the purposes, viz., south halves of sections 7, 8, 9, 23 and 24, also northwest quarter section 18 and southwest quarter section 19. In the latter quarter sections there is some very fair green poplar suitable for building purposes, also very good building timber is to be found along the east boundary of the southeast quarter of section 24. As the proposed line of the Grand Trunk Pacific Railway will pass either through this township or a few miles north of it, no doubt most of the land will be very soon settled upon.—*Wm. T. Thompson, D.T.S., 1904.*

Township 28.—The Qu'Appelle and Prince Albert trail passes through this township and affords the best route for reaching it, either from Qu'Appelle on the main line of the Canadian Pacific Railway, sixty-five miles south, or from Lipton on the Pheasant Hills branch line, which is a few miles west of this trail in township 22, range 14. The government telegraph line leading from Qu'Appelle to Prince Albert, Battleford and Edmonton, follows the trail mentioned, and a telegraph office and post office named Kutawa, is situated in the northwest quarter of section 10 in this township, and Indian agency buildings in southeast quarter section 16. The soil generally is a sandy or clay loam with clay subsoil and is of good quality, but the surface being generally rolling and with numerous ponds and hay meadows, it is best suited for pasturage and for grain growing to a limited extent, also to the raising of roots and vegetables. About one-quarter of the surface is covered with scrub and timber, the remainder is open. The west boundaries of sections 6, 7, 18, 19 and 30 pass through a considerable amount of poplar three to eight inches in diameter. There is also a quantity of poplar of same diameter adjoining Heubach lake in sections 17, 18, 19 and 20, also adjoining Bears lake in section 2, and Kutawa lake in sections 14, 15, 22 and 23. There are numerous fine hay meadows, viz.: in sections 23, 24, 25, 26 and 27, also in sections 14 and 15, all of these in high water are connected with Kutawa lake and cover a large area. In addition to these there are a large number of small hay sloughs scattered over the township, a few in nearly every section. The water generally is believed to be alkaline but the ice being thick, only a few lakes were examined; the smaller ponds and sloughs often contain good water. No streams were noted. Land surrounding Kutawa lake comprising the meadow lands already mentioned are liable to be flooded in times of high water, but this is beneficial to meadow lands, provided the high level is not maintained throughout the season. As to the probable depth it is difficult to say, perhaps three feet in wet seasons. There are no water powers. The climate is similar to other parts of Assiniboia, with a liability to summer frosts. Poplar and willow is available for fuel and a considerable quantity may be found around Bears lake, also around Kutawa and Heubach lakes and along the west boundary of the township in sections 6, 7, 18, 19 and 30. No stone quarries were observed nor were any minerals found. Prairie chicken and partridge or ruffed grouse are abundant, also rabbits and a few jumping deer. A preliminary line of the proposed Grand Trunk Pacific railway passes near Kutawa in this township. Some seven or eight settlers are located on homesteads, the original survey having been made in 1880. In conclusion, it may be stated that this township is very well adapted for stock raising and mixed farming on a small scale.—*Wm. T. Thompson, D.T.S., 1904.*

Township 38.—This township is situated about twenty-five miles north of the Canadian Northern Railway, Quill Lake station. There is a good road to reach it. The soil is composed of black loam from six to eighteen inches, with clay for subsoil and silts in a few places. The surface is level and covered with small poplar and willows, the largest six inches in diameter. There are no hay marshes. There are two large lakes and eight smaller ones, but all deep and containing plenty of fish. One of the large lakes is situated on the eastern row of sections and the other is on the northern portion of the township. The water is plentiful, fresh and permanent. The timber is poplar and ought to be reserved for settlers. The climate is good, with no summer frosts. There is no water power. Fuel is plentiful. There is no sign of coal or lignite. There are no stone quarries. There are no signs of minerals of any kind. The township is completely unsuitable for farming. Game is plentiful and consists of deer, antelope, fox, badger, lynx, bear, mink, muskrat, and all kinds of birds.—*C. E. Lemoine, D.L.S., 1904.*

Township 39.—This township is situated about twenty-five miles north of the Canadian Northern Railway, Quill Lake station. There is a good road to reach it. The soil is composed of black loam five to eighteen inches, with clay for subsoil and silts in a few places. The surface is level and covered with small poplar and willows, the largest eight inches in diameter. There are a few hay marshes. There are nine lakes scattered over the township, some large, some small, but all deep and with plenty of fish. The water is plentiful, fresh and permanent. The timber is poplar and ought to be reserved for settlers. The climate is good, with no summer frosts. There is no water power. Fuel is plentiful. There are no signs of coal or lignite. There are no stone quarries. There are no signs of mineral. The township is completely unsuitable for farming. Game is plentiful and consists of deer, antelope, fox, badger, lynx, bear, mink, muskrat, and all kinds of birds.—*C. E. Lemoine, D.L.S., 1904.*

Township 40.—This township is situated about eighteen miles from the Canadian Northern railway branch now under construction and there is a good trail through townships 39, range 17, and 38 and 37, range 16. The soil is composed of a light bed of black loam from five to eight inches deep, with a subsoil of good yellow clay. The township is suitable as a timber reserve, as it is entirely covered with large timber from eight to twenty inches in diameter, consisting of poplar and cottonwood, with a few birch and spruce, except on the eastern row of sections where the timber is small, fire having been through that portion about twelve years ago. There are no hay marshes, properly speaking, but on the shore of the lakes there is some good hay, more particularly in the following sections: 14, 23, 26, 27, 34 and 35. The water is fresh and abundant on every section. There are nine large lakes all full of fish. There are no water powers. The climate is rather cold, but no summer frosts occurred. There is no coal or lignite. There are no stones nor minerals. Game is plentiful—bear, deer, antelope, fox, duck, cranes, wild geese, partridge, &c. I believe that the largest part of this township could be reserved as a timber berth, more particularly the part which is situated west of Kitako lake.—*C. E. Lemoine, D.L.S., 1904.*

Township 47.—I proceeded to the survey of this township by way of the Canadian Pacific Railway to Winnipeg, thence by the Canadian Northern Railway to the village of Melfort. I outfitted at Melfort and surveyed several townships southeasterly from that village, then returned to the village of 'Star City' on the Canadian Northern Railway, and passed northeasterly over the settlers' trails to near the centre of the township south of, and adjoining, this one. The soil is a deep rich black loam underlaid with clay. In dry seasons, after clearing, much of it would grow oats and perhaps other grains, but until drained of water the land is much better adapted to cattle farming or ranching. There is no prairie, the whole being covered with scrub, or small trees. In many places this scrub is old enough and large enough to be called timber. These patches of larger scrub or timber occur constantly and cover the greater portion of the township. The varieties are composed of poplar and balm of Gilead, chiefly. Grasses grow in the marshes and some of them would make hay. Good pasturage may be obtained now in places amongst the lighter scrub. Much of the scrub land could be converted into grass land by clearing. Waters are all fresh and generally permanent. No lakes were found to survey. Carrot river crosses the township running from west to east and runs in a comparatively narrow valley about one hundred feet in depth. It has a strong current, and at the time of the survey (a period of low water) was from three to six feet deep. During spring freshets the river must have been forty feet higher, as indicated by its banks and the float amongst the scrub above the channel. Probably water power might be developed along this river. Deep water in this river would always be confined within its valley. No other creeks or streams were met with, worthy of note. Seasons of much precipitation would cause the level, flat land of this township to be too wet for grain growing. Early fall frosts are liable to occur in this section. Poplar wood for fuel may be obtained everywhere. No coal or lignite was seen. No rock for stone quarrying was discovered. No economic minerals were found. Game was not found in abundance. Bears, as usual, are common. Indians were met with carrying carcasses of deer slaughtered in the neighbourhood.—*G. B. Abrey, D.L.S., 1904.*

Township 48.—I proceeded to this survey from Toronto by way of the Canadian Pacific Railway to Winnipeg and thence by the Canadian Northern Railway to the village of Melfort. At Melfort I completed outfitting, made some surveys southeasterly of that place, returning crossed the Canadian Northern Railway at the village of 'Star City' and went northeasterly through the settlements, crossed Carrot river in township forty-seven in range fifteen, and went westerly along the higher land on the north side of that river cutting roads as we went. The soil is generally a deep black loam often not excavated through in digging pits eighteen inches deep. If drained and cleared it would make good farming land, with less labour the country is suitable for ranching. There is no prairie, the whole township being covered with a small growth of poplar, balm of Gilead, willows, &c., most of this not exceeding four inches in diameter. The whole township is very similar. There are not many hay marshes, but grass could be grown and hay obtained by clearing the scrub in the lower land. Waters are all fresh, but not very abundant this season. Some small streams are found running in ravines of considerable depth, most of these creeks would appear to be permanent. They would not subject any considerable areas to flooding. No lakes or streams were found requiring a survey. There are no waterfalls or water powers. The country is subject to early fall frosts. Fuel may be obtained in all places from the poplar timber found growing. No coal or lignite was seen. No stone quarries were found. No economic minerals were discovered. Game is not plentiful. Some ducks were seen, bears, as usual, are about. A few Indians were met with hunting for deer.—*G. B. Abrey, D.L.S., 1904.*

Range 17.

Township 39.—This township is situated about one hundred and twenty-five miles from the Canadian Pacific railway, Duck Lake station. The best road to reach it is from Duck lake, passing by Batoche, through the Indian reserve, 'One Arrow,' and then taking the Prince Albert road, as far as township 40, range 23. from there a first class trail has been opened. The nature of the soil is black loam from seven to eleven inches, and the western part, which is not covered with wood, is first class for farming. The surface is level and inclining southward; the greater part of it is covered by timber or small willow; the eastern half is covered by large poplar and cottonwood of ten to twelve inches in diameter. There is a very large hay marsh situated in the following sections: 4, 9, 16, 21, 28, 33; the hay is first class, and there is about one hundred and fifty tons in every section. Water is plentiful, very good and permanent; the land is not liable to be flooded. There are five large lakes, two of which contain fish. There is no water power. The climate is good and there are no summer frosts. There is plenty of dry timber to be used as fuel. There is no sign of coal or minerals of any kind. There are no stone quarries. Game is plentiful. Deer, antelope, fox, wolf, badger, muskrat, rabbits and snipe, of all kinds abound.—*C. E. Lemoine, D.L.S., 1904.*

Township 40.—I proceeded to this survey by the Canadian Northern railway to the village of Melfort (then at the end of the constructed part of the railway). I gathered my outfit at Melfort and went to townships 43 and 42, which I subdivided. I then cleared a road across township 41, into this township. The road was made passable for wagons the whole way from where it branched off from the Melfort road. The soil is black loam of good depth and underlaid with a clay subsoil. Much of the land is suitable for general farming, and other portions would make ranch grounds. The township is covered with scrub generally, poplar, and balm of Gilead, often of tree dimensions and large enough for building into houses; again some of the scrub is light and scattered with openings over a good portion of the southern and western parts, these open places developing into large sized prairies in the adjoining townships. A good many shallow ponds of considerable extent are found but were not surveyed on account of their shallowness, and their fluctuating shorelines. These in dryer seasons would yield hay. The uplands where not too heavily timbered yield abundance of peavine and excellent pasturage over large areas may be obtained. The water is all fresh the larger and deeper lakes are probably permanent and so also are the creeks found in the western side of the township. The land would not be subject to flooding except locally from wet seasons. There are no water powers. Frosts are liable to damage the grain crops in early fall before harvesting. Much damage was done to the wheat in the neighbourhood during the present season from frost at that time. Poplar wood for fuel is to be found throughout the township. There are no stone quarries. No economic minerals were seen and no lignite was discovered. But little game was seen; prairie chickens would seem to have abandoned the neighbourhood for a time at least.

Ducks as usual are to be seen in the ponds and marshes. Bears bothered our caches. This township is one of the best that I have subdivided for several years.—*G. B. Abrey, D.L.S., 1904.*

Township 42.—I went to the survey of this township by way of the Canadian Pacific railway to Winnipeg and from there by the Canadian Northern railway to the village of Melfort. This place being then at the end of the constructed road. From Melfort I went southeasterly along a road made to a sawmill (situated beyond this township) into township 43 in the same range. I then cleared and made roads leading into the township now being reported. The soil is black loam 2 to 12 inches in depth, and with generally a subsoil of clay or clay loam. The township is pretty wet, the wetter portions would make ranching farms while the dryer parts would do for general farming. Timber or scrub covers the ground. A small patch of prairie extends into the southwest corner from the townships lying westerly of this one. There is a greater area covered with scrub than with large timber; the timber occurs in clumps and patches all over the township, and is composed of poplar, balm of Gilead and birch, and runs up to 25 inches in diameter. Marsh grasses suitable for making into hay are to be found in the marshes and meadows, but not in large quantities. Good pasturage is to be had on the dry lands from the pea vines; many rosebushes are mixed with the vines. The waters are all fresh, a good many shallow lakes are met with. Barrier river crosses the township and widens in places into lakes. Water is abundant and probably is permanent in supply. The land would not flood from overflowing of lakes or streams. There is no water power. The country is subject to early fall frosts. During this season much of the wheat in the settlements nearby was damaged by frost before harvesting. Poplar wood for fuel may be obtained everywhere. No coal or lignite was seen. No stone quarries exist and no economic minerals were discovered. Bears would seem to be numerous. Ducks frequent the lakes and marshes, other game was not plentiful.—*G. B. Abrey, D.L.S., 1904.*

Township 43.—I reached this township through Melfort, a station on the Canadian Northern railway. From Melfort, I travelled over a road southeasterly running through the township to a sawmill situated farther away. The sawmill road has a good deal of travel over it and is in good condition. The surface soil is black loam of good depth and usually underlaid with a clay subsoil. The dryer parts are suitable for wheat growing or general farming, while the lower or wet lands are good ranch grounds. No prairie exists. The surface is covered with scrub and timber; more of the former than of the latter, and more timber in the northern and western parts than in the southern and eastern sections. The timber is in patches amongst the scrub, and is composed of poplar, balm of Gilead and spruce. The spruce is generally found in clumps. The timber runs up to 18 inches diameter. Some hay might be made, but not in great quantities. The grasses are the marsh varieties in the low places, and in the uplands much pea vine is found, with a thick growth of rosebushes generally amongst it. The water is all fresh and there is plenty of it, and probably the supply is permanent. In wet seasons a good deal of the land would be too wet for general farming. It could only be flooded by excessive rain or snow fall locally. There are no water powers. Frosts may and do occur in early fall before grains are harvested, during some years. Plenty of poplar wood for fuel is found everywhere. No coal or lignite was seen and no stone quarries exist. No minerals of economic value were found. Bears are plentiful. Ducks and prairie chickens are obtained but are not abundant. Perhaps the season this year for game was not as good as the average.—*G. B. Abrey, D.L.S., 1904.*

Township 47.—This township is very much like the one west of it. Carrot river enters the township in section 7 and flows easterly across sections 7, 8 and 9, in a very crooked channel fifty to fifty-five feet wide and ten to fifteen feet deep. It gradually straightens and widens to sixty and seventy feet in crossing sections 10, 11, 12 and 13. Rapids occur in low water, in sections 11, 12 and 13. The north portion of the township is comparatively level. The sections just north of the river and all south of it are rolling; sections 11, 12 and 13 are from rolling to hilly. Many fresh water sloughs are found all over the township, and they are very numerous in the north portion. They are not as large as in the township to the west, and gradually become smaller on the east side of the township. A lake was traversed in section 18, one in sections 22 and 23, and one in sections 19, 20, 29 and 30. This latter one has pike and jackfish in it. It is a favourite resort of wild duck and fort à la Corne Indians make regular hunting trips to it. The whole township is covered with poplar, balm of Gilead, willow and alder underbrush, and heavy bluffs and scattered trees of poplar and balm of Gilead, six to ten inches in diameter, on all sections north of the river. There are odd scattered trees south of the river, but not many heavy bluffs. A great amount of dead timber that will make good fuel is found all over the township. Building timber, other than for very rough log buildings, is scarce. The soil throughout the whole township is mostly a rich black loam or sandy loam, and clay subsoil. Nearly all that portion north of the river is unfit for cultivation until drained, but when drained will make good farms. Nearly all south of the river can be cultivated as at present, and I think will be readily homesteaded. A drainage system extending over several townships would be a simple matter practically, as there is ample fall for the purpose, but under present conditions I do not think the resulting benefits would warrent the expenditure. The weather throughout December was moderate. The snow fall was light, being not more than ten inches by the last of the month. No stone, excepting boulders in the river in the east half of the township, was seen, and no minerals. Water power could be developed in several places in the river, in the east half of the township; but the water is variable, so a steady power could not be got for any purpose. Muskrats, rabbits and coyotes abound in great numbers. Partridge are plentiful. There are a number of mink and fox and a few otter and jumping deer.—*Wm. R. Reilly, D.L.S., 1904.*

Township 48.—The southeast portion of the township is undulating with numerous sloughs and muskegs. The southwest corner is nearly level, very marshy. The west side is from undulating to rolling, running into sand ridges at the north with many muskegs. The interior and east side is slightly rolling, becoming more so as you go north. The north side is rolling, not many sloughs. The whole township is wooded, the southwest quarter covered with a dense growth of underbrush and scattered trees of poplar, balm of Gilead and spruce; odd clumps of spruce six to fifteen inches in diameter along the creek. The remainder of the township is mostly small spruce and tamarac on the muskeg, and heavy spruce and poplar underbrush on the high ground, willow and alder in the depressions and odd clumps and belts of spruce, tamarac and jackpine six to fifteen inches in diameter, many scattered trees, poplar bluffs six to ten inches in diameter and much dead wood. Several log shanties were built this winter and a portable saw mill was placed on the northwest quarter of section 18. Settlers were taking out logs on permits for their own use, and from appearances, not much saw mill timber will be left on this, or the township to the west of it, after they finish this winter's work, as timber for that purpose is very limited. There is abundance of timber for rough log building, fencing and fuel. A winter packtrail (mail trail) from Fort à la Corne to Cumberland House, passes through sections 30, 29, 32, 33 and 34. A creek rises in section 8 and runs easterly out of the township in section 13, another one rises in section 18, running north through several muskegs and out of the township in section 33. These creeks are natural outlets to the Saskatchewan of a continuous network of sloughs, marshes and muskegs, beginning in the southeast quarter of township 48, range 19, and stretching across range 18 into this township, and together with other outlets to the south, would naturally be used in any system of drainage to reclaim this district. The soil is in low spots fair sand loam, on high ground light sand and very poor and not fit for cultivation. A limited quantity of hay can be cut mostly in the southeast quarter of the township.

The weather in January was very steady and bright, moderately cold but pleasant and hardly a foot of snow. There is no stone and no minerals. Game consists of rabbits, coyotes and partridge, all of which are plentiful. Mink and fox are scarce; there are some jumping deer, and odd tracks of moose.—*Wm. R. Reilly, D.L.S., 1904.*

Range 18.

Township 47.—Carrot river enters this township in the southwest quarter of section 18 and flows easterly in a very crooked channel 40 to 50 feet wide and 10 to 15 feet deep, through sections 7, 8, 9, 10, 3, 2, 11 and 12. The banks are in most places fringed with a heavy growth of willows, especially the right bank through sections 7, 8 and 9. The surface for a distance of about a mile north of the river and all south of the river is pretty rolling, the remainder of the township from undulating to rolling. Numerous sloughs are found all over the south part of the township and from a short distance north of the river the north part of the township is a network of sloughs and marshes, and perhaps at times over one-fourth of the surface is covered with water. A large lake, with good shore line, at the corners of section 9, 10, 15 and 16, and one to the east side of section 13, were traversed. Several large stretches of water were found in the north part of the township, but owing to marshy receding shores they were not traversed. The whole township is covered with scattered bluffs of poplar and balm of Gilead, with much dead timber and a heavy growth of poplar and balm of Gilead, willow and alder underbrush. The heaviest bluffs are in sections 4, 5, 33, 34 and 35. Throughout the whole township a great quantity of fuel is available, but building timber is limited. A trail from Fort à la Corne to the lake in sections 19, 20, 29 and 13, township 47, range 17 runs along a low ridge a mile south of the north boundary. This ridge is a dividing line or watershed between Carrot and Saskatchewan rivers. The soil of the north part of the township is a fair sand loam and if drained would make fairly good farms, but under present conditions is not fit for cultivation. The land lying along the north side of the river and all south of it, is mostly a good sand or clay loam, clay subsoil, well suited for mixed farming and will be readily homesteaded. Hay can be cut around a great number of the sloughs in the township. The weather during the survey was mild, with very little wind. The sloughs were not frozen hard enough to carry until about November 25. No stone, water power or minerals were observed. Muskrat, rabbits and coyotes are plentiful. Mink, fox and otter are scarce. A few jumping deer were seen.—*Wm. R. Reilly, D.L.S., 1904.*

Township 48.—The south side of this township is slightly undulating, being for the most part muskeg, swamp and slough. There is a large slough or lake on the east side of section 2, extending north clear across the section, and another on the east side of section 3, extending half a mile north; these have very flat marshy shores, and were not traversed. Going north the surface gradually becomes rolling, inclined to be hilly on the north side of the township. The whole township is wooded. The south is covered with a heavy growth of spruce, tamarac, poplar, balm of Gilead, willow and alder underbrush. Occasional belts and clumps of spruce and tamarac six to twelve inches in diameter are found. Poplar and jackpine six to ten inches in diameter is found on the high ground, and small spruce and tamarac on the muskeg. Going north the surface is covered with jackpine, spruce, poplar and willow underbrush, with belts of jackpine and spruce six to twelve inches in diameter. Large stretches are covered with a thick young growth of jackpine on ground that has of recent years been fire swept. A considerable quantity of standing dry timber six to ten inches in diameter is found in many places. Some fine belts of jackpine and spruce six to twelve inches in diameter occur on sections 33, 34 and 35, but only a small percentage is at present large enough for railway ties. As stated in report for township 48, range 17, settlers from the south were cutting logs on this township to be manufactured into lumber; the timber for that purpose is very limited, but a great quantity of timber for log building, fencing and fuel is available, and will be a great benefit to settlers to the south for a number of years. The southern part of the township has a fair sand or black loam soil and if drained will make fairly good farms. Toward the north the soil is mostly light sand and is very poor. A winter pack trail (mail trail), from Fort à la Corne to Cumberland house, passes through sections 19, 30, 29, 28, 27, 26 and 25. Very little hay can be cut in this township. The climate in January was bright, cold and pleasant, with very little wind and about a foot of snow. There are no stone quarries or minerals. Rabbits and coyotes are plentiful and a few jumping deer are seen.—*Wm. R. Reilly, D.L.S., 1904.*

Township 49.—I reached this township from Melfort travelling easterly along the Canadian Northern railway to the village of 'Star City,' thence northerly through the settlements, thence I cut roads, crossed Carrot river, surveying some townships on the way, and passed westerly through townships 48 in ranges 15, 16 and 17. It was found that we could not move our outfit into the township now being described because of deep ravines in the way, therefore all of it south of Saskatchewan river was run from camps in township 48 and run in 1904. The part north of the river was run in March of 1905, while the river was frozen over. The outfit was moved from Fort à la Corne down the river on the ice. The soil is generally sandy, with sand hills and ridges in many places, and yields but scanty vegetation. The surface is covered with scattered jackpine trees with scrub of the same, in the sandy places. In the ravines spruce and tamarac are found. The jackpine are of considerable diameter, but are usually of stunted growth and unfit for timber. The spruce and tamarac can be utilized for lumbering purposes. Some of the poplar would make lumber and house-building logs. It grows on the upper flats where not too sandy. But little hay land or pasturage is found. The water is all good for domestic uses. In dry seasons but little would be found except in the river and the ravines. The Saskatchewan flows easterly across the township and is a large rapid river affording navigation for flat-bottomed steamers. Other streams are small. The Saskatchewan was traversed on both banks, and was the only water area surveyed. The land is not liable to flooding. No water powers exist, except it might be that by large expenditure of capital Saskatchewan river could be utilized. Summer frosts occur in the locality. Wood fuel of poplar, tamarac, &c., can be obtained generally. No coal or lignite was seen. No stone quarries were discovered. Much loose stone is scattered along the banks and in the Saskatchewan. No economic minerals were seen. Very little game appeared. Bears as usual are common. Deer of several varieties are sometimes killed. Birds are not numerous. I did not see many indications of fur-bearing animals.—*G. B. Abrey, D.L.S., 1904-5.*

Range 19.

Townshop 47.—This township is slightly rolling and covered with a heavy growth of poplar, willow and alder underbrush, and poplar bluffs with trees six to ten inches in diameter, with a good deal of dry wood in the bluffs. The bluffs are pretty evenly distributed all over, the heaviest bluffs being in sections 26, 27, 28, 33, 34 and 35. Some small prairie openings are found along the north side of the river, and in sections on the south side of the township. Carrot river enters the township on the west side of section 18, and flows, in a very crooked bed, easterly through sections 18, 17, 16, 21, 22, 23 and out of the township in section 24. This is a narrow stream thirty-five to fifty feet wide running in a channel ten to fifteen feet deep, and in high water has a strong current. At present it is fast drying up. The whole township is dotted all over with fresh water sloughs and marshes. They all appear to be very easily drained, as they seem to be nearly all connected one with the other, and in many places there is a strong runway from one to the other. Carrot river is low enough to afford splendid drainage for the whole district. The soil is a good sand loam in the north, gradually running into a rich clay loam in the south, but on account of the many sloughs and marshes, it can only be cultivated in patches. It would not be feasible to make roads on the road allowances without first draining them. This will make a very good township if once drained. A trail, from Melfort to Fort à la Corne, runs through sections 12, 13, 24, 23, 22, 21, 29 and 30. The poplar bluffs will supply good rough building material and fuel. A quantity of hay can be cut around many sloughs in the township. The climate through July was fine. There was plenty of rain, no frost, and much bright weather. There is no stone, nor minerals of any kind. Small game is plentiful, large game scarce.—*Wm. R. Reilly, D.L.S., 1904.*

Township 48.—This township was reached by trail from Sintaluta, after many efforts were made to get by rail to Prince Albert. I left Sintaluta on the 9th day of May, fording the Qu'Appelle valley at Blackwood crossing, through nearly half a mile of water, thence by way of Saltoun and Canadian Pacific railway grade to the Humboldt trail. Leaving the Humboldt trail a few miles north of Hoodoo lake and crossing over to Carrot river and following Carrot river to Kinistino, thence to Fort à la Corne, and east into the township on the 23rd day of May. I found the trail throughout very wet, the portion across the alkaline plains, between Touchwood and Humboldt, being almost impassable. The Hudson's Bay Company agent at Touchwood informed me that there was more water this year, than in any previous season in his recollection. The north half of the township is rolling, the west side of sections 30 and 31 rough and broken. The southwest quarter is slightly rolling, and the southeast quarter nearly level, with long stretches of muskeg. Some fine clumps of jackpine and spruce, six to twelve inches in diameter, are found on the north half of the township, the thickest and largest patches being in sections 31, 32, 33, 34 and 35. The south limit of the pine belt, which includes jackpine, spruce and tamarac, is through sections 18, 17, 16, 10, 11 and 12. From this line north the surface is covered with patches of jackpine, spruce, tamarac and poplar, six to ten inches in diameter, with intervening heavy underbrush. The surface covered by underbrush is far in excess of what is timbered. Towards the south the surface is covered with bluffs of poplar and balm of Gilead, with intervening heavy poplar, alder and willow underbrush. The soil of the north half of the township is light sand, not fit for cultivation, and as you go south it gradually runs into a sand loam; the two south tiers of sections being a fair sandy loam. The south half of the township is badly broken by fresh water sloughs and muskegs and will be of no use for cultivation until drained. A good drainage can be obtained, but under present conditions of the country, I hardly think the land would be worth the expenditure. The township contains a great amount of fuel, and building material which, I think, would be well to reserve for the use of settlers, as there is a good streach of country, to the south, not well supplied with building timber and it is fast settling up. A pack trail, from Fort à la Corne to Cumberland house, crosses sections 18, 17, 16, 15, 14, 23 and 24, with a branch through sections 8, 5 and 4. A portable sawmill has been at work close to the trail, on the east side of Hudson's Bay Company reserve and on section 33, and farther north with trails leading thereto, the timber for sawing being taken off this township and forther north. A quantity of hay can be cut around many sloughs in the township. The weather through June and July was good: slight frosts in June, but not damaging, frequent showers with plenty of rain, and much bright weather. No stone of any kind was seen, excepting boulders along Saskatchewan river.. There are no minerals. Duck, partridge, rabbits and muskrat are very plentiful. Large game is scarce, but some traces of bear were seen.—*Wm. R. Reilly, D.L.S., 1904.*

Township 49.—I reached this township from Melfort, travelling easterly along the Canadian Northern railway to the village of 'Star City,' thence northerly through the settlements; after which I cut roads, forded Carrot river, surveying some townships on the way and passed westerly through townships 48, in ranges 15, 16, 17 and 18, and followed a lumber road leading to near the Saskatchewan and not far from the centre of the township. All of that part of the township south of the river and some of it beyond was surveyed from a camp on this road during the fall of 1904. That part farther north was run in March of 1905, while the river was frozen over, the outfit being moved down the river on the ice. The mounding was done in May of 1905. The soil is generally very sandy, with sand hills and ridges in many places, and yields very scanty vegetation. The township is covered with scattered jackpine, and jackpine scrub in the more sandy portions. In the ravines spruce and tamarac are found. Some of the trees are of considerable diameter, but are of stunted growth. The spruce and tamarac can be made into lumber., and considerable of it has already been cut and removed. Some of the poplar might be cut into boards also. It would make timber for log houses. The best of it grows on the upper flats where not too sandy. Hay land and pasturage are scarce. All waters found are good for domestic use. In dry seasons, but little water would be found except in ravines and in the river. Saskatchewan river flows easterly through the township. It is a large rapid stream, and affords navigation for light draught streamers, and rafting of timber. All other streams are small. The Saskatchewan was traversed on both banks and was the only water surveyed. The land is not liable to flooding. No water powers exist, except it might be that of the Saskatchewan. This river could be made available. Summer frosts are liable to occur on this locality. Fuel of poplar, tamarac and other wood can be obtained generally. No coal or lignite was seen. No stone quarries were found. Much loose stone and boulders are scattered along the shores of the Saskatchewan. No economic minerals were discovered. Very little game was seen, bear, as usual, are common. Deer of several varieties are sometimes killed. Birds are not numerous. Not many indications of fur-bearing animals were observed.—*G. B. Abrey, D.L.S., 1904-5.*

Range 25.

Township 4.—This township is approached by trail from Moosejaw, 72 miles to the north. The soil is sandy loam, with clay subsoil. Adapted for mixed farming. The surface is highly rolling open prairie. A lake and numerous sloughs contain good water. There is no timber of any quantity or quality, but hay of good quality is very plentiful. There is no water power. Climate is dry and bracing and there are no summer frosts. Fuel is conveniently obtained from bush to the west. No coal, minerals or exposed rock was found. Prairie chickens and ducks are fairly plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 5.—The soil is black loam and some sandy loam with clay subsoil. The surface is highly rolling, broken prairie, with numerous ravines, suitable for mixed farming. There is no timber of any quantity or quality. Hay of good quality is very plentiful. There is a large lake in this township and numerous sloughs with good water. No water power exists in the township. The climate is dry and bracing and there are no summer frosts. Fuel is obtained from the bush about 20 miles to the west. No coal, stone or minerals were noticed. Prairie chickens and ducks are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 9 (N. By.)—The soil is mostly sandy loam, with gravelly and clay subsoil. This township is approached by trail from Moosejaw, forty miles north. The surface is broken, highly rolling prairie, rather stony and is adapted for mixed farming. There is no timber. Good hay is plentiful. The sloughs contain good water.

There are no water powers. The climate is dry and bracing and there are no summer frosts. Fuel is obtained from the southwest. No coal, stone quarries or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 10.—This township is approached by trail from Moosejaw, thirty-six miles north. The soil is sandy loam and some black loam with sandy, gravelly and clayey subsoil. The surface is rough, rolling, broken prairie, rather stony in places and is adapted for mixed farming. There is no timber. Hay of good quality is plentiful. Small lakes and sloughs abound with good water. There are no water powers. The climate is dry and bracing and there are no summer frosts. Fuel is is obtainable from the southwest. No coal, stone quarries or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 11.—This township is approached by trail from Moosejaw, twenty-eight miles to the north. The soil is black loam, some sandy loam, with clay subsoil. The surface is highly rolling broken prairie. There is no timber. Hay of good quality is plentiful. There are numerous sloughs with good water. There are no water powers. The climate is dry and bracing with no summer frosts. Fuel is obtained from the southwest. No coal, minerals or stone quarries were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 12.—This township is approached by trail from Moosejaw, twenty-four miles north. The soil is sandy loam, with clay subsoil and is adapted for mixed farming. The surface is highly rolling, broken prairie. There is no timber. Hay of good quality is plentiful. There are numerous sloughs with good water. There are no water powers. The climate is dry and bracing and there are no summer frosts. Fuel is obtainable from the southwest. No coal, stone quarries or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Range 26.

Township 10.—The soil is sandy loam, with clay subsoil and is adapted for mixed farming; the soil in section 8 is alkaline. The surface is highly broken prairie. There is no timber of any quantity or quality. Hay of very good quality is very plentiful. There are numerous sloughs containing good water. There are no water powers. The climate is dry and bracing and there are no summer frosts. Fuel can be obtained from bush six miles distant. No coal veins, stone quarries or minerals were observed. Prairie chicken are fairly plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 11.—This township is approached by trail from Moosejaw, thirty miles north. The soil is sandy loam, twelve inches deep, with clay and gravelly subsoil and is adapted for mixed farming. The surface is highly rolling, broken prairie. There is no timber of any quantity or quality. Hay of good quality is very plentiful. There are about seven small lakes and numerous sloughs with good clear water. There are no water powers. The climate is dry and bracing and there are no summer frosts. Fuel is obtained from bush to the southeast. No coal, stone quarries, or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 12.—This township is approached by trail from Moosejaw, twenty-four miles north. The soil is sandy loam with clay subsoil and is adapted for mixed farming. The surface is highly broken, rolling prairie. There is no timber. Hay of good quality is plentiful. There are numerous sloughs with good water. There are no water powers. The climate is dry and bracing with an even temperature and no summer frosts. There is no timber of any quantity or quality. Fuel can be obtained from bush six miles distant. No coal veins, stone quarries or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 50.—This township is reached by a trail from Prince Albert going north, which in summer skirts around several marshes which the winter trail crosses, I do not know the condition of the summer trail, having travelled only over the winter trail which is used by the lumbermen who are operating in limits farther north. The soil is generally of a good quality and will be well suited for agricultural purposes. The surface is slightly rolling, with no high hills. There are many good hay swamps scattered throughout the township, the high land is all timbered with poplar suitable for fuel and fencing, but very little suitable for building purposes, being mostly under nine inches in diameter. The water is fairly good, but in some places tainted with alkali. Little Red river enters the township from the north in section 32 and crosses southeasterly through the township, passing out in section 1. The average width of this river is about one chain, is very crooked with a rapid current and there are no falls. There are no water powers, minerals or quarries. There were a few red deer seen in the township.—*David Beatty, D.L.S., 1904.*

Township 51 (E. By.)—The country is rolling, without any high hills, but with many willow flats or sloughs. The soil is generally a brown loam and will be good farming land. The timber is mostly poplar, but very little of it exceeds six inches in diameter and is of no commercial value except for fuel and fencing. There are no minerals, quarries or water powers.—*David Beatty, D.L.S., 1904.*

Township 52 (N. & E. Bys.).—The country is rolling without any high hills, but with many willow flats or sloughs. The soil is generally a brown loam and will be good farming land. The timber is mostly poplar, but very little of it exceeds six inches in diameter and is of no commercial value except for fuel and fencing. There is some jackpine in patches along Bittern creek, but of a poor quality. There are no minerals, quarries, or water power. Indians say there are moose, elk and red deer.—*David Beatty, D.L.S., 1904.*

Range 27.

Township 10.—This township is approached by trail from Moosejaw, thirty miles north. The soil is generally sandy loam averaging twelve inches deep, with clay subsoil and is adapted for mixed farming. There is no timber. Hay of good quality is plentiful. The climate is dry and bracing and there are no summer frosts. Fuel can be obtained from bush to the south. There are numerous sloughs containing good water. No coal, stone quarries or minerals were observed. Prairie chicken and duck are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 11.—This township is approached by trail from Moosejaw, thirty miles north. The soil is sandy loam, with some black loam, having clay subsoil and is adapted for mixed farming. The surface is highly rolling, open prairie. There is no timber. Hay is plentiful and of good quality. There are numerous sloughs containing good clear water. There are no water powers. The climate is dry and bracing with an even temperature and no summer frosts. Fuel is obtained from bush about six miles distant. No coal, stone quarries or minerals were observed. Prairie chicken and ducks are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 12.—This township is approached by trail from Moosejaw, twenty-four miles north. The soil is a sandy loam generally, but a black loam in some places, with a clay subsoil and is adapted for mixed farming. The surface is highly broken, open prairie. There is no timber. Hay is plentiful and of good quality. There are numerous sloughs containing good water. There are no water powers. The climate is dry and bracing, with an even temperature and no summer frosts. There is no timber of any quantity or quality. Fuel can be obtained from bush six miles distant. No coal veins, stone quarries or minerals were observed. Prairie chicken and ducks are fairly plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 50.—This township may be reached from Prince Albert by the Sturgeon lake road, which passes through the western part of the township, or it may be reached in the winter by what is called the Shannon trail, which passes about the centre of the township from south to north. The country is fairly level, with numerous ponds and marshes, many of which are hay swamps in dry seasons. The greater part of the township will be better adapted for grazing than agricultural purposes. About one-third of the township is timbered with jackpine comprising the greater part of the southeast quarter and the centre. The best half of the pine has been cut for railroad ties. The part timbered with jackpine is sandy, while the part timbered with poplar and willows is loam suitable for farming purposes. The water in Shell river which crosses the southwest corner of the township, is fresh, but that in many of the ponds and marshes is tainted with alkali. There are no water falls, minerals or quarries in the township. There are a few red deer.—*David Beatty, D.L.S., 1904.*

Township 51.—This township may be reached from Prince Albert by the Sturgeon lake road which passes through the western part of the township, or it may be reached in winter by what is known as the Shannon trail passing north and south through about the centre of the township. Sturgeon river passes through the west side of sections 19, 18, 7 and 6 and Little Red river passes diagonally across section 36. The water in both these rivers is good, but that in most of the ponds and marshes is tainted with alkali. The surface of the country is generally level and timbered with poplar and willow, the soil is mostly a loam suitable for farming purposes also well adapted to grazing with many small hay swamps in dry seasons. The greater part of the timber is suitable only for fuel and fencing, but there are small clumps with trees from ten to twelve inches in diameter that would be suitable for building. There are no water falls, minerals or quarries in the township. There are a few red deer.—*David Beatty, D.L.S., 1904.*

Township 52 (N. By.)—The country is rolling without any high hills but with many willow flats or sloughs. The soil is generally a brown loam and will be good farming land. The timber is mostly poplar, but very little of it exceeds six inches in diameter and is of no commercial value except for fuel and fencing. There are no minerals, quarries or water powers.—*David Beatty, D.L.S., 1904.*

Range 28.

Township 3.—This township is approached by trail from Moosejaw, seventy miles north. The soil is sandy loam with clay subsoil and adapted for mixed farming. There is no timber of any quantity or quality. Hay is fairly plentiful. Water is to be obtained of good quality. There is no water power and very few sloughs. Climate is dry and bracing, no summer frosts were experienced. Fuel is obtained from bush convenient to the west of this township. There are no coal veins, stone quarries or minerals. Prairie chickens and ducks are fairly plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 6.—This township is approached by trail from Moosejaw, 60 miles north. The soil is sandy loam with clay subsoil suitable for mixed farming. The surface is highly broken, open prairie and there is no timber. Hay of good quality is fairly plentiful. There are numerous sloughs with good water, but no water power exists in the township. The climate is dry and bracing and there are no summer frosts. Fuel is obtained conveniently from bush to the west. No coal, stone or minerals were found. Prairie chickens and ducks are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 50.—This township can be reached by way of the Sturgeon lake road from Prince Albert, which enters the township from the east in section 14 and passes through sections 25, 26 and 35, and the Green lake trail which branches off the Sturgeon lake road, passes through sections 1, 2 and 3. Sturgeon river enters the township from the north in section 35 and joins Shell river (in section 26) which runs southeast through sections 27, 26, 25 and passes out of the township through section 24. Both of these streams have a rapid current and are each about one chain wide. The surface is rolling and timbered with alternate areas of jackpine and poplar. The greater part of the township is light and sandy soil and will be better adapted to grazing than agricultural purposes. There are no hay swamps in the township. The water is good. There are no water powers. minerals or quarries in the township. There are a few red deer.—*David Beatty, D.L.S., 1904.*

Range 29.

Township 4.—This township is approached by trail from Moosejaw, 72 miles north. The soil is sandy loam, some black loam with clay and gravelly subsoil. The surface is highly rolling, broken prairie suitable for mixed farming. There is no timber. Hay is of good quality and plentiful. There is a large lake and numerous sloughs with good water. No water powers exist in the township. Climate is dry and bracing, no summer frosts were experienced. Fuel is obtained from bush to the west. No coal, exposed rock or minerals were found. Chickens (prairie) and ducks are plentiful.—*A. F. Martin, D.L.S., 1904.*

Township 5.—This township is approached by trail from Moosejaw, 65 miles north. The soil is chiefly sandy loam with clay and gravelly subsoil, adapted for mixed farming. No timber of any quantity or quality exists, but there is some small poplar up to 3 inches in diameter and some ash. Hay of good quality is plentiful. There are numerous sloughs and springs with good clear water. The surface is very broken, rolling, prairie, scrubby and alkaline in parts. There is no water power. Climate is dry and bracing and there are no summer frosts. Fuel, poplar is to be obtained conveniently. No coal veins, exposed rock or minerals were noticed. There are three houses in section 36. Prairie chickens and ducks are fairly plentiful.—*A. F. Martin, D.L.S., 1904.*

TOWNSHIPS WEST OF THE THIRD MERIDIAN.

Range 1.

Township 49.—This township is reached from Prince Albert by what is known as the Shell brook road, which is a good graded road built by the government and crosses Shell river by an iron bridge. This road enters the township on section 13 and crosses to the west, leaving it in section 18, also what is known as Green lake trail enters the township from the north on section 35 and crosses said section westward and section 34 leaving the township on section 33 to the north. The Saskatchewan river forms the greater part of the south boundary of the township. The soil is sandy and will when cleared be better adapted for grazing than for agricultural purposes. There is a marsh with tamarac and willows scattered throughout which enters the township near the northeast angle and crosses diagonally to and across section 7. The surface is generally rolling and timbered principally with jackpine, the best part of which has been taken out for railroad ties. There are scattered small areas of poplar principally in the northeast quarter of the township. I saw no hay swamps in the township; the water is good. There are no water powers, minerals or quarries. There are a few red deer.—*David Beatty, D.L.S., 1904.*

Township 50.—This township can be reached by what is known as the Green lake trail, which branches off to the west from Sturgeon lake road about 12 miles north of Prince Albert. This trail enters the township in section 1 and passes out into township 49 in section 2 and again into the township in section 4, thence northwesterly passing out in section 7. Shell river crosses the northeast corner of the township entering from the north in section 35 and passing out in section 36. The soil is principally a good loam and is well suited for agricultural purposes. The surface is rolling and well timbered with poplar suitable for fuel and fencing, but not exceeding 9 inches in diameter. There are very few hay marshes in the township, the principal one being in sections 12 and 13. The water is mostly fresh, but in some places slightly tainted with alkali. There are no water powers in the township. There are no minerals or quarries. There were a few red deer seen in the township.—*David Beatty, D.L.S., 1904.*

Range 2.

Township 51 (E. By.)—The country is rolling and timbered with poplar and spruce, but it has been cut over by the lumbermen and there is very little merchantable timber left. The soil is generally light, being a sandy loam, but in places a good brown loam and will make fairly good farming land. There are no minerals, quarries or water powers. Indians say there are moose, elk and red deer in this district.—*David Beatty, D.L.S., 1904.*

Township 52 (E. By.)—The country is rolling and timbered with poplar and spruce, but it has been cut over by the lumbermen and there is very little merchantable timber left. The soil is generally light, being a sandy loam but in places a good brown loam and will make fairly good farming land. There are no minerals, quarries or water powers. Indians say there are moose, elk and red deer in this district.—*David Beatty, D.L.S., 1904.*

Range 10.

Township 27.—This township can be reached by the old Bone trail from Saskatoon. It is heavily rolling, open prairie in the west and rolling in the east. The northern part is rolling and broken near the valley of Red Deer lake, crossing sections 31, 32 and 33. A marshy lake crosses sections 17, 16 and 21. The soil is sandy loam with sandy subsoil. Class 1 and 2 and in places through the centre of the township, there is a clay loam with clay subsoil. It is very good land for farming. There is no timber, but hay can be cut in the marshes in a dry season. There is a permanent supply of good water in the township. There is fresh water in all the marshes, but it is alkaline in Red Deer lake and unfit for drinking. There are no springs. There are no streams in the township and no water power. No summer frost was experienced and none until very late in the fall. There is no fuel except along Red Deer lake. No coal or lignite veins were noticed in the township and there are no stone quarries or minerals. Wild ducks, prairie chickens and antelope are found.—*J. A. Côté, D.L.S., 1904.*

Township 28.—This township can be reached by the old Bone trail from Saskatoon. The north is rolling and broken, open prairie to quite level down in the valley of Red Deer lake which crosses sections 6, 4, 3, 10, 2, 11 and 12. Its valley is from 140 feet to 150 feet deep and one mile wide. The south bank is well wooded with poplar, ash and willow. South of the lake the country is heavily rolling and broken. Soil clay loam with clay subsoil in the east and north. In the south and west there is sandy loam with sandy subsoil, class 1 and 2. Very good land for farming. There is no timber. The hay marshes are scattered along the north boundary. There is a permanent supply of good water in the township. There is fresh water in all the marshes, but alkaline in Red Deer lake and unfit for drinking. There are no springs and no streams in the township. There was no summer frost and none until very late in the fall. There is fuel only along Red Deer lake. No coal or lignite veins were found in the township. No stone quarries suitable for quarrying and no minerals. Wild ducks, prairie chickens and antelope are found.—*J. A. Côté, D.L.S., 1904.*

Township 29.—This township is best reached by the Bones trail from Saskatoon, though Hanley will be a more convenient post office so soon as there is a ferry across the Saskatchewan nearby. The surface of this township is rather a gentle rolling prairie—well dotted with sloughs of various sizes. The soil is generally a rather light clay loam and would seem to be well adapted to agriculture and kindred pursuits. Wood, for fuel, &c., had to be brought from the banks of the Saskatchewan, some fifteen miles away, there being none in the township. A few antelope and some wild fowl were seen. There are no creeks nor water powers in this township, but at the time of survey there was plenty of water in the sloughs. No economic minerals were seen.—*M. L. Gordon, D.L.S., 1904.*

Township 30.—This township is best reached by the Bones trail from Saskatoon, though Hanley would be nearer when there is a ferry at the river. In wet weather the trails in the country spoil quickly, but in dry weather there is good travelling even over the prairie. Generally speaking the soil in this township is fine clay loam, well adapted to agriculture. Along the creek, which flows diagonally across the township, there is however a good deal of stone, from gravel to boulders in size. This creek and the numerous sloughs would supply ample water for domestic use, &c., but none for water power. The surface of the township is a rolling prairie, broken by coulées, the largest being that in which the creek-bed lies. There is no timber in the township; settlers haul wood for fuel and poles from the banks of the Saskatchewan, fifteen miles away. No minerals were noticed and very little game. No frosts were experienced during the survey (June). Several settlers have located in this township and there would be many more were a railroad assured.—*M. L. Gordon, D.L.S., 1904.*

Township 31.—Using Saskatoon as a base this township is reached by taking the Bones trail and the branch of it skirting the west side of a lake; by this route it is about 65 miles. A trail east of the lake would be much shorter, but on the completion of the ferry now building on the Saskatchewan in township 31, Hanley would be a more convenient town and post office, being only about half the distance to Saskatoon. The soil varies, being a rich loam in the southwest part of the township, very sandy in the eastern part and heavy clay in the northern part. The southern, western and central parts of this township should make excellent farming land, while the eastern part would make good grazing land, but the northern part would appear to be little good for anything. The country is generally a rolling prairie, but the north part is mostly a boggy flat, broken by sloughs and muskegs. There is no timber only a very little scrub but there is a limited supply of poplar poles to be had in the small hills near the east outline; to these the settlers also have to look for fuel. There is a good sized creek flowing north through this township; the current is slow and it is not suited for power, though it is quite deep (4 or 5 feet, and so is not likely to dry up. Sloughs are numerous, mostly of good water. No frosts were noted. No minerals were seen nor any stone. Game is scarce, though a few antelope were seen and one or two deer. Some ducks and prairie chickens were also seen. Settlers are pressing into the surrounding country and this township is likely to be soon settled. The settlers are mostly from the United States, and they say it is a fine grain-growing country, and are encouraging their friends to come over and settle.—*M. L. Gordon, D.L.S., 1904.*

Township 32.—The best route for reaching this township, distant about 45 miles from Saskatoon, is by way of the Bones trail, generally in good condition, except in the spring. This township did not appear to be suitable for any kind of farming. A large alkaline lake covers about one-half of its acreage and the remaining part is comprised mostly of large muskegs and sand hills. The soil is generally a heavy alkaline gumbo , with the exception of the northeast section in the sand hills, where it is very light and sandy. The surface is flat near the lake, becoming undulating on approaching the sand hills. Some good bluffs of poplar timber were found in the sand hills, size 4 to 8 inches. Large quantities of hay can be cut in the many swamps and sloughs that surround the lake. The lake water is alkaline, drinkable in the spring months, but later on becomes too strongly alkaline and gives forth a very offensive odor, which can be smelt several miles from the lake. A large creek which drains the neighbouring townships enters the lake at its southern extremity and averaged one and a half chains wide, 6 feet deep and a current of one mile per hour. No outlet to the lake was observed. No water powers. Climate experienced was fine warm days and cool nights and no summer frosts. Fuel in the shape of dry poplar wood can be obtained from the several bluffs in the sand hills, but not in any great quantity. No stone quarries or minerals were located. The lake abounds in waterfowl and several antelope were seen. The survey of this township was commenced in May, but on account of the very wet character of the country, slow progress was made, and consequently it was not proceeded with until August, when it was considerably dryer.—*M. L. Gordon, D.L.S., 1904.*

Township 33.—This township is best reached from Saskatoon by the Bones trail, making the distance about forty miles. The trail is liable to be boggy in spring time, but is in good condition at all other times. The soil is, as a rule, a light loam and appears to be suitable for wheat cultivation. The land is gently undulating, with many scattered sloughs. No timber is to be found in this township; wood, however, can be procured, distant 5 to 10 miles on the east side of Goose lake. Hay in the form of slough grass may be cut in the various sloughs that abound in this township. The only water readily obtained is the slough water and the water from an alkaline lake. It appears, however, that good well water can be had at a depth of about 30 feet. There are no water powers; no minerals were seen or stone quarries. The climate appears to be good; such grain as was seen in the neighbourhood was doing well, although a little late. Game in the shape of prairie chickens, ducks and antelope were seen.—*M. L. Gordon, D.L.S., 1904.*

Township 34.—This township is best reached by a branch of the Bones trail from Saskatoon, about forty miles away. This trail is very good in dry weather, but soon spoils with rain and in the spring was quite impassable, unless it were for very light rigs. The surface of the township is gently rolling prairie with a few willows along the creek as its only break. The soil is a rich sandy loam and seems to be well suited to farming. There is no timber in the township, poplar poles and wood (the only fuel) being hauled 10 or 15 miles from adjacent townships. Eaglehill creek runs through the township. It has an average width of about fifty links, is two feet deep and has a current of about two miles per hour; the bottom is very soft and not safe for teams. The creek flows in a marshy flat about half a mile wide; this is worse than the creek and must be quite impassable in the spring. However, it makes beautiful hay meadows and so is a boon to the farmers. Sloughs are numerous. There are no water powers, no minerals of economic importance were seen nor any game beyond a few wild fowl. The climate seems good, several people having crops that appeared to be doing nicely. I am told that most, (in fact nearly all) of the ¼ sections open for entry are squatted on, but a great many of the squatters must have been absent at the time of survey.—*M. L. Gordon, D.L.S., 1904.*

Range 11.

Township 27.—This township can be reached by the old Bone trail from Saskatoon. It is undulating to rolling, open praire with clay loam soil and clay subsoil. Classes 1 and 2. It is very good land for farming. There is no timber and the hay is very scattered. There is a permanent supply of good water in the township. There is fresh water in the marshy lake crossing sections 13 and 24, but it is very scarce in the west and there are no springs. There are no streams in the township and no water power. There is no summer frost and none until very late in the fall. There is no fuel except along Red Deer lake. No coal or lignite veins were found in the township and no stone quarries or minerals. Wild ducks, prairie chickens and antelope are found.—*J. A. Côté, D.L.S., 1904.*

Township 28.—This township can be reached by the old Bones trail from Saskatoon. It is gently rolling to undulating, open prairie. The western end of Red Deer lake crosses sections 1, 12, 13, 24, 23, 26, 27, 34, 33, 28 and 29. In sections 12 and 13 the valley is generally 150 feet deep. The east part has a soil of clay loam about 6 inches deep, with clay subsoil. Class 1. In the west, the subsoil is sandy. Class 2 and 3. It is very good land for farming, except on both sides of Red Deer lake, where it is stony. There is no timber. The hay marshes are scattered. There is no permanent supply of good water in the township. There is no fresh water. In Red Deer lake the water is alkaline and unfit for drinking. There are no springs and no streams in this township. No summer frost was experienced and none until very late in the fall. There is no fuel except along Red Deer lake. No coal or lignite veins were found in the township. We saw no minerals or exposed rock. Wild ducks, prairie chickens and antelope are found.—*J. A. Côté, D.L.S., 1904.*

Township 29.—The best method of arriving at this township at present is by way of the Bones trail, from Saskatoon, distant about 80 miles. Hanley, however, is considerably closer and should a ferry service be instituted across the Saskatchewan, the latter place would be the more convenient starting point. The soil is a heavy clay loam and ought, with good tillage, to give good wheat crops. The surface of the country is undulating. Hay can be obtained in the numerous sloughs and in the creek valley. Fresh water was found in some sloughs, but the majority were alkaline. A small sluggish alkaline creek flows through a marshy valley in a northeasterly direction towards a lake, average 3 feet deep, 50 links wide, current 1 mile per hour. It is very boggy and extremely hard to cross with a horse and vehicle. The valley is under water in the spring. There is no water power. Climate: fair, warm days, with cold nights and no summer frosts were experienced. Fuel, in the shape of poplar and willow, is obtained in the sand hills in the northwest in township 31, range 11, but not in any quantity. No coal or lignite veins were seen. No stone quarries or minerals were located. Many ducks, geese and antelope were seen.—*M. L. Gordon, D.L.S., 1904.*

Township 30.—This township is best reached from Saskatoon, distant about 70 miles, by means of the Bones trail, which is generally in good condition, except in the spring months. The soil is a good quality of clay loam and appeared to be well adapted for raising wheat. The surface of the ground is gently undulating. No timber is to be found in this township. Hay can be cut in almost all the various sloughs. Fresh water can be obtained by digging wells down about 40 feet and from some of the sloughs. Surface water appears to be very plentiful in the spring and becomes scarce towards the end of the summer. There is no water power. Climate: nice warm days and cool nights and no summer frosts were experienced. The only fuel available is poplar and willow wood obtained in the sand hills to the northwest in township 31, range 11, west of third meridian, which with a large influx of settlers would soon be cleared out. No coal or lignite veins were noticed. No stone quarries or minerals were seen. Game can be had in abundance in the shape of ducks, geese, antelope, &c.—*M. L. Gordon, D.L.S., 1904.*

Township 31.—The best route for reaching this township from Saskatoon, distant about 60 miles, is by way of the Bones trail, generally in good condition, except in the spring. The soil is a medium clay loam, with the exception of the northwest portion in the sand hills where it is very sandy. The surface of the country is rolling, much broken by a deep coulée running through it in a northeasterly direction and by the sand hills in the northwest. Much good timber is found in the sand hills, being poplar up to 12 inches in diameter and willow (small). This timber, however, being the only supply for many miles around would soon be exhausted should there be a large influx of settlers. Hay can be cut in almost all the numerous sloughs that abound in this township. Almost all the surface water is slightly alkaline. Good water can be obtained by digging about 40 feet. A small dry creek runs in a north-easterly direction. There is no water power. Fine days and cool nights and no summer frosts were experienced. Fuel, in the shape of wood, can be procured from the sand hills. No coal or lignite veins were seen. No stone quarries or minerals were located. Much game, such as ducks, geese, antelope, &c., were seen.—*M. L. Gordon, D.L.S., 1904.*

Township 32.—The best route for reaching this township, distant about 55 miles from Saskatoon, is by way of the Bones trail, which is generally in good condition, except in wet weather. The soil is chiefly a rich loam with clay subsoil and appeared well adapted for raising wheat. The surface of the prairie is undulating, with sand hills in the southwest corner. A few scattered clumps of poplar are to be found in the sand hills, but the timber is of small size. Hay can be cut in most of the sloughs. Good water can be found in most of the sloughs in the spring months, it would appear, however, that this would be dried up in the summer months, and in order to insure a permanent supply wells would have to be dug. The water from a lake (alkaline) in this township is only good in the spring months. There is no water power. Fine warm days and cool nights and no summer frosts were experienced. The only fuel readily available is dry poplar, to be found on the sand hills about 5 miles to the southwest, but not in any great quantity, so that it would be speedily exhausted should there be any large influx of settlers. No stone quarries or minerals were located. Game in the shape of ducks and antelope were seen.—*M. L. Gordon, D.L.S., 1904.*

Township 33.—This township is best reached by trail from Saskatoon, made by the settlers, but not named. I was not over this trail, but it is said to be a good one. The surface of the township is rolling prairie, with a few patches of scrub and open bluffs of land along the creek. The wood in these bluffs is Manitoba maple and seems to be of little use for anything. Wood for fuel and poles has to be brought about 12 miles, either from the north or south. Eaglehill creek traverses the township in the north half of it. The creek flows through a marshy flat in a well defined valley about half a mile wide at the bottom. This creek is very dangerous to cross on account of the bottom, but it is not large. The water in it is not very good. The creek furnishes some good hay flats, as do some of the sloughs of which there are enough to furnish water. No minerals of value were seen, nor any game. There is no water power. There were a good many settlers in this township and it will probably soon be taken up.—*M. L. Gordon, D.L.S., 1904.*

Township 34.—The best route to reach this township, distant about 50 miles from Saskatoon, is by way of the Smithville trail and a new trail around the north end of Colines lake, the former trail is well graded and generally in good condition, the latter is not good in the spring. The soil is a fine loam with clay subsoil and appeared to be very suitable for raising wheat. The surface of the country is rolling prairie, with occasionally a few willows around the sloughs. No timber is to be found in the township. Hay can be cut in most of the sloughs. The greater number of the sloughs are fresh water, and good water can be obtained also by digging wells down about 40 feet. There is no water power. Fine warm days and cool nights and no summer frosts were experienced. The only fuel available is soft maple, about six miles south in township 33, range 11. Timber for building purposes cannot be obtained nearer than 'poplar bush,' about 15 miles northeast. No stone quarries or minerals were located. Antelope, prairie chickens, geese and ducks were seen.—*M. L. Gordon, D.L.S., 1904.*

Range 12.

Township 29.—This township is reached from Saskatoon, 75 miles distant by the Bones trail and that branch of it striking the west side of Goose lake. Hanley would be nearer, but at the time of survey there was no trail and no ferry across the Saskatchewan. The soil is generally a heavy clay loam and is not so good, apparently, as in some of the country north, though doubtless it would prove fair farming land were it worked. The country is mostly undulating prairie, but the surface is very rough or hummucky like old slough bottom. We broke four rigs driving about the township. There is no timber of any kind—poles and fuel are hauled about 10 miles —larger timber there is none, and the settlers have to freight out lumber from Saskatoon. Sloughs are numerous in this township, but at the time of survey (July) many of them were quite dry and others nearly so. There is a small sluggish creek of not very good water crossing the southeast corner of the township. The climate is good. There is no water power. No coal or economic mineral was seen, but there were many small stones and boulders, evidently carried by water some time in the past to their present position. A few duck were seen, and an occasional antelope, but usually in the distance.—*Geo. A. Grover, D.L.S., 1904.*

Township 30.—This township is best reached by the Bones trail from Saskatoon, taking that branch of the trail which goes west of Goose lake and again turning due west along the north boundary of township 30, range 11. This is a fairly good trail in fine weather, but rain quickly spoils it. The soil varies from light sandy loam in the north part of the township to a very heavy clay loam in the south, all of it would be well suited for farming, though the southern part might prove heavy to break. The surface is gently rolling prairie, very lumpy ground, largely old slough bottoms. Sloughs are evidently very numerous in the spring, but at the time of survey (July) only the larger ones contained water; some of these are probably never dry. There is no other water in the township. The fuel most used is wood, which has to be drawn some fifteen or twenty miles. There were no economic minerals noted in the township. Very little game was seen—a few antelope. This township is being rapidly settled and should a railroad be built near it soon, will probably prove a great wheat-growing country, but it would seem that the railroad is essential to its development, as the country is not suitable for cattle raising.—*Geo. A. Grover, D.L.S., 1904.*

Township 31.—This township is best reached by the Bones trail from Saskatoon, taking a westerly branch from township 34; the trail is very good except in wet weather, when it becomes almost impassable. The southern part of the township is gently rolling prairie, with a fine sandy loam. Soil: excellent land for the farmer. The northern and northeastern parts, however, are not so good, being mostly sand hill, with much poplar and scrub, especially in the northeast corner of the township. Eaglehill creek crosses the northwest corner of this township; it was an insignificant stream at the time of survey (July), but the bottom is bad—dangerous for horses. There is a very pretty lake on the north boundary of the township, section 35, which holds very good water, the best I have seen in the neighbourhood. No game was seen nor any minerals of economic importance. The poplar bluffs in the sand hills furnish fuel and some building material for all the adjacent country—the best is being rapidly culled out. This township will probably not be settled as soon as those adjacent on account of the sand hills, which are apparently only fit for grazing purposes. The survey stakes of the Grand Trunk Pacific cross the north end of the township—people are rushing into the country in anticipation.—*Geo. A. Grover, D.L.S., 1904.*

Township 32.—This township is reached by the Bones trail from Saskatoon, from which a well defined branch runs into the township. The surface of the township is rolling prairie, with sand hills and poplar bluffs in the southeast corner. The soil is a sandy loam and except in the sand hills spoken of, should make fine farms. There is a pretty little lake partly in section 2. Eaglehill creek runs through the west half of the township. At the time of survey (August) it was not large; 50 links wide and 3 feet deep, current 1½ miles per hour; but the bottom was soft and dangerous and the water seemed to have been much higher in the spring. No minerals of economic importance were seen. A few wild fowl and one or two deer were all the game noticed. Fuel is got from the poplar bluffs in the southeast corner of the township. There were several squatters in this township and I should think it would soon fill up.—*Geo. A. Grover, D.L.S., 1904.*

Township 33.—This township is best reached by trail west from Saskatoon, passing through Smithville and crossing Eaglehill creek on a bridge in township 35, range 10. This is a good trail in dry weather, but is easily spoiled by rain. The surface of the township is a rolling prairie getting gradually rougher as it approaches the Bear hills, which is slightly on the northwest corner of the township. Eaglehill creek flows through the southeastern portion of the township in a wide valley. This creek is not large, but the bottom is very bad and the least wet weather makes the valley bottom one large marsh—in places it appears to be a permanent marsh. There is no timber in the township nor other fuel. No minerals were noted. A few wild fowl were seen. There are no water powers. This township will undoubtedly soon be settled and furnish fine farms for many, but there is so much land that looks more promising, in the adjacent township, that this has so far received little attention.—*Geo. A. Grover, D.L.S., 1904.*

Township 34.—This township is easily reached by trail running almost due west from Saskatoon, made by the settlers. The surface of the country is a rolling prairie growing gradually rougher to the Bear hills. These hills do not appear to differ from the adjacent prairie except as to the degree of roughness and it is hard to say exactly where the rolling prairie becomes hills and vice versa. The soil is a clay loam not so attractive to the settlers as a lighter soil, but I fancy that in a few years it would produce good crops. The western part of the township is almost too rough for farming. There is one large lake in the township—running diagonally across the west half of it. I did not care to test the water in this lake as it had a most unpleasant odor. There were some good springs flowing into the west end of this lake, but there was no apparent outlet. The other lake in this township (secs. 24 and 25) is more like a marsh, but it is permanent water and seemed to be quite deep. There is no timber in the township either for fuel or building. An old cart trail was noticed in the township, apparently leading to Prince Albert—it has not been much used recently, but is well broken. Plenty of wild fowl were seen. There were no minerals of importance and no water powers.—*Geo. A. Grover, D.L.S., 1904.*

Range 13.

Township 29.—This township, like the rest of those in the south half of my contract, is best reached by the Bones trail from Saskatoon, keeping west of Goose lake and branching west again along the north boundary of township 30, then striking south. The country is exactly similar to the adjacent townships in my contract, gently rolling prairie. The soil seems rather heavy, but is said to be exactly similar to that of the Red river valley in Manitoba, if so this should become a great wheat-growing country with the advent of a railroad. There is no timber of any kind in the township, and wood for fuel has to be drawn from 10 to 15 miles. The only water in the township is in the sloughs, most of which were dry at the time of survey (July); generally the water is fairly good. There is a large slough or lake on the north boundary of the township—it seems to be permanent, though much grown up with tall grass. There were no minerals of economic importance seen and very few small stones even.—*Geo. A. Grover, D.L.S., 1904.*

Township 30.—This township is reached from Saskatoon by the Bones trail and taking the western branch. The soil throughout the township is a heavy sandy loam said to be excellent for wheat raising and general farming. At present the railroad is too far away, but settlers are coming in, in the hope that one will soon be built. The surface is gently rolling prairie, dotted with many sloughs, most of which were dry at the time of survey (July) though some looked as though they never dried up. Fuel is got from the sand hills in township 31, range 12—poplar poles and not a very great supply of that. There were no economic minerals seen. A few antelope and some duck were all the game seen.—*Geo. A. Grover, D.L.S., 1904.*

Township 31.—This township is almost 60 miles southwest from Saskatoon and is reached by one of the branches of the Bones trail. This trail is well broken and much used, but in wet weather is not a good one for heavy loads. The surface of the township is a rolling prairie, broken in the southwest part by coulées running into that of Eaglehill creek. This creek traverses the township from the southwest to the northeast, flowing in a deep valley about a quarter of a mile wide. The soil is a nice sandy loam, well adapted for agriculture. There were no frosts during the time of survey. No minerals of economic value were seen nor was any game. Fuel: poplar and poles can be got from the bluffs in the township to the east. Sloughs would furnish all the water necessary for settlers away from the creek. Hay could be cut in the sloughs and along the creek. At the time of survey there were no settlers in the township, but there is no apparent reason why it would not support a good many.—*Geo. A. Grover, D.L.S., 1904.*

Township 32.—This township is reached by a branch of Bones trail from Saskatoon. This is a very good trail in dry weather, but easily spoiled by rain. The soil is a light sandy loam and would appear to be excellent for farm purposes. The surface of the township is a gently rolling prairie in most parts. It is broken by quite a large ravine about two miles from the parallel to the south boundary. This ravine holds a dry creek which appears to be quite large at high water. There is no timber of any account in the township. Fuel and poles can be got from the poplar bluffs in township 31, range 12. No hay flats were noticed. but light hay could be cut almost any place. Water is scarce. No minerals or game were seen.—*Geo. A. Grover, D.L.S., 1904.*

Township 33.—This township is best reached by trail, almost due west from Saskatoon, made by settlers in the adjacent township. This is a very good trail except in wet weather. There is an old cart trail crossing the township, which would appear to lead to Prince Albert. It is well marked and good travelling, but has not been much used of late. The surface of the township is a rather heavy rolling prairie, increasing in roughness towards the north, where it gradually merges into what are known as the Bear hills. The soil is a clay loam throughout and should be good for agriculture, though not so easily worked as the lighter soil in some of the adjoining townships. There are no streams or water powers in the township and no timber of any size. Sloughs and ponds are, however, numerous and some of them were well covered with wild fowl. There were no minerals of economic importance seen.—*Geo. A. Grover, D.L.S., 1904.*

Township 34.—This township was reached by a good trail from Saskatoon, almost due west. The surface of the township is very rough and even hilly through what are known as the Bear hills, which lie largely in the south and southeastern parts of this township, appear to be merely an accentuation of the rolling character of the country. The soil is a clay loam. but owing to the roughness of the country it is not suited for farming. It might, however, be used for pasture. There were numerous springs seen in this township, which furnished excellent water, though unpleasant in smell owing to its being heavily charged with sulphuretted hydrogen. Numerous sloughs are scattered through the township and several small lakes. There was no timber, water power or economic mineral seen and no game except wild fowl.—*Geo. A. Grover, D.L.S., 1904.*

Range 14.

Township 27.—This township can be reached by the old Bone trail from Saskatoon. This township is undulating, open prairie. In the west part the soil is clay loam and clay subsoil; class 1. The east portion is sandy loam and sandy subsoil; class 1 and 3. Sections 30, 31 and 32 are crossed by a marshy lake of fresh water. This is very good land for farming and affords good pasturage. There is hay in marshes which can be cut in the dry seasons. There is a permanent supply of good water in the township. There is fresh water in the marshy lake crossing sections 30, 31 and 32, but there are no springs. There are no streams in the township and no water power. No summer frost occurs and none until very late in the fall. Fuel can be had only on the sandy hills in range 11. No coal or lignite veins were noticed in this township and no stone quarries or minerals. Game consists of wild ducks, prairie chicken and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 28.—This township can be reached by the old Bone trail from Saskatoon. The northern part is rolling prairie and the south portion is undulating. The soil is clay and sandy loam and clay with sandy subsoil, classes 1 and 2. A large marshy lake crosses sections 5, 8, 9, 10, 11, 14 and 13. The land is very good for farming. There is no timber. Hay can be cut in the marshy lake in dry seasons. There is a permanent supply of good water in the township. There is fresh water in the marshy lake. There are no streams in the township. There are no water powers. There are no summer frosts and no frost until late in the fall. The only fuel is in the Sandy hills, range 11. There are no coal or lignite veins in the township. There are no stone quarries or minerals. The game are wild duck, geese and prairie chicken and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 29.—This township can be reached by the old Bone trail from Saskatoon. This township is rolling to undulating, open prairie. The soil is generally clay and sandy clay loam on a sandy clay subsoil, class 2. Water is very scarce except in the southwest and the north. There is a large marsh in sections 29 and 30 and in section 9. This township is very good for farming. There is no timber. There is hay in the marshes and it can be cut in the dry seasons. There is a permanent supply of good water in the township. There is fresh water in the marshes in sections 29 and 30 and in section 9. There are no springs. There are no streams in the township. There are no water powers. There are no summer frosts and no frost until very late in the fall. The only fuel is in the Sandy hills, range 11. There are no coal or lignite veins in this township. There are no stone quarries or minerals. The game are wild duck, prairie chicken and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 30.—This township can be reached by the old Bone trail from Saskatoon. This township is rolling to undulating, open prairie. Soil is generally clay and sandy clay loam on a sandy clay subsoil, class 2. Water is hard to find in the eastern part, but in the west there is more, especially in a marsh crossing sections 7, 8, 17 and 18. Eagle creek crosses sections 31 and 33. In this creek the water is alkaline and unfit for drinking. There is fair farming land. There is no timber and the hay is very scarce in the east half. There is a little more in the west in the marsh mentioned, which can be cut in a dry season. There is a permanent supply of good fresh water to be had from this marsh, but there are no springs. There is no summer frost and none comes until late in the fall. There is no fuel except in the sandy hills in range 11. No coal or lignite veins were noted in this township, and no stone quarries or minerals. Wild ducks, prairie chickens and antelope are found.—*J. A. Côté, D.L.S., 1904.*

Township 31.—This township can be reached by the old Bone trail from Saskatoon. It is rolling, open country. Sections 6, 4, 10, 15, 14, 23 and 24 are crossed by Eagle creek, running into a deep valley. those sections are heavily rolling; soil, sandy with stones along the banks of the creek, class 4. A small watercourse crosses sections 31, 32 and 33. In sections 7, 8, 17, 20, 29 and 28 lies a marshy lake of fresh water. The soil is sandy and sandy clay loam on sandy subsoil, class 1. This township is very good for farming. There is no timber. The hay is very scarce in this township. A permanent supply of good water could not be found. In Eagle creek the water is alkaline and unfit for drinking. There are no springs or streams in the township. There are no water powers. There is no frost until very late in the fall. The only fuel is in the Sandy hills, range 11. There are no coal or lignite veins, no minerals or stone quarries. The game are wild duck, prairie chicken and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 32.—This township can be reached by the old Bone trail from Saskatoon. It is rolling to undulating open prairie. The northwest is heavy, rolling country. There begins the coteau du Missouri. Sections 4, 7, 8, 9, 10, 15, 20, 21, 22, 24, and 25 are springy and alkaline lands; all the other sections are of clay and sandy clay loam and class 1, 2 and 3. An old cart trail crosses sections 30, 29, 33 and 34. A few small creeks flow easterly through the north and south. There is some very good land for farming, but no timber. In this township the hay is very scarce and there is no permanent supply of good water. There are no springs or streams whatever and no water power. Frost occurs, but not until very late in the fall. Fuel can be found only in the Sandy hills in range 11. We saw no coal or lignite veins and no stone or minerals. Game consists of a few prairie chickens and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 33.—This township can be reached by the old Bone trail from Saskatoon, and lies on the Bear hills. It is all open prairie. The western part is heavy, rolling and hilly, much broken by lakes, sloughs and marshes. The soil is sandy, of classes 3 and 4. The eastern part is rolling with a light sandy soil, class 4. There are few quarters suitable for mixed farming, and the greater part is only fit for grazing. There is no timber. Scattered about there is a great number of small sloughs and marshes, where hay could be cut in dry seasons. The numerous small sloughs and marshes furnish a permanent supply of fresh water. In the lakes the water is alkaline. There are no streams, springs or water powers in the township. There is no frost in summer and only late in the fall. There is no fuel except in the Sandy hills in range 11. There are no coal or lignite veins, no stone quarries or minerals. The game are, wild duck, geese and prairie chicken, also a few antelope.— *J. A. Côté, D.L.S., 1904.*

Township 34.—This township can be reached by the old Bone trail from Saskatoon, and it lies on the Bear hills. It is very heavily rolling and broken by lakes, sloughs and marshes. Soil, sandy loam and sandy subsoil. Classes 3 and 4. There are few quarters good for mixed farming, but the greater part is fit only for grazing. There are a number of small hay sloughs and marshes, where hay can be cut in dry seasons. In the sloughs and marshes the water is fresh, but in the lakes it is alkaline. There are no springs or streams and no water power. Climate: frost only late in the fall. There is no fuel except in the Sandy hills in range 11. No coal or lignite veins and no stone quarries or minerals were found. Game: wild ducks, geese and prairie chickens and a few antelope.—*J. A. Côté, D.L.S., 1904.*

Range 15.

Township 27.—This township can be reached by the old Bone trail from Saskatoon. It is undulating, open prairie. Soil is clay loam with clay subsoil. Class 1. A creek or chain of small pools flows northerly through sections 30 and 31 to a marshy lake in the centre of township 28, range 15. This township is very good for farming. There is no timber. Abundance of hay can be cut in the dry seasons in the marshy lake which crosses sections 24, 25 and 36. There is a permanent supply of good water in the township and fresh water in the marshy lake, which crosses sections 24, 25 and 36, but there are no springs. There are no streams in the township and no water power. No summer frost occurs and none until very late in the fall. No fuel is found except in the Sandy hills in range 11. No coal or lignite veins were observed in this township. No stone quarries or minerals were noticed. Game consists of wild ducks, prairie chicken and antelope.—*J. A. Côté, D.L.S., 1904.*

Township 28.—This township can be reached by the old Bone trail from Saskatoon. The northern part is hilly prairie, a large marshy lake lies on sections 25 and 26. The east and south are undulating and rolling prairie. There is a lake crossing sections 4, 9, 10, 14, 15, 16, 17, 21, 22 and 23, and another crosses sections 18, 19, 20 and 29, and another one crosses sections 19 and 30. The soil is clay loam with clay subsoil, classes 1 and 2. The land is very good for farming. There is no timber. There is hay along the lake and it can be cut in dry seasons. There is a permanent supply of good water in the township. There is fresh water in the numerous small marshes. The lakes are alkaline. There are no streams in the township. There are no water powers. There are no summer frosts and no frost until late in the fall. The only fuel is on the Sandy hills, range 11. There are no coal or lignite veins. There are no stone quarries or minerals. The game are wild duck and geese, prairie chicken and a few antelope.—*J. A. Côté, D.L.S., 1904.*

Township 29.—This township can be reached by the old Bone trail from Saskatoon. The west part is heavily rolling and hilly and lies in what is called the Bad hills. The soil is sandy clay loam, with sandy clay subsoil and very stony; class 2 and 3. The eastern portion is rolling, open prairie soil clay and sandy loam, with sandy clay subsoil. Class 1 and 2. In the valley which crosses sections 26, 27, 22, 15, 10 and 9, there is excellent pasturage. There is some very good land for farming and except on the Bad hills it is very good for mixed farming. There is no timber and hay meadows are very scattered in the township. There is no permanent supply of good water in the township. The fresh water is very scattered. There are no springs and no streams in this township. There are no summer frosts and none until very late in the fall. There is no fuel except in the Sandy hills in range 11. No coal or lignite veins were found in the township. There is no stone suitable for quarrying and no minerals. A few prairie chickens and antelope are to be found.—*J. A. Côté, D.L.S., 1904.*

Township 30.—This township can be reached by the old Bone trail from Saskatoon. It is rolling open prairie, with sandy loam soil and clay subsoil. Class 1 and 2. Eagle creek runs through sections 29, 30, 33, 34, 35 and 36 into a valley about 60 feet deep. This valley is a quarter of a mile in width with clay loam soil and clay subsoil with stones, class 3 and 4. A few small marshes are scattered about. A small water course crosses sections 7, 9, 17 and 18 at the bottom of a deep ravine. There is very good land for farming in this township, but no timber. There is a little hay scattered through the township. There is no permanent supply of good water; the water in Eagle creek being alkaline and unfit for drinking, and there are no springs. There is no summer frost and none until very late in the fall. There is no fuel except in the Sandy hills in range 11. No voal or lignite veins were found in the township and no stone quarries or minerals. Wild ducks and prairie chickens and a few antelope were found.—*J. A. Côté, 1904.*

Township 31.—This township can be reached by the old Bone trail from Saskatoon. The eastern part is open, rolling prairie with very few marshes; classes 1 and 2. Sections 1, 2, 3, 4, 5 are heavy rolling and stony prairie; they are situated on the northern bank of the Eagle creek valley. Class 3. The southwest is gently rolling, open prairie, with a heavy clay soil and the northwest open rolling prairie with clay loam and clay subsoil. Class 1. The land is very good for farming purposes and produces fair pasturage. The coteau du Missouri borders the southern limit of section 19. A small creek running easterly crosses sections 31 and 36. No timber is to be found. Hay may be cut only in a few small hay marshes. In this township there is no permanent water, neither springs nor streams. No summer frost was noted. Frost occurs very late in the fall. There is no fuel except in the Sandy hills in range 11. No coal or lignite veins were found in this township and there are no stone quarries and no minerals. Prairie chickens and a few antelope are to be found.— *J. A. Côté, D.L.S., 1904.*

Township 32.—This township can be reached from Saskatoon by the old Bones trail. The northwest part is heavily rolling, the south and east quite rolling. Along the north boundary, one can find excellent pasturage, and fair farming land. The whole township is advantageous for farming purposes. Soil is a clay loam and clay subsoil. Classes 1, 2 and 3. Sections 11, 12, 13 and 14 are alkaline land. Rising more sharply on the north from sections 23 and 24 a considerable elevation is reached above the plain to the south and the east. There is no timber and very little hay. Although a rather small lake occurs in sections 22, 27 and 26, the water is scarce, for there are no springs or streams and no water power. There was no frost until very late in the fall. Fuel is to be found only in the Sandy hills, range 11. In this township we found no coal or lignite veins, no minerals and no rock in place. A few prairie chickens and antelope are the only game to be found.—*J. A. Côté, D.L.S., 1904.*

Township 33.—This township can be reached by the old Bone trail from Saskatoon, and it lies on the Bear hills. The east is heavy rolling to hilly country with many marshes scattered about; and is very stony in places. The west is heavily rolling to hilly and broken with open prairie; a good many ponds and marshes and very stony places are to be found in this part. The soil is sandy loam with sandy subsoil. Classes 2, 3 and 4. A small creek, course easterly, from a lake in section 9, crosses sections 3 and 2. The south part is hilly with a good soil and excellent pasturage. There is no timber. There are a great number of small hay marshes, where hay can be cut in a dry season. There is a permanent supply of good water in the township. The water in the numerous small sloughs and marshes is fresh, but it is alkaline in the lakes. There are no springs. The climate is fair, and frosts occur only very late in the fall. Fuel can be found only in the Sandy hills, range 11. There are no coal or lignite veins, no minerals and no stone quarries. Wild ducks and geese, prairie chickens and a few antelope are found. —*J. A. Côté, D.L.S., 1904.*

Township 34.—This township can be reached by the old Bone trail from Saskatoon. This township lies on what is called the Bear hills. The west part is open rolling prairie. The east is broken by ponds and marshes, and is a heavily rolling country in the south and rolling to the north. The soil of sandy loam is of classes 2 and 3 in the south and 4 in the north. There are few quarters good for mixed farming, but the greater part is fit for grazing. Scattered about there are a great number of hay sloughs and marshes, where hay can be cut in a dry season. There is a permanent supply of fresh water, in the numerous small sloughs and marshes; but no springs or streams whatever can be found and there is no water power. Climate: frost, none in summer, but late in the fall. No fuel except in the Sandy hills in range 11. No coal or lignite veins were observed and no stone quarries or minerals. Game: Wild ducks, geese and prairie chickens, a fe wantelope.—*J. A. Côté, D.L.S., 1904.*

Township 45.—This township lies about two miles east of the Battleford and Round hill trail. This trail is in good condition and the travelling after leaving it is easy. The soil is clay and black loam and is suitable for wheat and mixed farming.

The surface is rolling prairie, with scattered bluffs of small poplar and willow, probably about two-thirds prairie. There is no timber, but scrubby poplar scattered throughout the township. There is a small quantity of hay in the northern and western parts of the township. There is very little water in the township. What there is in sloughs and ponds is fresh, but hard, and that in the small lake on the north boundary is slightly alkaline. There are no water powers. The climate is similar to that in other parts of Saskatchewan, there are occasional summer frosts. Small poplar is the only fuel; it is found in bluffs scattered all over the township. There are no stone quarries or minerals. Prairie chickens and ducks were the only game seen.—*T. S. Gore, D.L.S., 1904.*

Range 16.

Township 27.—The soil in this township is very hard and dry, being chiefly hard clay. From the nature of the soil it is not well adapted for agriculture or grazing. The southeasterly portion would perhaps be good for crops if once broken up, yet the soil is very hard. The westerly portion is very hilly and undulating and in parts stony. The whole surface is open prairie without any timber or scrub of any kind on any part of it. Water is very scarce and is found only in a very few ponds, many of which are alkaline. There are no running streams on any part of the township. The general climate appears to be favourable and there would not be liability to summer frosts. Fuel is entirely wanting, as there is no timber of any kind. There were no coal seams or lignite observed on any part of the township, nor are there any stone quarries or minerals of any kind. Game is scarce, only an occasional antelope to be seen. The general rating of the township would at least be second class, on account of the hardness and dryness of the soil, and scarcity of fuel and water. There is a small spring on section 33, also on section 21, but the supply is very limited, as the water is soon dried up after it is away a few chains from the spring.—*James Warren, D.L.S., 1904.*

Township 28.—The soil in the township is very hard and dry, and on account of that is not well adapted for agriculture; and as there is not much grass the township is not favourable for ranching purposes. The surface is open prairie and is very hilly and undulating and in some parts the surface is stony, and no timber of any kind is to be found on the township. There are no hay lands or marshes, the only grass is about the ponds or sloughs. Water is not plentiful, but there are a few ponds that would yield a permanent supply, which in most cases is good, there being little alkali. There are no streams, consequently there are no water powers. There is no fuel of any kind to be found, as there is no timber nor are there any seams of coal or lignite. There are no stone quarries, but in many places there are a great many loose stones on the surface. Minerals of all kinds are unknown. Game is also scarce—only a few ducks on the ponds, and an occasional antelope. Taking this township as a whole, it would be a second or third-class township on account of the hardness of the soil, and scarcity of grass for cattle or grazing purposes.—*James Warren, D.L.S., 1904.*

Township 29.—The southerly portion of this township is very hilly and broken, having numerous ponds or sloughs. The northerly portion is not so uneven, being comparatively level, except part of the northwesterly portion. The soil in the township is generally hard clay and difficult to dig. The subsoil is also very hard, being There are no streams, consequently there are no water powers. There is no fuel of composed of whitish clay. The surface is all prairie; no timber or scrub of any kind being on the township. There are no hay marshes of any kind and the grass in most places is very short. There are several ponds of water, most of them being good, but some which contain a good deal of alkali. There are no streams of any kind, nor are there any water powers. The climate is favourable and

I would not consider the land to be liable to summer frosts, judging from the surroundings. There is no fuel of any kind, the nearest wood we got was at the northwesterly angle of township 30, range 17, where there is a little in a very deep coulée, which is small in size. There are no stone quarries or exposed rock in any part of the township, nor are there any minerals to be found. Game is scarce—only a few antelope were seen occasionally. Taking the township as a whole it should be rated as second class, owing to the hardness of the soil and lack of grass or pasturage. It is difficult to say for what the township is best adapted; there are portions that might be available for cultivation once it was broken up, yet the soil is hard.—*James Warren, D.L.S., 1904.*

Township 30.—The surface of the township is very varied, from a hard clay prairie to a soft loam along the banks of Eaglehill creek. There are some sections that could be rated as first class, but the greater part is second class. Some of the land would be well adapted for growing grain, but the greater part is too hard for practical use. The surface is entirely prairie and has no timber or scrub of any kind on any part of the township. There are no hay lands or meadows, the grass being generally very short. Eaglehill creek runs through the southerly part of the township. Its course is very tortuous and the current slow, from one to one and a half miles an hour. The channel is deep and steep on the sides, which, with the soft bottom makes the crossing very bad and dangerous. The water is impregnated a good deal with alkali. In the springtime it floods a great deal of the flats on its banks. The current being so slow it is not possible to develop any water power. The climatic indications are favourable. There is no fuel on any part of the township. The only wood near is in the northwesterly part of township 30, range 17, where there is a very limited supply. There are no coal or lignite seams to be found in any part of the township nor are there any stone quarries, and surface stones are scarce. There is no game, only an occasional antelope and a few ducks on the creek and ponds. The township as a whole would be rated second class.—*James Warren, D.L.S., 1904.*

Township 31.—The soil in this township is generally very hard and dry, being chiefly hard clay and therefore would not be well adapted for agriculture or crop raising and on account of the hardness of the soil the grass is very short in most places; it would not be good for grazing. The surface is open prairie; there is no timber or scrub on any part of the township. The surface is in many places quite undulating and hilly. There is no hay land or grass that would be fit for cutting to be found on the township. There are some ponds in which the water is generally good, there being little alkali. There is one very large pond or lake in the township, which was traversed under the name of Green lake. The water in places is about 3 or 4 feet deep in the easterly part of the lake, but in the westerly part it is not so deep and is covered with grass. There are no streams and consequently no water powers of any kind. The climate of itself seems to be favourable and we saw no indications of any coal or lignite and no timber; the nearest of any quantity being on township 35, range 16. There are no quarries or fixed rock on any part of the township nor are there any indications of minerals. Game is scarce, only a few ducks on the ponds and lake. The Battleford and Swift Current trail runs through the northwesterly angle of the township; there are also some traces of old trails on other parts. —*James Warren, D.L.S., 1904.*

Township 32.—This township taken as a whole is very undulating, with very little level prairie. The greater part of the soil is very hard, only a few sections would be good for agriculture. The surface is entirely prairie, there being no timber or scrub to be found on any part of the township. There are no hay marshes or meadows, but in places the grass is fairly good for grazing during the early part of the season. There are many ponds which contain good water and the supply would be permanent, as many of the ponds are quite deep. There are no streams and no favourable mill sites.

The general indications of the climate are favourable and there would not be much chance of summer frosts. There is no fuel of any kind in the township. The nearest point where fuel could be had is in township 35, range 16, known as 'the 60 mile bush.' There is no fixed stone any where in the township, but in places there are loose stone on the surface. There are no minerals of any kind. The game is scarce, there being only a few antelopes and some ducks on the ponds. The Swift Current and Battleford trail goes through the township and is a very great convenience in travelling, as the trail is a first class one.—*James Warren, D.L.S., 1904.*

Township 33.—The soil in this township is clay, and in many places very hard. So on the whole it would not be suitable for agriculture, and the grass is generally short, except around the ponds, where the grass is longer. On the whole the township would be rated as second class, there being no first class land. The surface is undulating and in many places very hilly, and is all open prairie; there being no timber or scrub on any part of it. There are no hay lands or any grass that could be cut for hay. The water in the ponds is generally fresh, there being little trace of any alkali. There are no streams of any kind, so that the water supply would depend entirely on the ponds, some of which would appear to be permanent. Fuel is entirely wanting, as there is no timber, and no seams of coal or lignite were to be seen on any part of the township and there are no minerals of any kind. Game is also scarce, as we did not see any antelope or ducks. The Battleford and Swift Current trail runs through the township.—*James Warren, D.L.S., 1904.*

Township 34.—The soil in parts of this township is loamy or sandy and in other parts the soil is very hard; but many parts would be adapted for agriculture. The greater part of the township is prairie, but in the northerly part there is a little bush; but the trees are small and none of them would be of any commercial value, but some could be used for small buildings, also for fuel, but the timber is very small. There is a good deal of scrub and willow in places. There is a nice hay meadow in section 30. This is the only hay land in the township, and this is limited. There are many ponds, some of which are quite alkaline and others are good fresh water. There are no streams on any part of the township, and consequently no water powers. The climate seems favourable, but from the surroundings might be liable to summer frosts. The only fuel in the township is the small timber already referred to. There are no indications of coal or lignite, nor are there any indications of stone anywhere, or any signs of any minerals. Game is scarce, only a few duck were seen on some of the ponds. The northern part of the township is, in places, quite sandy, especially where it is scrubby. and yields no grass. Part of the township could be used for ranching purposes as there would be some shelter for cattle.—*James Warren, D.L.S., 1904.*

Range 17.

Township 27.—The soil in this township is very hard and in places stony, and on account of its hardness is unfit for agriculture and there being no grass of any account, is not suitable for grazing purposes. The surface is very hilly, which on account of the hard soil, makes the rating of the township very low, as a great deal of the soil is rated third class. There is no timber of any kind on any part of the township, as the surface is all open prairie. Neither is there any hay land on any part, and the grass generally is very short. Water is scarce, only a few ponds in which water can be got, which are generally fresh, but some are quite alkaline. There are no streams, and consequently there are no water powers. Fuel is scarce, in fact none at all to be got on the township. The nearest wood (and that of a very limited supply) is at the northwest angle of township 30, range 17, where there is a very little in a deep coulee. There is no coal or lignite to be seen. Neither are there any stone quarries or fixed rock of any kind, or any indications of minerals. An occasional antelope is the only game to be seen. Swift Current and Battleford trail runs through the township, which is a very great convenience, as the trail is very good.—*James Warren, D.L.S., 1904.*

Township 28.—The soil in this township is very hard and dry, being nearly all hard clay, and in some places stony. The soil is so hard that it is quite unfit for agriculture, and the grass being short would not be good pasturage, and would be rated as a second of even a third class township. The surface is very much broken with hills, there being no level land on any part of the township, and there is no timber or scrub. The nearest timber of any quantity is on township 35, range 16. There is a very limited supply in the northwest corner of township 30, range 17. There are no hay marshes to be found. There is no water, only what is to be found in some ponds, and they are few, but the water is generally good. There are no streams and consequently no water powers, nor are there any stone quarries or minerals to be found. Game is scarce—a few antelope being seen occasionally. Swift Current and Battleford trail runs through the township, which was a very great convenience to us. The trail is good. In many places the pits were badly obliterated and difficult to find.—*James Warren, D.L.S., 1904.*

Township 29.—I began operations on May 23 and completed the subdivision on the 31st of same month. I found the soil in the township very hard and difficult to dig, as the surface was very hilly and in places stony. There were a great many ponds, some of which were very deep and large. The water was fairly good in most cases. There were some ponds that were alkaline, but not to any extent. The soil is very hard, chiefly clay and is not adapted to agriculture, but in some parts the grass is fairly good. The surface is all prairie and there is no timber of any kind growing on the township. There are no hay marshes or any grass meadows. The water is generally good in the ponds, some of which, no doubt, would contain water all summer. No streams of any size only one small stream in the northerly part of the township. There are no water powers. The climate is such that there would be no summer frosts of any account. There is no fuel in any part of the township. The nearest point at which we got any wood—and that of a very scrubby nature—was at the northwest angle of township 30, range 17, in which there is a very deep coulée in which there is a little wood. There are no stone quarries nor any fixed rock, but in places some loose stones are to be found. Neither are there any minerals of any economic value. There is very little game, only a few antelope to be seen. It is difficult to say what the township is best adapted for on account of the hardness of the soil, the hilly nature of the surface and the absence of hay meadows. Taking the township as a whole I would rate it second class, owing to the hardness of the soil. Battleford and Swift Current trail runs through this township and is a very great convenience for travel.—*James Warren, D.L.S., 1904.*

Township 30.—The eastern and northern portions of this township are comparatively level, no very steep or abrupt hills. The northwesterly part is broken with hills and coulées, also by Eaglehill creek running through part of the northeasterly portion. The soil is generally clay, which is mostly very hard and dry. It is difficult to say what it is best adapted for, as the soil with its whitish clay subsoil is so hard and dry. Along Eaglehill creek, the flats are alkaline and soft. There is no timber on any part of the township, only in a deep coulée in the northwesterly corner, where there is a little wood, but very small and scrubby and very limited in supply. Eaglehill creek runs through the northeasterly part. It is a deep and very sluggish stream, current not more than one mile an hour. The water has a good deal of alkali in it. The stream is from twenty to fifty links wide and from eighteen inches to four feet deep. This stream would flood a great deal of land in the spring time or in high water. There are no water powers on the creek, as it runs very slowly. The climate would be fair and would not be liable to summer frosts, judging by the surroundings. There is no coal or lignite exposed in any part of the township. There is no fixed stone or rock nor are there any minerals of any kind to be seen, nor liable to exist there. There is no game except an occasional antelope. There are portions of the township that might be available for cultivation if once broken up, yet at present it is not a township that would be available for agriculture, and there are no hay marshes or meadows that would supply hay for ranching purposes.—*James Warren, D.L.S., 1904.*

Township 31.—The north and northeasterly portions of this township contain some fairly good land, but the south and southwesterly parts are rough and broken by deep coulées and the valley of Eaglehill creek. The soil along the flats of the creek contains a good deal of alkali, but the northern portions are comparatively free from it. These would be well adapted for agriculture, but the grass is very short in most parts of the township. The surface is entirely prairie, some of which is partly level, but other parts are badly broken up by coulées. There is no timber of any kind only a few scrubby trees in a coulée near the southwesterly corner of the township. There are some ponds of fairly good water, but the water in Eaglehill creek, which runs through the southwesterly quarter, flows with such a slow current that it could not be utilized in any way for water power. In spring it floods for quite a distance from its banks, which are very steep. The stream itself is twenty links to, in some places, over one chain in width and in many places deep, but the depth when the stream is running is not more than eighteen inches to two feet, and has a muddy bottom. The climate is fairly good and free from frosts. There is no fuel of any kind, there being no veins of coal or lignite appearing anywhere, nor any fixed stone to be seen. A few duck may be seen on the ponds, but game of all kind is very scarce. Battleford and Swift Current trail runs through the township, which is a great convenience for getting into the township, and the crossing at Eaglehill creek is not a bad one and could be easily made a good one. The pits along the trail are very hard to find, and scarcely any posts are to be seen anywhere.—*James Warren, D.L.S., 1904.*

Township 32.—The soil in this township is generally very hard and dry. The southerly and southeasterly portions are more level. The whole of the surface is prairie, there being no timber or scrub on any part of it. There is no hay land or tall grass of any kind. The grass is generally very short and thin. There is a small spring creek running through the northwesterly part of the township, which is fairly good water, having only a slight trace of alkali. The creek is supplied from a spring in the northerly part of the township, and the supply all through is permanent. The stream being small, only from two to three feet wide, and only six inches deep, is not of a sufficient capacity for any water power to be developed from it, and as the current is slow it could not be utilized. The climate appears to be favourable and would not be liable to summer frosts. There is no fuel of any kind on any part of the township. The nearest supply of any kind is in township 35, range 16, where there is some timber. There are no indications of coal or lignite to be seen, nor any stone quarries or minerals of any kind as the prairie is all quite bare. There is no game of any kind, except a few antelope. The general surface is favourable, but the soil being so very hard and dry it would be rather unfavourable for agriculture, yet if it was broken up it might yield good grain crops. There are scarcely any ponds on the township, so the water supply is rather scarce, only the small spring creek already referred to. We found a trace of a railway survey on the north boundary of section 22, but not elsewhere.—*James Warren, D.L.S., 1904.*

Township 33.—The soil in this township is generally very hard and in many places stony and on account of its being so hard it is not well adapted for agriculture; and the grass is very short in most places and would not be suitable for grazing or ranching. The surface is open prairie, undulating and in many places very rough and hilly. There is no timber or scrub on any part of the township, nor are there any hay meadows or marshes. There are a good many ponds in parts of the township in which the water is generally good, but the supply is not large. There are no streams of any kind, and consequently no water powers. The climatic indications are favourable. There is no fuel on the township, the nearest is on township 35, range. 16. Neither are there any seams of coal or lignite to be seen or stone quarries, but there are a good many stones on parts of the township that could be used for building purposes. No minerals of any kind were seen. Game is scarce—only a few antelope and duck were seen occasionally. Taking the township as a whole it would be rated second class at least, as the soil is not adapted for agriculture or grazing.—*James Warren, D.L.S., 1904.*

Township 34.—This township taken as a whole is very broken and rough, there being a great many hills, sloughs and ponds and not much soil that would be fit for cultivation. The surface is entirely prairie and of a very undulating nature. No timber or scrub of any kind is to be found on any part of the township. There are no hay marshes or meadows to be found. There are many ponds of water, some of which are good, but many are alkaline. The supply in many cases will be permanent as the ponds are deep. There are no streams of any kind to be seen, and as there are no streams there are no water powers of any kind. The climate will be favourable and not subject to summer frosts, judging from the surroundings. There is no fuel on any part of the township nor any coal and lignite. The nearest supply of fuel is on township 35, range 16, which is known as the 'sixty mile bush,' in which there is a fair supply of wood. There is no fixed rock in any part of the township, but in many places stones are to be found on the surface. There are no minerals of any kind. Game is scarce—a few antelope were seen and on the ponds there are a few ducks. This township as a whole would have to be rated as low as second class. There are places where cattle and horses would feed well during the summer months, but there is no shelter of any kind for the winter, and there is very little soil that is available for agriculture.—*James Warren, D.L.S., 1904.*

Township 51.—Turtle lake trail northward from Jackfish lake runs within a few miles of this township and is a fairly good road in dry weather. The soil is principally clay and black loam and is suitable for mixed farming. The surface is generally covered with poplar and willow scrub, though there are some stretches of open prairie in the eastern half of the township. The timber is poplar up to about 10 inches in diameter and is scattered in clumps through the scrub all over the township. It is only suitable for fuel. There is a fair amount of good hay scattered about in sloughs and adjoining Maiden lake. The water in ponds and sloughs is fresh and apparently permanent. Maiden lake on the north boundary of the township is a shallow marshy lake with fresh water; the outlet of it is through marshy land northward into the south branch of Turtle lake river. There are no water powers. There have been some slight summer frosts this year. The only fuel is poplar scattered about the township. There are no stone quarries and no minerals. Very little game was seen, only a few ducks.—*T. S. Gore, D.L.S., 1904.*

Township 52.—This township may be reached by the Stony lake trail, which branches off the Turtle lake trail at Louis Nault's ranch in township 51, range 18. The trail is but little travelled, but is passable in dry weather. The soil is generally a dark loam, gravel and clay, and is suitable for mixed farming. The surface is mostly covered with scrub and timber, but through the middle and south parts there are large flats and swamps that are partly open. There is spruce and poplar up to 15 inches in diameter in patches, principally in the northern part of the township. It is suitable for building, but very little would do for lumbering. There is a quantity of rather inferior quality of hay all through the south half of the township. The large swamp in sections 15, 16 and 10, which, this year, is too deep to wade, in drier seasons would afford a large amount of good hay. The water is fresh, but dark. The east boundary runs along the marsh on west side of Midnight lake, and this lake, which is shallow and marshy, empties through the south branch of Turtle river into another lake on the west side of the township. The river where it is not spread out in the marsh is about 1½ chains wide and from three to four feet deep and runs two or three miles per hour. There are no water powers. Poplar is the only fuel, it is found all over the township. There is rather more summer frost than in the open country. There are no minerals and no rock exposures. Duck and deer are the only game.—*T. S. Gore, D.L.S., 1904.*

Range 18.

Township 30.—The route for reaching this township is along the surveyed trail from Swift Current towards Battleford, and thence westerly to this township. The trail is in good condition. The soil is generally about six to eight inches of black loam on a clay subsoil in the easterly half of the township, and a sandy subsoil in the westerly half. The greater part of the township is hilly, and best adapted for grazing, but sections 1, 2, 11, 12, 13, 14, 23, 24, 28 and 29 are not so hilly and fairly suitable for farming. The whole of this township is open prairie, except in section 36, where there is a deep coulée containing some scrub. In this coulée there is a small quantity of maple and poplar from two to six inches diameter. There are small hay marshes scattered throughout the township, but none of large size. The quality of hay cut from these marshes would be good. Fresh water marshes and ponds are numerous throughout this township, and Shrimp lake in sections 22 and 27 is also fresh, but full of organic matter. The water supply is sufficient, and in the lake and deep ponds is permanent. The land is not liable to be flooded. There are no water powers. The general indications point to a climate with comparatively little rainfall in the summer months. There were no summer frosts. There is a small quantity of wood in the coulée in section 36 suitable for fuel, but it would soon be exhausted. No coal or lignite veins were found. There were no stone quarries or minerals of any kind found in the township. A few antelope were seen, also waterfowl on Shrimp lake and the different ponds and marshes. An old cart trail enters the township in section 24, and runs in a southwesterly direction, leaving the township near the southeast angle of section 6. *Herbert J. Bowman, D.L.S., 1904.*

Township 51.—This township can be reached by the Turtle lake trail from Jackfish, which touches the southwest part of it. The trail is fairly good. The soil is principally clay and in many places gravelly and stony. It would be only suitable for mixed farming. The surface is irregular and rolling and is about one-third prairie, and the rest scrubby poplar bluffs and willows. The timber is poplar up to 10 inches in diameter, more or less scattered all over the township, but principally on the west half. There is considerable hay scattered throughout the northern half of the township, in small areas—it is of good quality. The water in sloughs and ponds is fresh, but there are not very many of them, and water would probably be scarce in dry seasons. There are no water powers. There have been a few slight summer frosts this year. The only fuel is poplar, which is scattered throughout the township. There are no minerals and no exposed rock. The only game seen was a few ducks and prairie chicken.—*T. S. Gore, D.L.S., 1904.*

Township 52.—This township may be reached via Turtle lake trail from Jackfish lake. The trail is poor and very little used. The soil is generally a dark loam inclined to be stony on the higher ground; it would be suitable for general farming. This township is undulating, with many swamps and almost entirely covered with willow and poplar scrub and timber. The timber is white and black poplar up to 12 inches in diameter and also a little spruce of about the same size scattered about. The greater part of the timber is on the north half of the township. There is a heavy growth of long grass, but not much available for hay on account of the brush growing through it. The water is fresh and permanent and is very high this year, a good deal of the low land being flooded. A lake extends nearly half way across the township from the east boundary. It is shallow, with flat shores. It empties into the south branch of Turtle lake river which flows westward across the township and this year is a stream from 4 to 10 feet deep and a chain and a half wide running about 3 or 4 miles an hour. Land adjacent to the lake is liable to be flooded 2 or 3 feet deep in places. There are no water powers. This part of the country is more subject to summer frosts than the more open country south. Climate, otherwise similar. The only fuel is poplar, scattered all over the township. There are no minerals and no stone suitable for quarrying. Ducks and deer are the only game.—*T. S. Gore, D.L.S., 1904.*

Range 19.

Township 43.—(Part of township).—The land in parts is fairly well adapted to cultivation, being open and undulating prairie, classed 2 and 3. Soil is sandy loam with clay subsoil, being especially well suited for grazing. Good water is found in the sloughs, which are scattered throughout the township. No timber is found on this portion of the township nor were any minerals visible. Sounding lake trail passes in the southeast corner of section 1, leading to Battleford, which is about 13 miles distant.—*G. C. Rainboth, D.L.S., 1904.*

Township 52.—This township may be reached by the Turtle lake trail from Battleford via Jackfish lake. The trail, except for the last 10 miles is fairly good. The soil is generally dark loam and clay and is suitable for general farming. The surface is nearly all covered with scrub and timber and is slightly rolling. The timber is principally poplar up to 14 inches in diameter, and scattered clumps of spruce about the same size. There is considerable fallen timber in the northern part of the township and travelling is very difficult. In dry seasons there would be considerable hay in sloughs and flats this year flooded, and so not available. The water in sloughs, lakes and creeks is good and fresh. The south end of Turtle lake occupies about 2 sections in the northeast corner of the township and empties into Turtle lake river, which flows through the township and out near the southwest corner. It is joined by the south branch in section 9. This summer they are both about from 1 chain to one and a half chains wide and from 3 to 6 feet deep, flowing about 3 miles per hour. Both streams caused me considerable loss of time on the survey of the township, as in most places they could not be crossed without a boat. There is no water power. Poplar is the only fuel and it is everywhere in the township. There are no stone quarries and no minerals. The weather has been very fine all summer, with sufficient rain, but there has been more or less frost each month. Ducks, deer and bear were the only game seen. Fish are plentiful in Turtle lake.—*T. S. Gore, D.L.S., 1904.*

Township 53.—This township can be reached by the Turtle lake trail from Battleford, but it is not a good road. The soil is a sandy and clay loam, and if the land was cleared might be suitable for mixed farming. The general surface is slightly rolling and covered with poplar and willow brush, and scattered poplar and spruce timber. The timber is poplar up to 14 inches diameter and spruce up to 24 inches diameter, scattered about the township. There is a little hay round some of the sloughs and near the shore of Turtle lake. The water in Turtle lake and in the ponds is fresh. This lake occupies about five sections in the southeast corner of the township. There are no water powers. The climate is similar to that in other parts of the district, but is more subject to summer frosts than the more open country. The fuel is poplar, growing all over the township. There are no stone quarries and no minerals. Moose were the only game seen. Jackfish are very plentiful in Turtle lake.—*T. S. Gore, D.L.S., 1904.*

Range 20.

Township 29.—The soil in this township is a deep clay loam, except a few flats of heavy clay, especially about section 20. It seems best adapted for grazing purposes, as I think it is apt to be too dry for agriculture, except in very wet years. There are no streams, but two small lakes and a number of sloughs furnish a supply of good water. There is no timber, stones, fuel or minerals of any kind to be found in the township. There is a small amount of hay on nearly every section, but nowhere much. Antelope and a few duck were the only game seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 30.—This township, which lies to the southeast of Kiyiu lake, is a heavy clay loam, with some small stone in places, and appears to be well adapted for any kind of agriculture, but the climate is probably too dry for profitable grain raising. There are no streams, but two small lakes and a number of deep sloughs furnish an abundant supply of good fresh water. There is plenty of hay in all parts of the township, but no timber, no fuel nor minerals of any kind were seen. Antelope and duck were the only game seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 31.—The soil in this township is a deep clay loam in the eastern part while the central and southwestern parts is a heavy bare clay with no alluvial soil, and is of no apparent use. There is considerable hay in the northern part, and a few sloughs of good fresh water in the southern and southwestern parts, which slope down to Eagle lake. The water is somewhat alkaline. There is a small creek emptying into Eagle lake, but it is dry most of the time. The township is best adapted for grazing purposes, as it seems too dry for agriculture. A few duck and antelope were the only game seen. There is no timber, fuel, stone or mineral of any kind to be found in the township.—*Abel S. Weekes, D.L.S., 1904.*

Township 32.—This township is a deep clay loam with occasional flats of heavy clay. It is well adapted for mixed farming, though rather too rolling for grain raising on a large scale. There are occasional summer frosts. There is an abundance of hay and also surface water of good quality, but no running streams. There is no timber, fuel nor minerals. The only game seen was antelope and duck.—*Abel S. Weekes, D.L.S., 1904.*

Township 33.—This township is a deep rich clay loam, but too rolling for convenient cultivation. It is well adapted for grazing purposes and there is an abundance of hay, especially about the central parts, but there is no shelter or fuel of any kind. There is no timber or scrub. There are a number of dry grass sloughs that contain plenty of good water in most years. There is no running water. There are no minerals of any kind. Duck, a few chicken and antelope was the only game seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 34.—This township lies at the south end of Tramping lake on the old trail from Saskatoon to Edmonton. This trail was only visible in places in the spring, but it is now worn down somewhat by land seekers and surveyors, freighting supplies. It is very soft in the spring, but in dry weather is good. The soil is a heavy clay loam so deep that only in a few places do the pits expose the subsoil. The projected line of the Grand Trunk Pacific railway passes through the northeast corner of this township. The surface is entirely prairie, there being no timber or scrub of any kind except a few dry poplar in the gulches running into Eagle creek. Hay is abundant in all parts of the township, especially in the southwestern part. There is a number of sloughs of fresh water which might dry up some seasons. Well water would probably be alkaline. There are no running streams except Eagle creek, which runs out of Tramping lake in section 34 and as this is very often dry in this part, it would not be available for water power. There are no minerals or stone quarries. Duck, chicken and a few antelope were the only kinds of game seen. The township is well adapted for any sort of agriculture, but especially for grazing purposes, as I am of the opinion that there are some summer frosts.—*Abel S. Weekes, D.L.S., 1904.*

Township 52.—This township can be reached by my survey trail from Emmaville post office; it is chopped out and bridges built where necessary, the latter will probably stand for several years, as the water in creeks is abnormally high this year. The road is bad. The soil is generally a good clay loam, but rather stony. It is suitable for any of the usual crops of the country. The surface is generally slightly rolling, and is almost entirely covered with poplar and willow brush to fifteen feet in height with bluffs of larger timber. The timber is poplar from 4 inches to 10 inches in diameter, and a few clumps of spruce up to 12 inches, the latter is scattered about near the middle of the township. The poplar is all over the township, but more dense in the eastern half. There is no hay except a little on section 8, south of the lake there. The water in the lakes is fresh and apparently permanent. Turtlelake river, where it flows through the southern part of the township, is a large stream from three to ten feet deep and a hundred feet wide. It runs from one to five miles per hour in different places. The stream running out of the lakes into Turtlelake river is about 60 links wide and 3 feet deep and runs about four miles an hour. After a succession of dry seasons, however, there is probably very little water in either of them. All the northern and eastern part of the township is singularly dry, with very few ponds or sloughs. There are no water powers. The climate is variable. There was ice formed on June 13. There are no stone quarries, but plenty of granite boulders. There are no minerals. Signs of deer and moose were seen, but no small game, but a few ducks.—*T. S. Gore, D.L.S., 1904.*

Township 53.—This township can be reached by an old trail, running westward from the Meadow lake trail, leaving the latter between Turtle lake and Brightsand lake; the trail is poor and little used. The soil is sandy on the higher lands and vegetable loam on the flats. It would be suitable for mixed farming. The surface is slightly rolling and most of it is covered with scrub and clumps of poplar and spruce. The timber is poplar and spruce up to 14 inches in diameter, and is scattered about the township, but principally in the north and east portions. There is considerable good hay on sloughs south and west of Brightsand lake. The water is fresh and good particularly in Brightsand lake and the stream flowing out of it on the southwest side. Brightsand lake occupies more than one-third of the township, and is a beautiful clear water lake with clean sandy and stony bottom; it extends about two miles north of the township. The stream running out of the lake is about fifty links wide, and two or three feet deep flowing about three miles an hour. It overflows its banks for about ten chains wide during high water for about two miles down from the lake. There are no water powers. There was ice formed in August, otherwise the climate appears good. The only fuel is poplar, scattered all over the township. No stone quarries or minerals were noticed. The game is deer, moose and a few ducks. There are plenty of whitefish and jackfish in Brightsand lake.—*T. S. Gore, D.L.S., 1904.*

Range 21.

Township 27.—This township is rolling prairie, except in the eastern part, where a large valley about one hundred and fifty feet deep runs through the entire length of the township. There is a small creek, dry at most times of the year, running to Snipe lake. The soil is a clay loam of fair quality but is very stony. It is of very little use except for grazing purposes. There is a large marsh in sections 8 and 9 that evidently has water in it all the time. There is no other water in the township. There is a little hay in all parts of the township, but nowhere much. There is no timber, fuel or mineral in the township. Antelope were plentiful but no other game was seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 28.—This township is so badly cut up by several large coulées running through it that it is of no use for farming purposes, but should be of some value for grazing. The soil is generally a clay loam of good quality but is very stony. There is a good deal of hay in all parts of the township. There is no permanent water except one deep marsh on section 29. A few hay sloughs on section 30 have water in them most of the time. There is a creek in the large valley that runs across the southern part but it is generally dry. There is no timber, fuel or mineral of any kind. Duck and a few antelope were the only kinds of game seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 29.—The soil in this township is a deep clay loam and should be well suited for any kind of farming if the climate is not too dry. There is an abundance of hay in all portions of the township and in the southern portion the sloughs will contain water most of the summer. There is no permanent water. There is no timber either for building or fuel, and no minerals of any kind. No game was seen except antelope, which were fairly numerous.—*Abel S. Weekes, D.L.S., 1904.*

Township 30.—About one-half of the surface of this township is a clay flat, formerly covered by the waters of Eagle lake, and is of no use whatever; the balance is mostly clay loam of good depth but is too stony for cultivation. The northeastern portion of the township is good land and fairly free from stone. It is suitable for any kind of farming, but I suspect it is too dry for it to be profitable. The only water is Eagle lake, and it is not very good. There is only one point in the whole circumference where the banks are solid enough for animals to get to the water. There is a little hay in the southwest and northeast corners of the township but no timber, fuel or minerals. No game, except antelope was seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 31.—The soil in the northern portion of this township is a deep rich clay loam suitable for any sort of agriculture, though I think it is better for grazing purposes than any other. The southern portion, which slopes to Eagle lake, is a bare white clay and is of very little use. There are several deep sloughs of good fresh water in the northern portion but no running water. In the southern portion there is no water except Eagle lake, which is somewhat alkaline. There is no timber, fuel nor mineral of any kind in the township. Duck and a few antelope were the only kind of game seen.—*Abel S. Weekes, D.L.S, 1904.*

Township 32.—The soil in this township is a deep clay loam and is well adapted for any kind of agriculture, although I think in average years the climate will prove too dry for succesful grain raising. The surface is gently rolling prairie generally free from stone. There is no running water and very little surface water, but any seen was of good quality, so probably good water could be obtained at a moderate depth. There is no timber, fuel or mineral of any kind to be found in the township. The only game seen was a few duck and antelope.—*Abel S. Weekes, D.L.S., 1904.*

Township 33.—The soil in this township is chiefly a heavy deep clay loam, and should be well adapted for any sort of agriculture. There is very little fresh water in the township, Curley lake, near the centre, being slightly alkaline, but not enough to prevent its use by stock. There are no other bodies of water in the township. There is no timber, fuel nor minerals of any kind in the township. A few antelope and ducks were the only game seen.—*Abel S. Weekes, D.L.S., 1904.*

Township 34.—This township is a heavy clay loam, except a small patch of sand hills on sections 5, 6 and 7. It is well adapted for mixed farming, though the central part is too rolling for convenient cultivation. There is some hay in the central and southeastern parts, but not in any large quantities. There are a few deep sloughs in the southern part of the township, but no other water. There is no timber or mineral and no fuel of any kind. The only game seen was duck and a few antelope.—*Abel S. Weekes, D.L.S., 1904.*

Township 52.— This is reached by Onion lake trail from Battleford to Emmaville post office and thence east by my survey trail. The road is fairly good. It is mostly light sandy soil, not much good for anything but a cattle run. The surface is rolling and scrubby with some prairie. The timber is scrubby poplar up to 12 inches in diameter, and scattered all over the township. There is a little hay along the creek through the middle of the township. The water is fresh. There are two good creeks, one through the westerly part of the township about ten feet wide and four feet deep, running two miles an hour; and another one running from the north into lake No. 2 about twice the size of the former. There are two small lakes in the west part of the township with good water and plenty of jackfish and some other kinds of fish. The land is not liable to be flooded, except a small area adjoining the south part of lake No. 2. There are no water powers. The summer was cool, and summer frosts were not uncommon. Poplar is the only fuel : and it is scattered all about the township. There are no minerals and no exposed rock. Ducks, and a few prairie chickens were the only game seen.—*T. S. Gore, D.L.S., 1904.*

Township 53.—This township can be reached by an Indian trail which runs through the northern part of it. This trail branches off from the Battleford and Meadow lake trail and goes south of Brightsand lake. The trail is poor and but little used. The soil is generally a rich black loam, and would be suitable for any of the products of the country. The surface is rolling and much broken by little pot holes with water in them, surrounded by dense willow thickets. It is nearly all covered with a thick growth of poplar and willow and a tangle of various kinds of underbrush. There is a quantity of good poplar up to ten or twelve inches in diameter scattered all over the township; and a little spruce up to fourteen inches in diameter on the west half of section 18. There is very little hay; a small quantity could be obtained around sloughs in the southwest part of the township. There are no water powers. There is plenty of fresh water in sloughs and ponds scattered all over the township. There is a plentiful rainfall and frosts are common in summer, as appears to be the case wherever the country is thickly covered with bush. The only fuel is poplar, which can be had in any part of the township. There are no stone quarries or minerals. Deer and ducks were the only game seen.—*T. S. Gore, D.L.S., 1904.*

Range 22.

Township 27.—This township may be conveniently reached by taking a trail leading westerly from Saskatoon and crossing Eaglehill creek, where it issues from the south end of Tramping lake. After reaching the top of the west bank of the valley of Eaglehill creek, one may strike across the prairie in a southwesterly direction to township 27, range 22. The old trail from Duck lake to Red Deer forks that passed through the southern portion of township 28, range 22, is obliterated in its vicinity and it does not appear to have been travelled for some years past. The soil is principally a brown clay and the northerly portion of the township is mainly hard and hummocky. The southerly portion is good second-class land, while the northern portion is third class. The various grains, such as wheat and oats; and vegetables, such as potatoes, carrots, onions, &c., could no doubt be grown on this land with a good measure of success when it is once brought under cultivation unless the amount of rainfall was insufficient. The greatest apparent drawback would be the labour of breaking the land, but after being broken, the soil would no doubt be found fertile and comparatively mellow. The growth of grass is fair or below the average. The surface is open prairie throughout; the southern portion of the township being gently rolling, the central portion rolling and the northern portion high rolling land. There is no timber in the township. There are no hay meadows of any value. No water was found in this township when it was surveyed and there are no water powers. The climate during the past summer was warm and dry. The amount of rainfall was very limited being, apparently, much below the average. There were no summer frosts. No trace of any kind of fuel was noticed in the township. There are no stone quarries. No indications of any minerals of economic value were seen. Antelope are numerous and there are a few coyotes and red foxes. A few badgers were also seen in the township.—*Geo. Ross, D.L.S., 1904.*

Township 28.—This township can be conveniently reached by a trail leading westerly from Saskatoon and crossing Eaglehill creek, where it issues from the south end of Tramping lake in the northeastern part of township 34, range 20, west of the third meridian. After reaching the top of the west bank of the valley of Eaglehill creek one may reach township 28, range 22, by striking southwesterly across the prairie. The trail from Saskatoon to Tramping lake is in good condition, and one may easily travel across the prairie from the south end of Tramping lake to the township under consideration. The old trail from Duck lake to Red Deer forks passing through the southern part of this township does not now appear to be travelled. In many places it is obliterated. The soil is mainly a hard clay or clay loam, the greater portion of the township being hard, hummocky land. The labour of breaking or bringing the soil under cultivation would, no doubt, be rather difficult, but when once broken the soil would probably be comparatively mellow and adapted for raising the various crops, such as wheat and oats, and vegetables, such as potatoes, beets, carrots, onions, &c. The growth of grass in this township is only fair or rather below the average. The surface is open prairie, mainly high rolling land and the central portion of the township between the north and south boundaries is broken by gullies from about 50 to 90 feet in depth, extending easterly and westerly through the township. There is no timber in the township. The only water found in this township when it was surveyed was in two marshes of limited extent, one in the southeast quarter of section 11 and the other in the southeast quarter of section 33, in each of which there was about 6 inches of fresh water. There are no water powers. There is no hay in this township. During the past season the summer was warm and dry, the rainfall being very limited, and apparently much below the average. There were no summer frosts. There is no timber for fuel and no indication of lignite or coal veins. Fuel was obtained for our purposes during the survey, along the South Saskatchewan. There are no stone quarries in the township, but large quantities of field stone, mainly granite, are scattered over the surface. No trace was observed of any mineral of economic value. Antelope are quite numerous and there are also a few coyotes and red foxes. A few badgers were also noticed.—*Geo. Ross, D.L.S., 1904.*

Township 29.—This township can be most conveniently reached by taking a trail leading westerly from Saskatoon and crossing Eaglehill creek, where it issues from the south end of Tramping lake. After reaching the top of the ascent of the west side of the valley of Eaglehill creek, this township may be reached by striking across the prairie. The trail above mentioned is in good condition. The soil is mainly a very hard clay loam, which I have rated as third class for agricultural purposes. When this township was surveyed, the greater portion of its surface was seamed with cracks opening on an average, about half an inch at the surface. In the lower portions of the township, the soil was baked and very hard, the cracks being much wider and deeper than those in the higher portions. There is a fair growth of grass generally throughout the township, and it is quite suitable for ranching purposes and although at present the soil seems rather stiff, for agricultural purposes, if properly tilled it would probably become more mellow and the various grains and vegetables usually grown in the district might, no doubt, be grown on it with success. The surface is open prairie. There is no timber in this township. There are a number of marshes varying in extent from about one to 50 acres, scattered over this township, except in the southwestern portion thereof. In the greater number of these marshes there is a good growth of hay. These marshes would occupy about 2 per cent of the surface of the township. The only water found was in marshes and they were fast drying up. The only water of any consequence found was in the marsh at the northeast corner of section 34, and the northwest corner of section 35, and also in the marsh at the southeast corner of section 30. This marsh also occupies the southwest corner of section 29, the northwest corner of section 20 and the northeast corner of section 19.

The water found was fresh and good. The land is not liable to be flooded and there are no water powers. Last summer was warm and dry and according to indications, the amount of rainfall and dew was much below the average. There is no fuel in this township. The nearest points from which fuel was obtained was along the South Saskatchewan or from the immediate vicinity of Tramping lake. No coal or lignite veins were discovered in the township. There are no stone quarries in this township. No minerals of economic value were found in the township. Antelope are quite numerous and there are a few prairie wolves, red foxes and badgers.—*Geo. Ross, D.L.S., 1904.*

Township 30.—This township can be conveniently reached by taking a trail leading westerly from Saskatoon to a point immediately south of the south end of Tramping lake in the northeastern part of township 34, range 20, west of the third meridian, where Eaglehill creek is crossed. After ascending to the top of the west bank of the valley of Eaglehill creek one may reach the township under consideration, by striking southwesterly across the prairie. The trail from Saskatoon to Tramping lake is in good condition. The soil in this township is a heavy clay loam, and when surveyed it was hard and hummocky. It would, no doubt, be hard to break but when once under cultivation it would probably become comparatively mellow, and would be adapted for the growth of various grains and vegetables usually grown in the district. There is a fair growth of grass in this township and it is fairly well adapted for grazing and ranching purposes. The surface is open prairie and is mainly high rolling land, broken with scattered marshes. A fair quality of hay is found in the marshes, which are scattered pretty generally throughout the township and occupy about three per cent of its surface. These marshes vary in size from one to two acres to forty or fifty. There is no timber in this township. The only water found was in the marshes and ponds. It was fresh and of a good quality. The greater number of the marshes dry up during the summer but a few of the larger ones would retain water throughout the year. The land is not liable to be flooded. There are no water powers. Last summer was warm and the rainfall very limited, much below the average. There were very few storms and no indications of summer frosts. Apparently no fuel of any kind can be procured in the township. During the summer we procured our wood for fuel from the vicinity of Tramping lake, although the supply there is quite limited. There are no stone quarries but there are considerable quantities of field stones scattered over the township, mainly granite. No minerals of economic value were found. Antelope are quite numerous and there are a few red foxes and prairie wolves. Considerable numbers of wild ducks were seen in the vicinity of any open water and there are also a few sandhill cranes.—*Geo. Ross, D.L.S., 1904.*

Township 31.—This township may be reached by taking a trail leading westerly from Saskatoon. After passing the southerly end of Tramping lake one may strike southwesterly across the prairie. The trail from Saskatoon to Tramping lake is in fair condition. The soil is mainly a hard clay loam. When surveyed it was very dry and seamed with cracks; hard hummocky land. There is a fair growth of grass generally in the township and it would be very suitable for ranching purposes. The soil seems rather stiff for agricultural purposes, though when cultivated it would become more friable, so that it could be worked with less labour than appears at present. I have rated the soil mainly as third class land. There are marshes varying from about one acre to fifty acres in extent with a few still larger ones scattered about the township and occupying about three per cent of its surface. In these marshes generally there is a fair growth of a good quality of hay. These hay lands are scattered generally throughout the township and not confined to any particular portion of it. The water found in the marshes was all fresh and of good quality, except in a marshy pond on the line between sections 35 and 36, which contained slightly alkaline water. Along the southerly portion of the township there is a creek that was dried up when the township was surveyed except for a few shallow and stagnant marshy pools. There are several marshes in the north half of the township in which there is from one to three feet of water. Those would apparently retain a supply of good water throughout the season. The land is not liable to be flooded. There are no water powers. The summer season of 1904 was warm and the amount of rainfall was very limited. There were no summer frosts. There is no fuel in this township. There is no timber and no indications of coal or lignite were seen. There are no stone quarries although the land has scattererd over it and near the surface many field stones of medium or small size, mainly granite. No minerals of economic value were noticed. Antelope are quite numerous and a considerable number of wild duck were noticed.—*Geo. Ross, D.L.S., 1904.*

Township 32.—This township may be conveniently reached by taking a trail westerly from Saskatoon, and crossing Eaglehill creek, where it issues from the south end of Tramping lake in the northeasterly part of township 34, range 20, west of the third meridian. This trail is in good condition. After ascending to the top of the western bank of the valley of Eaglehill creek, one may reach this township by striking across the prairie in a southwesterly direction. The soil is mainly a heavy clay loam, and considerable portions of the township are hard and hummocky. The northeasterly portion of the township is second class land and the remainder I have rated as third class for agricultural purposes; but I have no doubt that when the soil is brought into cultivation, it will be found to be fairly well adapted for raising the various grains such as wheat and oats and vegetables, such at potatoes, carrots, onions, &c. The surface is open rolling prairie, there being no timber whatever in the township. There are no hay meadows of any value. The only water found was in the marshes and it was fresh and good, except in a small marsh on the limit between sections 2 and 3, which contained slightly alkaline water. There are no available water powers. The summer season of 1904 was warm and dry, with a very limited rainfall. The amount of rainfall was apparently very much below the average. There is no timber for fuel and no traces of any coal or lignite veins were noticed. There are no stone quarries in this township. No indications were seen of any minerals of economic value. Antelope are quite numerous, and in the large marsh in sections 28, 29, 30, 31, 32 and 33, there are vast numbers of wild ducks. There are also a few red foxes and coyotes. A few wild geese and sandhill cranes were also seen.—*Geo. Ross, D.L.S., 1904.*

Township 33.—This township may be conveniently reached by taking a trail westerly from Saskatoon and crossing Eaglehill creek, where it issues from the south end of Tramping lake, in the northeasterly part of township 34, range 20. This trail is in good condition. After ascending to the top of the west bank of the valley of Eaglehill creek, one may strike across the prairie to the part of the township it is desired to reach. The soil is mainly a clay loam, being hard and hummocky in the southern portion of the township. It would be fairly well adapted for the various agricultural purposes of growing the different grains and vegetables usually raised in the district. Although on the whole it is fairly well adapted for agricultural purposes, I do not consider any of it to be first class, but have rated it as second and third class and there is some flat land with alkaline soil in sections 32, 33 and 34 that I have rated as fourth-class land. There is a fair growth of grass generally throughout the township and it would be fairly suitable for grazing purposes. The surface is open prairie, being mainly rolling land. The northwestern portion of the township is high rolling land and the northeastern is gently rolling or nearly level land. There is no timber in the township. In sections 11 and 12 and the southeastern portion of section 14, there is a large marsh with a good growth of hay around its edge of about from one to two chains in width. In the northeast quarter of section 20 and the southeast quarter of section 29 there is a hay meadow of about eighty acres in extent, with a good quality of hay. In the northeast quarter of section 34 and the northwest quarter of section 35, there is also a hay meadow of about eighty acres in extent with a heavy growth of hay. Besides these three, are some small marshes scattered through the township with a good growth of hay. The only water found was in the marshes and this was good and fresh. The water supply in the larger and deeper marshes would not dry up during the year. There are no water powers. The summer season during the year 1904 was warm and dry. The amount of rainfall was very limited, being apparently much below the average. There were no summer frosts. No timber for fuel grows in the township and no indication of coal or lignite veins was noticed. There are apparently no minerals of economic value to be found in this township. Antelope are quite numerous and there are a few coyotes and red foxes. Large numbers of wild ducks breed in the marshes and there are also a few sand hill cranes.—*Geo. Ross, D.L.S., 1904.*

Township 34.—This township can be most conveniently reached by a trail from Red Deer forks to Battleford, which passes within three-eighths of a mile of the northwest corner of the township. There is a considerable amount of travel upon it at present and it is in good condition. The soil in this township is mainly a light sandy loam. In sections 7 and 8 and the south portions of sections 17 and 18 the soil is mainly clay. In the northwest quarter of section 13 and the northeast quarter of section 14, and also in the northeast quarter of section 23 and in the northwest quarter of section 24, there are some low sand drifts or ridges and in sections 4, 5, 7 and 8 there are some alkaline flats. There is a good growth of grass in the township and it would be suitable for grazing land. It is also well adapted for grain growing and is mostly second-class land. The surface is rolling or gently rolling throughout. There is no timber. There are many small and a considerable number of medium-sized marshes scattered pretty generally through the township, in which there is a good growth of grass suitable for hay. And in sections 3, 4 and 10 a large hay marsh extends from White Heron lake in a southeasterly direction into township 33, range 22. The water in the marshes and ponds is mainly good and fresh, although in White Heron lake and in the small creek running into it on the west it is slightly alkaline as is also the water in the marshes extending from south portion of this lake. The land is not liable to be flooded. There are no water powers. The weather during the past season was warm and dry. The amount of rainfall was very limited, apparently much below the average. There were no indications of summer frosts. There is no timber for fuel in the township and no indications were seen of veins of coal or lignite. There are no stone quarries, and no traces of minerals of economic value were seen. Antelope are numerous and there are a few red foxes and coyotes. There are also considerable numbers of wild ducks and a few prairie chickens.—*Geo. Ross, D.L.S., 1904.*

Township 52.—The township is reached by the Battleford and Onion lake trail. The route of this trail, as surveyed is now branched off from in township 50, range 21, and runs to Onion lake via Emmaville post office, which is on the southeast quarter of this township. The road is fairly good in dry weather. The bridge over Englishman river at Emmaville was carried away this spring and I had to replace it by a new one before I could cross with my survey supplies. I came in via Edmonton and down the Saskatchewan in a scow of fifteen tons capacity, and landed all my supplies for the season at a point on the river ten miles southwest of Emmaville. I found the route a very good one by which to get into this part of the country with supplies in the early spring. I took nine days to make the trip down the river; about 200 miles. The soil in this township is generally rather light and sandy, though there is some good sandy loam and black loam in places. It is best suited for mixed farming and stock raising. The western part of the township is mostly flat, partly open and partly scrubby and a good deal of the land adjoining Englishman river on the west is flooded this year. The eastern half of the township is high rolling land covered with poplar and willow scrub and small poplar, with open spaces. The only timber is the small poplar, scattered about. There is quite a quantity of fairly good hay throughout the central portion of the township. The water is fresh but hard and is in ponds and sloughs everywhere this season. But I am informed that seven years ago these were nearly all dry, and Englishmen river, which is now six feet deep and 30 feet wide, could be crossed almost dry shod. This river flows from north to south through the township, and runs 5 or 6 miles an hour. It has overflowed a large swamp on sections 33, 34, 27 and 28 to a depth varying from 1 to 10 feet. A small water power might be developed by building a dam on the river on section 16. There were heavy night frosts till June 1, and it is said to be liable to summer frosts. The only fuel is small poplar scattered about the township. There are no stone quarries and no minerals. Ducks and prairie chickens were the only game seen.—*T. S. Gore, D.L.S., 1904.*

Township 53.—This township lies about four miles north of the Battleford and Emmaville trail, and can be easily reached by wagons from the latter place. There is an old Indian cart trail running through the northern part of the township which goes from Onion lake to Brightsand lake, but it is in bad condition now, much overgrown with brush and little used. The soil is generally clay and black loam, but in many places stony. It is suitable for the usual products of the country. The surface is rolling, about one-third prairie, the balance scrubby, with bluffs of small poplar. The only timber is small poplar scattered about the township. There is considerable good hay in small areas scattered throughout the township. The water is fresh and plentiful in sloughs. Englishman river runs through the township, and is about 25 feet wide and 2 feet deep. It runs about three miles an hour. Very little land is liable to be flooded by it. There are no water powers. The climate is good, though there is more or less summer frost. The only fuel is small poplar scattered about the township. There are not stone quarries and no minerals. Ducks and a few deer were the only game found.—*T. S. Gore, D.L.S., 1904.*

Range 23.

Township 27.—This township can be conveniently reached by a trail leading westerly from Saskatoon and crossing Eaglehill creek at the south end of Tramping lake in the northeasterly part of township 34, range 20, west of the third meridian. After crossing Eaglehill creek one may strike southwesterly in the desired direction across the prairie. The trail leading westerly from Saskatoon to the south end of Tramping lake is in good condition. The soil is mainly composed of a brown clay, the greater portion of which may be described as hard, hummocky clay land. The various grains, such as wheat and oats, and vegetables such as potatoes, carrots turnips, beans, &c., could no doubt be successfully grown in it unless the rainfall were insufficient. The breaking of the soil would be rather difficult, but after being broken it would become mellow and could be cultivated with comparative ease. There is a medium growth of grass in this township, but rather below the average, so that it would not make first-class grazing land. The surface is open prairie. There is no timber in this township. A fair quality of hay grows in a hay meadow of about a thousand acres in extent in sections 29, 30, 31 and 32. A more inferior quality of hay grows in another hay meadow of about one thousand acres, situated in sections 1, 2, 10 and 11. No water was found in this township when surveyed. The land generally is high and not subject to floods, but the hay meadows mentioned would, undoubtedly be covered with water in a wet season or in the spring to a depth of from 1 to 3 feet. There are no water powers. The weather during the past season was warm and dry, with very few storms of any kind, and no summer frosts. There appears to be no available fuel of any kind in the township. There are no stone quarries nor traces of any minerals of economic value. Considerable numbers of antelope were seen in this township. There are also a few coyotes, red foxes and badgers.—*Geo. Ross, D.L.S., 1904.*

Township 28.—This township may be conveniently reached from the trail leading from Battleford to Red Deer forks, by leaving said trail when west of this township and striking easterly across the prairie. The trail mentioned is in good condition. The soil consists mainly of a brown clay and in sections 31, 32, 33, 34, 35, 36, 25 and 26, the soil is rather hard and hummocky. The land generally is rated as second or third class for agricultural purposes, but when brought under cultivation it would no doubt be found fairly well adapted for the growth of the various grains, vegetables, &c., usually raised in the district. The growth of grass in the township generally is fair or rather below the average. The surface is open prairie mainly rolling land and the southwesterly portion of the township is broken by a deep valley extending across it. Sections 25, 26, 27 and 28 are also broken by a gully about 50 feet deep. There is no timber in the township. The only water found in the township when it was surveyed was in the pond in the grass marsh in the southwest quarter of section 9, and situated in the bottom of the large valley mentioned. The water at that time was from about 6 to 12 inches in depth and was fresh. The land generally is high and not liable to be flooded. A fair quality of hay is found in the bottom of the large valley in sections 9, 8, 17, 20 and 19, in which there is an area of about one thousand acres of hay land. In the southwesterly part of section 5 and the east part of section 6 there is also a hay meadow about 50 acres in extent with a fair growth of hay. There are no water powers. During the past season the weather was warm and dry, with very few storms and no summer frosts. The rainfall during the past summer was very limited, being apparently much below the average. There is no timber for fuel in this township and no traces of coal or lignite were seen. There are no stone quarries and no indications were noticed of minerals of economic value. Antelope are quite numerous and there are a few prairie wolves, red foxes and badgers. —*Geo. Ross, D.L.S., 1904.*

Township 29.—This township can be reached in a convenient manner by the trail from Red Deer forks to Battleford. This trail passes at a considerable distance west of this township and should be left when north or northwest of the township, then by taking a southerly or southeasterly course across the prairie the township may be readily entered. The Red Deer forks and Battleford trail can be reached by means of trails leading westerly from Saskatoon, without taking the trail from Saskatoon to Battleford. The soil is mainly a hard clay loam and when the township was surveyed in July, was very dry and the greater portion of it was seamed and cracked so that it might be described as hard, hummocky land. There is a fair growth of grass on nearly all the land and it would make suitable grazing grounds were it not that the water supply is very insufficient. The soil appears to be rather stiff for cultivation but would no doubt be more mellow when broken and worked, so that the various grains and vegetables usually grown in the district could be raised with success as far as the soil is concerned, and I have mainly classed it as third-class land. The surface is bare prairie, being nearly level, gently rolling or rolling land. There is no growth of any kind of timber in this township. There are no hay meadows of any value, although there are a few small marshes scattered over the township. The only water found in the township was in a small marsh about 250 feet long and 100 feet wide about the centre of section 27. This water was very good, being fresh and soft. The land is not liable to flood and there are no available water powers. While engaged on the survey of this and adjoining townships, the summer season was mainly hot and dry. The rainfall was very limited and judging from the surface of the ground it was much below the average. There were no summer frosts. There is no fuel of any kind. There are no stone quarries nor do there appear to be any indications of minerals of economic value. The game animals observed were antelope, which appear to be quite numerous; a few foxes and prairie wolves were also occasionally seen. —*Geo. Ross, D.L.S., 1904.*

Township 30.—This township can be conveniently reached by striking easterly or southerly from the trail leading from Red Deer forks to Battleford. This trail is travelled to a considerable extent at present and is in good condition and one may travel readily across the prairie between the Battleford trail and this township with horses, vehicles, &c., The soil is mainly a hard or stiff clay loam. At present it is very dry and about 50 per cent of it is what might be called hummocky land, but there is a fair growth of grass on nearly all the land and it would be suitable for grazing purposes. The soil seems to be rather stiff for easy cultivation, but after being broken up and worked would probably be more mellow so that wheat, oats, &c., and the various grains and vegetables grown in the district could be raised on it with considerable success. The surface is nearly level, gently rolling or rolling prairie. There is no timber whatever. There is a good hay meadow of about 50 acres in the north part of section 33, and there are a few small marshes scattered over the township, but their total percentage is very small. The only water found in the township was in the marshes and they were nearly all dry. There was about 16 inches of water in the hay meadow in the north part of section 33 and some water was also found in the small scattered marshes in the western central part of the township. All the water found was of a good quality and fresh and soft. The land is not liable to flood. There are no water powers. While we were in the vicinity (July) the summer season was mainly hot and dry and the rainfall during the past season was too limited for the successful growth of grain; but the season was apparently unusually dry. There were no summer frosts. No fuel of any description was observed. There do not appear to be any stone quarries, and there are no minerals of economic value in this township. Antelope are quite numerous and there are a few foxes, badgers and coyotes.—*Geo. Ross, D.L.S., 1904.*

Township 31.—This township can be conveniently reached by striking easterly across the prairie from the trail leading from Red Deer forks to Battleford. This trail is travelled to a very considerable extent and at present is in good condition. The soil is mainly a stiff clay loam and when the township was surveyed it was hard and hummocky. It would be rather difficult to break the land to bring it into cultivation, but after being broken and cultivated, it would no doubt become more friable and the various grains and vegetables usually grown in the district could no doubt be grown in it with success. The township is covered with a fair growth of grass and would make fairly good grazing lands. The surface is prairie, being mainly nearly level or gently rolling. There is no timber in this township. There is a good hay meadow in the south half of section 1, and the southeast quarter of section 2 of about sixty acres in extent; and in the east half of section 3, and west half of section 2 there is a hay meadow with a good growth of hay, about 250 acres in extent. The only water found was in the marshes and hay meadows and it was fresh and good, but the supply would not be permanent. The land is not liable to be flooded. The summer season of 1904 was warm and dry, the amount of rainfall being very limited and apparently much below the average. No timber for fuel grows in this township and no indications were seen of coal or lignite veins. There are no stone quarries. No traces of minerals of economic value were found. Antelope are quite numerous and there are also a few red foxes and prairie wolves.—*Geo. Ross, D.L.S., 1904.*

Township 32.—This township can be conveniently reached by the trail from Red Deer forks to Battleford which passes through the northwesterly part of it. At present there is a considerable amount of travel on this trail and it is in good condition. The soil is mainly hard clay loam and the surface generally hard and hummocky, but when brought under cultivation the soil would become comparatively mellow and no doubt it will be found to be well adapted for the growth of the various grains and vegetables grown in the district. The surface is rolling or gently rolling prairie. There is no timber. There are no hay lands of much value in this township, but a fair quality of hay may generally be obtained from the various marshes scattered throughout the township. The only water supply in the township is that found in the marshes. The water is fresh, but only a few of the larger and deeper ones would retain water throughout the season. The land is not liable to be flooded and there are no water powers. During the summer season of 1904, the weather was warm and dry. The amount of rainfall was very limited, apparently much below the average. There do not appear to be any veins of coal or lignite, and there are no stone quarries. No indications were seen of any minerals of economic value. Antelope are quite numerous and there are also a few badgers, coyotes and red foxes.—*Geo. Ross, D.L.S., 1904.*

Township 33.—This township can be conveniently reached by a trail from Medicine Hat to Battleford via Red Deer forks. This trail passes through the township in a northerly direction a short distance west of the middle of the township and is at present travelled to a considerable extent, and is in good condition. The soil is mainly stiff clay loam with considerable quantities of small stone in many places. When the survey was made, the soil, except in the marshes, was very dry and rather hard, but it was generally covered with a good growth of grass and would be very suitable grazing land. The various grains and vegetables usually raised in the district could be cultivated with success, but the soil is rather stiff for cultivation in its present condition, and I have mainly classified it as third-class agricultural land. The surface is prairie, mainly rolling land except in the southern part of the township where the surface is gently rolling or nearly level. In sections 31 and 32 there is a growth of some wolf willow scrub. There is no timber. In the north halves of sections 7 and 8 there are about one hundred and fifty acres of fair hay lands, and a fair quantity of hay can be obtained generally from the various marshes scattered through the township. The only water is that found in the marshes and ponds. They contain fresh water and the supply in many of them would not dry up during the year. The land is not liable to be flooded. During the summer season of 1904 the weather was warm and dry. The amount of rainfall was very limited, being apparently very much below the average. There were no summer frosts. There is no fuel of any kind in this township. There are no stone quarries nor were any indications seen of minerals of economic value. Antelope are quite numerous and considerable numbers of wild ducks breed in the marshes.—*Geo. Ross, D.L.S., 1904.*

Township 34.—This township is conveniently reached by the trail leading from Battleford to Red Deer forks, which passes diagonally through the township, from section 36 to section 4. At the present time there is a considerable amount of travel on this trail and it is in good condition. The soil is mainly a light sandy loam, interspersed with stretches of clay and clay loam in many places. There is a good growth of grass in the township and it is well adapted for grazing. The various cereals, such as wheat and oats, could be raised with success and the vegetables usually grown in the district would also do well in the greater part of the township. The surface is rolling prairie throughout. There are a few patches of wolf willow in section 7, but there is no timber. There is a good growth of grass suitable for hay in nearly all the marshes scattered pretty generally throughout the township and occupying about 3 per cent of its area. There is one small creek in the north part of section five and east part of section seven and west part of section eight, which flows into Ruby lake, which occupies parts of the northeast ¼ section 7, the northwest ¼ section 8, the southwest ¼ section 17 and the southeast ¼ section 18. This creek was nearly dry when the township was surveyed (June), but the water was fresh, while that in Ruby lake was very slightly alkaline. Elemer lake in sections 34 and 35, and Zella lake in sections 31 and 32, contain alkaline water, and the large marsh occupying a great portion of the east half of section 32 and also extending into sections 28, 29 and 33, contains alkaline water, but in all the various hay marshes scattered over the township there is good fresh water. In autumn these marshes would be dry, with the exception of the central portion of some of the larger ones. The land is not liable to be flooded.

There are no water powers. The summer season of 1904 was warm and dry, the amount of rainfall being very limited, and apparently much below the average. There were no summer frosts. There is no fuel of any kind in the township, there is no timber, and no traces of coal or lignite veins were seen. However in many portions of the township suitable trees, if protected from fire, would grow very rapidly. There are no stone quarries. No indications of any minerals of economic value were seen. Antelope are quite numerous and many wild ducks breed in the marshes. There are also a few red foxes, coyotes and badgers.—*Geo. Ross, D.L.S. 1904.*

Range 24.

Township 27.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 27, range 26, and from which a good trail can be made into the township. The surface is generally slightly rolling, but in some places for considerable extent the surface is fairly level. The soil is generally clay without any loam on top and, I think, is better suited for grazing than agricultural purposes. There are several small hay marshes scattered throughout the township. There are no minerals, quarries or water falls in the township. The only game I saw in the township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 28, range 25, from which a good trail may be made. The surface is rolling, with a few scattered small hay marshes. There is a large lake in sections 19, 20, 21, 22, 27, 28 and 30, the water of which is alkaline. The soil is generally hard clay, without any black mould on top and is better adapted for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township and the only game are antelope, duck and geese.—*David Beatty, D.L.S., 1904.*

Township 29.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 29, range 25, and from which a trail can be made into the township. The surface is generally rolling, with hay sloughs scattered throughout. The water in the township is strongly alkaline. The soil is hard clay and is better adapted to grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game I saw were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 30, range 25, and from which a trail may be had into the township. The surface is rolling, with a few small lakes and hay marshes. The water is alkaline. The soil is mostly hard clay and is more suitable for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game is antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 31.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes northeasterly through the township from section 6. The surface is rolling prairie, without any high hills. The soil is hard clay and is better suited for grazing than agricultural purposes. The water in most of the small sloughs is alkaline. There are no minerals, quarries or water powers. The only game I saw in this township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 32.—This township can be reached by a very good trail, which runs from Medicine Hat to Battleford, passing through the southeast part of the township, crossing through sections 12 and 13. The surface is rolling prairie with, in places, deep basins with lakes or marshes, notably through sections 34 and 27, with a stream from thirty to fifty links wide, opening up into a lake in sections 21, 22, 16, 17, 8, 9 and 5, and deep marsh passing out into township 31. The soil is generally clay and only in a few places with black soil on top. In many places the clay is so hard that it was necessary to use picks to loosen it when digging the pits. I think the township is more suitable for grazing than for agricultural purposes. The water in the large lake is alkaline, but in most of the small sloughs it is fresh. There are no minerals, quarries or water powers. The only game I saw in the township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 33.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 32, range 23, west of the third meridian, and from which township a good trail can be made to said township 33. The surface is rolling prairie, with many ravines, notably one running south through sections 28, 21, 16, 10 and 3 from the south end of a lake in sections 28, 29, 31, 32 and 33. The soil is generally very hard clay without any black mould on top, requiring picks to dig the pits. The township is more suitable for grazing than agricultural purposes. The water in the lakes is alkaline as well as in most of the small sloughs. There are many small sloughs where hay may be cut. There are no minerals, quarries or water powers, the only game I saw were antelope and duck. —*David Beatty, D.L.S., 1904.*

Township 34.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes a few miles east of the east boundary and from which a good trail can be had into the township. The surface is rolling prairie with small sloughs scattered throughout. There is only one lake in the township, on sections 20, 21 and 28, the water of which is alkaline. There are only a few small hay swamps in the township. The soil is generally hard clay requiring picks to dig the pits. There are no minerals, quarries or water powers in the township and it is more suitable for grazing than agricultural purposes.—*David Beatty, D.L.S., 1904.*

Township 39.—This township is situated about fifty-five miles southwest of Battleford, on what is known as Sounding lake trail. This trail passes through comparatively level country, and although not used much during the last few years, is in good condition. Battleford at the junction of Battle and Saskatchewan rivers, is at present the most convenient supply station, postal and telegraph office. The soil of this township is better than those to the west, being for the most part sandy loam, with a clay subsoil. In the central portion of the township is quite an area of rich black loam covered with a splendid growth of long grass and very desirable for grazing or farming purposes. This township is decidedly rolling prairie, there being very few hills in any part of it, with the exception of the land adjoining the large lakes in sections 34, 26 and 23. There is absolutely no timber upon this township, but towards the southeast a number of clumps of willow scrub are growing. Small natural hay meadows are to be found in almost every section, but none of any great extent occur. There is an abundance of water in this township to be found in many sloughs and fresh water lakes. The largest of these latter is to be found in sections 15, 16 and 21. There are also two large alkaline lakes extending through sections 24, 23, 26, 27 and 34. There is no water power on this township. There were no summer frosts experienced during the subdivision of this township, the weather being moderately warm. On July 15, an exceedingly heavy wind and rain storm occurred and also during the two days following rain fell at intervals. There is no fuel to be found upon this township, but a limited supply was discovered in township 40, range 24, where a small poplar grove grows in a ravine. There are no stone quarries. There are no minerals known to exist. No game was observed, with the exception of a few duck.—*J. W. Tyrrell, D.L.S., 1904.*

Range 25.

Township 27.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 27, range 26, and from which a good trail can be had. The surface is rolling with a few small hay swamps. The water is mostly alkaline, but I found sufficient fresh water for camping purposes. The soil is generally hard sand, requiring picks to dig the pits. There are no minerals, quarries or water powers in the township. The only game are antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 28.—The surface is rolling prairie with a few small hay swamps scattered throughout. The soil is generally hard clay and is more suitable for grazing than agricultural purposes. The water is mostly alkaline. This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the township. There are no minerals, quarries or water powers in the township. The only game are antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 29.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the eastern portion of the township from north to south. The surface of the country is rolling, with occasional small hay sloughs. The soil is generally hard clay and is better adapted to grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game are antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the eastern portion of the township. The surface is rolling, with a few small hay swamps scattered throughout. The soil is generally hard clay and is better suited for grazing than agricultural purposes. The water is mostly alkaline. There is a good spring on section 23 on the south shore of the lake. There are no minerals, quarries or water powers in the township. The only game seen were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 31.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes a few miles east of the township. The surface of the country is rolling, with a few gullies or ravines and several hay swamps. The soil is hard clay and is better adapted to grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The water is mostly alkaline, although I found sufficient fresh water sloughs for camping purposes. The game are antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 32.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the southeast corner of township 32, range 24, from which township a good trail can be made. The surface is fairly level prairie, with sloughs scattered throughout the township, notably a large one in sections 2, 3, 10 and 11, which in a dry season will be a good hay swamp and this applies to most of the marshes. The soil is hard clay and required picks in digging pits. The water in most of the sloughs is alkaline. The township is more suitable for grazing than agricultural purposes. There are no minerals, quarries or water powers. I saw a few antelope and plenty of duck.—*David Beatty, D.L.S., 1904.*

Township 33.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 33, range 23, and from thence a good trail can be made into the township. The surface is rolling prairie with no high hills. The soil is generally hard clay and in most places we were obliged to use picks in digging the pits. The water in many of the sloughs is alkaline, but we found sufficient fresh water for camping purposes. The township is better adapted to grazing than agricultural purposes. There are no minerals, quarries or water powers. The only game I saw were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 34.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 33, range 23, from which township a good trai can be made. The surface as rolling prairie with sloughs scattered throughout, notably a large one on sections 7, 8, 17 and 18, which in a dry season will be a good swamp. There are many small hay sloughs in the township. The water in a lake on sections 22, 26, 27 and 34 is alkaline, as well as in many of the sloughs, but I found sufficient fresh water for camping purposes. The soil is hard clay, requiring picks in most places to dig the pits. There are no minerals, quarries or water powers. The only game I saw in the township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 35.—This township is open prairie, undulating and rolling; soil, mostly second class, being sandy loam with clay subsoil. A few small ponds and sloughs, with some very good hay marshes, are scattered over the township, in which some hundred tons of hay could be cut. This township is well adapted to cultivation and grazing. There is no wood or timber of any kind. No fixed rock or mineral was found. Game is mostly waterfowl, but a few antelope are still to be found. Fur-bearing animals are muskrats and red foxes. The most convenient route from this township is by the Red Deer trail to Battleford, but has to be reached across the prairie, and is some sixteen miles distant.—*G. C. Rainboth, D.L.S., 1904.*

Township 36.—This township is open prairie, undulating and rolling; soil, mostly second class, being sandy loam, with clay subsoil. A few small ponds and sloughs, with some very good hay marshes are scattered over the township, in which some hundred tons of hay could be cut. This township is well adapted to cultivation and grazing. There is no wood or timber of any kind and no fixed rock or mineral was found. The game is mostly waterfowl, but a few antelope are still to be found. Fur-bearing animals are muskrats and red foxes. The most convenient route from this township is by the Red Deer trail to Battleford, but this has to be reached across the prairie.—*G. C. Rainboth, D.L.S., 1904.*

Township 37.—This township, situated about sixty-five miles southwest of Battleford, may be reached by what is known as Sounding lake trail, which runs, for the most part, through comparatively level country, and although not travelled much of late years, is in good condition. The town of Battleford is at present the most convenient supply station. It is also a telegraph and post office. The soil in this township is almost altogether a heavy clay, with, however, areas of sandy clay with a clay subsoil. In sections 26 and 27 considerable alkaline clay is to be found. This township is suitable for grazing and general farming purposes. This township varies from level to gently rolling and even hilly prairie. The large ravine running easterly and westerly through the centre appears to be the dividing line between the comparatively level portion to the south and a more broken country towards the north. No timber is to be found upon this township. A large hay meadow containing probably one hundred acres or more is to be found on the east boundary of section 3. The water in this marsh was about one foot or eighteen inches deep when crossed in July, but in all probability it would be dry later in the season. Other small hay marshes occur throughout this township. The lakes in this township are in nearly every case fresh and full of grass. The largest of these lakes appears in sections 23, 24, 25 and 26. It is fresh, full of grass and almost circular in shape. There is no water power to be found in this township. While this township was being subdivided the weather became exceedingly warm, the thermometer registering 100 degrees or more for two or three days. No rain fell, and frosts were unknown. There is no fuel upon this township, but a small supply can be procured in township 40, range 24, west of the third meridian, where there is a small poplar grove. There are no stone quarries in this township. There are no minerals in this township. Only a few duck were seen in this township.—*J. W. Tyrrell, D.L.S., 1904.*

Township 38.—This township is situated about sixty miles in a southwesterly direction from Battleford and almost directly on the old Sounding lake trail. This trail is in good condition and lies through a comparatively level country, but has not been used much for some years. The most convenient supply station at present is

Battleford, at the junction of Battle and Saskatchewan rivers, where there is also a telegraph and post office. The soil is, generally speaking, sandy clay and sandy soil, with a clay subsoil, but towards the southwest in sections 6, 7, 8 and 17 and thereabouts considerable black loam appears. The whole township has an abundant growth of long grass and is well suited for grazing and general farming purposes. This township varies from gently rolling to level prairie, the only hills of any size appearing in the northeasterly sections. No timber is to be found upon this township. Small natural hay marshes are to be found throughout this township, but none of great size, the largest being about sixteen acres and appearing on the east boundary of section 9. There are no large bodies of water in this township, but fresh water sloughs occur frequently. Probably the most important lake is a fresh water one in sections 20 and 21. No water power exists upon this township. There were no summer frosts experienced and the weather was moderately warm during the subdivision of this township. Rain fell on July 18th for a few hours. There is no fuel to be found upon this township. The nearest supply (and that limited) is to be found in township 40, range 24, west of the third meridian, where a small poplar grove was found. There are no stone quarries in this township. There are apparently no minerals in this township. Some duck, a few sandhill crane and brant geese were seen in this township.—*J. W. Tyrrell, D.L.S., 1904.*

Township 39.—This township, situated about 60 miles in a southwesterly direction from Battleford, is most directly and easily reached by Sounding lake trail, which passes through the northerly half of it. This trail passes for the most part through a level country and although not used much for the past few years, is in good condition for travelling. The nearest and most convenient supply station is Battleford, which is also a telegraph and post office. The soil of this township is generally speaking, sandy clay with a clay subsoil, but loose sandy soil, clay and sandy loam appear in places. It is also quite stony in sections, especially at the south end of the large lake in sections 14 and 15. This township is well suited for grazing and general farming purposes. This township is open hilly prairie, the only portion of any extent being at all level or rolling is that towards the southeast where a few sections are free from large hills. No timber is to be found upon this township. There are a few small natural hay marshes in this township, but none of any great extent. The lakes in this township are numerous and of considerable size, but nearly all alkaline. Fresh water sloughs, however, and some smaller lakes, are to be found in many sections. No water power occurs upon this township. During the subdivision of this township, which took place the second week in July the weather was dry and moderately warm, and entirely free from summer frosts. There is no fuel upon this township. A small poplar grove in a ravine on township 40, range 24 being the nearest available supply and that is very limited. No stone quarries occur upon this township. There are no minerals known to exist. Duck of different kinds, and a few brant geese were seen.—*J. W. Tyrrell, D.L.S., 1904.*

Range 26.

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 28, range 25, from which a good trail can be had. The surface of the country is rolling and hilly with several ravines. There are many small hay sloughs scattered throughout the township. The water in all the ponds and many of the sloughs is alkaline. The soil is hard clay and is better adapted to grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game are antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 29.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 29, range 24, and from which a good trail can be made into the township. The surface is generally rolling, with small hay sloughs or swamps scattered throughout. There is a deep ravine or gully crossing the southwestern portion of the township. The soil is generally hard clay, but there is some sandy soil in the southern tier of sections. The township is more suitable for ranchaing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game I saw in the township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 30, range 24, and from which a good trail may be made into the township. The surface is rolling, with small hay sloughs or swamps scattered throughout. The soil is generally hard clay and is more suitable for grazing than agricultural purposes. The water is slightly alkaline, but I found sufficient fresh water sloughs for camping purposes. There are no minerals, quarries or water powers in the township. The only game I saw was antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 31.—There is a good trail from Medicine Hat to Battleford, via Red Deer forks, which passes through township 30, range 25, from which a good route can be found through township 31, range 25, to this township. The soil is mostly a very hard, stiff clay, but portions of it are hard sandy loam, and is not suitable for agricultural purposes, being better adapted for grazing purposes. The surface is rolling open prairie, the nearest timber suitable for fuel being in the valley of Eyehill creek and the south Saskatchewan below Red Deer forks. There are no streams, quarries, minerals or good hay marshes. The water in the larger sloughs is slightly alkaline, and that in the smaller sloughs fairly fresh, but does not constitute a permanent supply. I saw a few antelope and some duck, but no chicken.—*Walter Beatty, D.L.S., 1904.*

Township 33.—This township is open prairie, the northern half undulating and rolling, the southern half hilly and rough, soil mostly class 3, being a sandy loam and hard clay and gravelly subsoil. The grass is fairly good, with a few good hay marshes on the northern half. Small ponds and sloughs intervene among the hills in the southern half. Three lakes were found large enough to traverse, one extending in sections 20 and 21, one in sections 11, 13 and 14 and one in sections 13 and 24, the latter being crossed by the east boundary of the township. The tops of the hills are stony and gravelly, with scant vegetation; the northern half could be cultivated, but the southern half, under present condition, I consider to be unfit for cultivation. There is no fixed rock or mineral in sight. Waterfowl are abundant and a few antelope are met with. Fur-bearing animals are muskrats and foxes. The most convenient route from this township is by the Red Deer trail to Battleford, but has to be reached across the prairie some six miles east.—*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, undulating and rolling, the soil rates between second and third class, being a sandy loam, with boulder clay and gravelly subsoil, which is very hard and dry. While only fairly well adapted to cultivation, it is a superior township for grazing, supporting rich grasses. A few small hay marshes are found, but of little consequence. Water is scarce. No fixed rock or minerals are found, and no game. Antelope, however, are occasionally seen. Two routes to Battleford are found. One by Red Deer trail and one by Sounding lake trail, either of which has to be reached across the prairie.—*G. C. Rainboth, D.L.S., 1904.*

Township 35.—This township is open prairie, undulating and rolling in the northern tier of sections; hilly in the central part of the township and rolling in the southern part. The soil ranges from class 2 to 3, composed of sandy loam and boulder clay, and gravel subsoil. Several large hay marshes where hundreds of tons of hay can be cut, extend across the northern middle part of the township. A big hay marsh also extends across sections 4, 5, 8 and 9, in which several hundred tons of hay could be cut. This township is only medium as regards being fit for cultivation, but is very well adapted for grazing and will eventually be valuable as a hay producing township, as a very large portion of this section of country is better fitted for stock raising, and hay would be essential for wintering stock. There is no fixed rock or mineral in evidence. Fairly good surface water is found in most of the sloughs. Wild fowl abound in the marshes and a few antelope are still found wandering over the country, while muskrats are found in all the ponds and sloughs. No timber or wood of any kind is found. Two routes to Battleford are found by the Red Deer trail and the Sounding lake trail, but these have to be reached across the prairie.—*G. C. Rainboth, D.L.S., 1904.*

Township 36.—This township is open prairie, rolling and undulating, being rated class 2 and 3. Soil is sandy loam with clay and gravelly subsoils. It is fairly suitable for cultivation and well suited for grazing, being covered with rich grasses. Several large hay marshes are found in the southwestern part of the township from which hundreds of tons of hay can be cut. A few sloughs of surface water are found with water fit for use. A small lake partly in sections 19 and 30 was traversed; the water in it is alkaline. No wood or timber of any kind was found. No fixed rock or minerals were met with. Wild fowl are plentiful and a few antelope. Muskrats abound in the sloughs and marshes, red foxes are also found. Two routes to Battleford are found, one by Red Deer trail and one by the Sounding lake trail, but either has to be reached across the prairie.—*G. C. Rainboth, D.L.S., 1904.*

Township 37.—This township, situated about seventy miles to the southwest of Battleford, may be reached by Sounding lake trail, which, though little used during the past few years, is an easy trail, passing through comparatively level country. The town of Battleford is the most convenient supply station, also telegraph and post office. This soil, like that in the townships immediately to the north is almost without exception a sandy clay, with a stiff clay subsoil. Here and there, however, especially towards the northwest portion, are to be found large tracts of heavy clay soil. Everywhere the grass was long and appeared to be well suited for grazing or general farming purposes. This township is almost entirely open, rolling prairie, especially towards the south, where it becomes almost level. The large ravine running through sections 36, 35, 34 and 33 is the most prominent feature. No timber of any kind is to be found upon this township. A large natural hay marsh is to be found in sections 2 and 3 containing probably one hundred acres, but many smaller ones occur in almost every section throughout this township. Many small fresh sloughs and lakes occur throughout this township with here and there a comparatively large body of water. Almost all of these are fresh and full of grass. The two largest lakes are in a ravine which runs through sections 36, 35, 34 and 33, and extends into township 38, range 26, to the north. No water power exists upon this township. The condition of the wild flowers and wild pea vines would indicate that for some few weeks, at least, no frosts had occurred. During the 25th, 26th, 27th and 28th, of June, while this township was being subdivided, the weather was fine and mild. No fuel was to be found upon this township, the supply for cooking purposes at camp having to be procured from a small poplar grove in township 40, range 24, west of the third meridian. No stone quarries occur upon this township. No minerals of economic value are known to exist upon this township. The only game observed in this township were duck of different species and occasionally a few sandhill crane.—*J. W. Tyrrell, D.L.S., 1904.*

Township 38.—This township is situated about sixty-five miles southwest of Battleford, and may be reached from that place by Sounding lake trail, which crosses comparatively level country. The town of Battleford is at the present time the most convenient supply station, telegraph and post office. The soil of this township, although varying considerably is chiefly sandy clay with a clay subsoil containing in some sections gravel and boulders. Alkali flats also appear in some places. The strong growth of grass observed everywhere throughout this township would indicate a suitable grazing or general farming country. This is open prairie country and varies from gently undulating to hilly. No timber of any kind is to be found in this township. A few willow and small poplars growing around the shores of sloughs or lakes is all the wood appearing. Natural marsh hay is to be found throughout this township on almost every section, and no doubt a number of the large grassy lakes would be dry enough later in the season to afford a crop of hay. The largest body of water occurring upon this township is to the south in sections 4, 5 and 6 and extends westerly into the next township. It is a large fresh grassy lake. Elsewhere large fresh and alkaline lakes occur, also many small fresh sloughs. No water power exists upon this township. This township was subdivided between June 21 and 24, during which time the weather was fine and mild, there being no sign of summer frosts. Judging from the luxuriant growth of grass, and the abundance of wild pea vine and wild flowers, the weather previous to this time must have been bright and warm, and entirely free from frosts, for at least some weeks. There is no fuel of any kind to be found upon the township, the nearest available supply being a small poplar grove in township 40, range 24, west of the third meridian. No stone quarries occur upon this township. No minerals of value are known to occur upon this township. Antelope in pairs, ducks, geese and a few sandhill crane were observed throughout the township.—*J. W. Tyrrell, D.L.S., 1904.*

Township 39.—This township, which is situated about 65 miles southwest from Battleford, may be reached from that place by what is known as Sounding lake trail; a trail, which though not travelled much of late years, crosses comparatively level country. The town of Battleford is, at the present time, the most convenient supply station as well as telegraph and post office. The soil of this township is chiefly a Judging from the strong growth of grass everywhere observed upon the township, it is well suited for grazing as well as general farming. The surface of this township is entirely that of an open prairie varying from what might be termed gently rolling to that of decidedly hilly country. No timber of any description is found upon this township. A few very small willows or poplars only being found here and there about the shores of some of the lakes and sloughs. Natural marsh hay is found in considerable quantities on almost every section upon this township. One of the largest of these hay marshes or meadows being situated on section 31, where there are about eighty acres of fine natural hay. Many other smaller meadows, however, occur everywhere throughout the township. The largest body of water occurring upon this township is found upon sections 11, 12, 13 and 14, in the form of an alkaline lake, but elsewhere throughout the township fresh water is abundant in the many smaller lakes and sloughs. The largest of these occur upon sections 1, 2, 3, 5, 15 and 24. No water power exists in this township. This township having been surveyed during the month of June, I can only judge of the climate from what was experienced at that time, and the luxuriant growth of grass which was everywhere noticed. Between the 17th and 21st days of June, whilst engaged in subdivision of this township, rain was several times experienced, but nothing in the shape of summer frosts, nor could any of these have occurred for some time previously since the wild flowers and particularly the wild pea vines were everywhere flowering and gave no indication of recent frosts. Fuel of any description upon this township is a rare commodity. The nearest available supply being on township 40, range 24, west of the third meridian, where in a deep ravine a small poplar grove was discovered. No stone quarries occur upon this township. No minerals of economic value are known to occur upon this township. Several antelope were observed on this township and the surrounding locality; duck of various description were everywhere common upon the lakes and sloughs. Besides these several brant and sandhill cranes were noticed.—*J. W. Tyrrell, D.L.S., 1904.*

Township 43.—This township, which is situated about 55 miles due west from Battleford, can most directly be reached from that place by what is known as Sounding lake trail, which passes through the country some miles to the south and which, though not travelled much of late years, is in good condition, and for the most part is through comparatively level country. Battleford is at present the most convenient supply station, also postal and telegraph office. The soil in this township is almost altogether drifting sand, and useless for farming purposes. It would be suitable for grazing. The surface, where not covered by Manito lake, is very rough and hilly, caused to a great extent by the shifting nature of the soil. There is practically no natural hay in this township, but a certain amount of swamp grass might be cut around the shores of Manito lake. White and black poplar from 1 to 10 inches in diameter and dogwood 3 to 8 inches are to be found in scattered clumps throughout this township, but generally speaking, the bush is very small and of a scrubby nature. Almost the entire township is taken up with Manito lake, a large alkaline body of water extending through several townships. Besides this, however, there is a small fresh water lake on the east boundary of section 7 and a few fresh water sloughs in various sections. There is no water power in this township. The weather was fine and cool while this township was being subdivided, but no frosts occurred. There is a considerable supply of poplar wood on most sections of this township, which would be ample as fuel for some years to come. There are no stone quarries upon this township. There are no minerals of economic value known to exist. A flock of about 75 large white swans were several times seen in Manito lake, besides duck of various kinds and a few brant geese. Rabbits, prairie chicken, a few partridge and the tracks of bear and deer were observed at different times.—*J. W. Tyrrell, D.L.S., 1904.*

Range 27.

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 28, range 25, and from which a good trail may be had. The surface is rolling and hilly, with a few ravines and small hay sloughs. The soil is clay and is better suited to grazing than agricultural purposes. The water is mostly alkaline. There are no minerals, quarries or water powers in the township. The only game seen in the township was antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 29.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 29, range 25, and from which a good trail can be had into the township. The surface of the country is rolling prairie, with small grassy or hay sloughs. The soil is hard clay and is better adapted to grazing than agricultural purposes. The water is mostly alkaline, but I found sufficient fresh water sloughs for camping purposes. There are no minerals, quarries or water powers in the township. The only game seen was antelope and duck. —*David Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 29, range 25, from which a good trail can be had. The surface is rolling, with a few ravines and scattered small hay marshes. The water is mostly alkaline. The soil is principally hard clay and is better suited for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game I saw in the township was antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 31.—There is a good trail from Medicine Hat to Battleford, via Red Deer forks, which passes through township 30, range 25, from which a route can be found through township 31, ranges 25 and 26 to this township. The soil is mostly a hard sandy loam with a hard clay subsoil, and is not suitable for agricultural purposes, being best adapted to forming a summer range for cattle. The surface is rolling prairie without any timber of any kind. There are no streams, quarries, minerals or good hay marshes in this township. The water in the lakes is strongly alkaline and there is not any visible permanent supply of fresh water, the small sloughs that collect surface water in the spring being the only source of supply of water for camp purposes.—*Walter Beatty, D.L.S., 1904.*

Township 32.—There is a good trail from Medicine Hat to Battleford, via Red Deer forks which passes through township 31, range 24, from which a route can be found through township 31, ranges 25 and 26, to this township. The soil is mostly a very hard clay, but portions of it are sandy loam with a hard clay subsoil and is not well adapted to agricultural purposes, being more suitable for grazing land. A small percentage of it is stony on the surface. The surface is rolling prairie and not very broken excepting in the northwestern portion of the township, where there are low hills from 20 feet to 40 feet high. There are no streams, quarries, minerals or timber of any kind and no extensive areas of hay land in this township. The water in the lake on the south boundary of section 1 is alkaline, as is also the case in any large sloughs, the only fresh water being in small sloughs from which the surface water has not evaporated. I saw a few antelope in this township and some waterfowl.—*Walter Beatty, D.L.S., 1904.*

Township 33.—This township is open prairie very hilly and rough; class 3; soil sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet in height. Small ponds and sloughs are of frequent occurrence among the hills, the ponds being alkaline and the sloughs having fresh water; in dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the top of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, but hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild duck and various waterfoul are found in abundance; antelope are about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about twenty miles. —*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, very hilly and rough, class 3; soil, sandy loam, gravelly and stony, particularly on the tops of the ridges, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds having alkaline and the sloughs fresh water. In dry seasons water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, but hay could be cut around the sloughs in limited quantity. No wood, no mineral and no fixed rock is found. Wild duck and various waterfowl are found in abundance. Antelope are about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about 12 miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 35.—This township is open prairie, very hilly and rough; class 3; soil, sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds having alkaline, and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless hay could be cut around the sloughs in limited quantity. There is no wood, no minerals and no fixed rock. Wild duck and various waterfowl are found in abundance. Antelope are about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about fifteen miles from this township. There is an old trail marked on the map going to Edmonton but it is now invisible.—*G. C. Rainboth, D.L.S., 1904.*

Township 36.—This township is open prairie, undulating and rolling in the north half and rolling and hilly in the south. Soil mostly 3rd class, more fitted for grazing than cultivation. Cactus lake extends into the township from the west and crosses sections 31, 32, 30 and 29, its water is alkaline, another small lake in which the water is similar to Cactus lake, crosses into the east side of the township from the east, entering sections 24 and 25. Surface water (fresh) is to be found in sloughs and marshes, which are of frequent occurrence. Several large hay marshes from which hundreds of tons of hay could be cut are found in the centre and southern portions of this township. No wood or timber of any kind nor fixed rock or mineral were found. Wild fowl are plentiful, antelope are also found; fur-bearing animals are muskrats and red foxes. The trail from Sounding lake to Battleford passes in township 37, range 28, and is the most convenient route to civilization.—*G. C. Rainboth, D.L.S., 1904.*

Township 37.—This township, distant about seventy or seventy-five miles southwest of Battleford, is most easily reached by what is known as Sounding lake trail. which though not used much during the past few years, runs through comparatively level country. At the present time Battleford is the most convenient supply station, also telegraph and post office. The soil in this township is chiefly sandy clay with a stiff clay subsoil, but towards the north of the township considerable light sandy soil with a clay subsoil is to be found, also in a few places sandy loam, but none of it can be considered as first class. It, however, produces a strong growth of grass and seems to be well suited for grazing and general farming. This township although quite hilly can hardly be called rough country, as the rating will show; however, towards the north a large ravine breaks the surface into a series of hills. The southern portion is more even and might be called a gradual descent from the north. There is no timber to be found upon this township; however, a few small willows occasionally are found growing around the shores of the lakes and sloughs. No very extensive hay meadows are to be found in this township, but in almost every section smaller ones occur. One of these on the east boundary of section 15. although more properly speaking a slough, would no doubt be dry enough to cut later in the season. The water in this township is mostly fresh, but the largest body, that in the northwest corner of section 32, is slightly alkaline. Small, but fine fresh water springs, are to be found in each of the ravines noted in sections 34 and 5. Fresh water sloughs are numerous. No water power exists upon this township. During the subdivision of this township the weather was fine and warm. The vines gave no indications whatever of having been touched by summer frosts. A warm rain was experienced on July 1. There is no fuel to be had upon this township. Probably the nearest available supply being in the northerly part of township 40, range 27, where the poplar bush commences. No stone quarries occur upon this township. No minerals of economic value appear in this township. The only game noticed in this township were a few antelope and duck.—*J. W. Tyrrell, D.L.S., 1904.*

Township 38.—This township, which is situated about seventy-five miles southwest of Battleford, is directly on what is known as Sounding lake trail. This trail has not been used much of late years, but runs through a comparatively level country. Battleford, which is the most convenient supply station at the present time. is also the nearest postal and telegraph office. The soil of this township, like those to the south and east, is mostly sandy clay, but here and there a considerable expanse of heavy clay soil appears, and also, especially along the south boundary, more or less loose sandy soil, stony in places. Most of the township, but more particularly the westerly portion, was covered with a very heavy rich growth of grass, and appeared to be well suited for grazing or general farming purposes. This township might be described as hilly prairie, but in the neighbourhood of sections 16, 17 and 21 it is comparatively level, this apparently being the end of the large ravine mentioned in the township to the east. Natural hay meadows do not appear to be very plentiful in this township, but the large clay flats in sections 8 and 9 have a splendid growth of long swamp grass, different to that in the hay marshes, but no doubt equally as good for feeding purposes. The largest body of water is a fresh grassy lake, extending through considerable portions of sections 9, 10, 16 and 17, but other smaller ones appear in sections 18 and 30. These are permanent and would no doubt furnish a supply of water the year round. No water power exists in this township. The climate of this township during the early part of July was fine and moderate, no frosts occurring. The grass was still quite green, and had not begun to show much signs of turning brown. No fuel was to be found upon this township, the supply for camp purposes having to be procured from the northerly portion of township 40, range 27, where a few small poplar bluffs are located. Township 41, range 27, and those to the north of it, will furnish a considerable supply of poplar wood for some years. There are no stone quarries upon this township. No minerals appear in this township. Game was exceedingly scarce in this township, only a few duck being seen.—*J. W. Tyrrell, D.L.S., 1904.*

Township 39.—This township lies just to the north of what is known as Sounding lake trail, and is distant from Battleford in a southwesterly direction about seventy miles. This trail, although not used much of late years, is the best and most direct to this section of the country, passing as it does, through comparatively level prairie. Battleford, at the present time, is the most convenient supply station, also telegraph and post office. The soil in the easterly portion of this township is principally heavy clay, but varies from that to sandy clay with a clay subsoil. The southwesterly and northwesterly sections are very poor soil, the former being mixed with considerable gravel and the latter being drifting sand. Between these, howver, viz., in sections 18, 19 and 30 the soil is good, being in the valley of Eyehill creek. The surface of this township is mostly open, rolling prairie, but varies from that to hilly country. No particular portion can be set aside as distinctly rough unless it may be the northwesterly sections where after crossing Eyehill creek, the sand hills are encountered. No timber is found upon this township, but along Eyehill creek poplar scrub and willows are found growing in clumps. Natural hay meadows, though small, occur in many sections of this township. Probably the most important of these is found in the east baundary of section 23. There are no lakes in this township, but numerous sloughs. These sloughs, however, are small and most of them become dry towards the end of the summer. A fine fresh spring is to be found on the south boundary of section 6, which, though small at the present time, could be greatly improved. Eyehill creek, which flows through sections 7, 18, 19, 30 and 32 is alkaline and though probably quite a stream at some seasons, was almost dry during the summer. No water power exists upon the township. While this township was being subdivided the weather was dry and warmer than at any previous time during the season. No rain fell and summer frosts were never experienced. There is very little fuel upon this township, the only wood being some small poplar, above mentioned, along Eyehill creek. The nearest available supply is in township 40, range 27, west of the third meridian, where some small poplar bluffs occur. From there northerly, however, in township 41, range 27, the supply is sufficient for some years to come. No stone quarries occur upon this township. No minerals are known to occur upon this township. A few ducks and a number of prairie chickens were all the specimens of game seen in this township.—*J. W. Tyrrell, D.L.S., 1904.*

Township 40.—This township is situated in a southwesterly direction from Battleford about 65 or 70 miles and some distance to the north of what is known as

Sounding lake trail. This trail is in good condition and passes through comparatively level country. Battleford is at the present time the most convenient supply station, as well as telegraph and post office. Eyehill creek seems to be the dividing line in this township between two distinct classes of soil, that to the west being principally drifting sand and not very suitable for either grazing or farming purposes. To the east of the creek however, it is somewhat better there being considerable areas of sandy clay soil with a clay subsoil, and producing a fair growth of grass. This easterly portion would be more suitable for grazing than general farming purposes. This is decidedly a hilly country, there being no areas of any extent which are at all level. That portion along the east boundaries of sections 4, 9, 16 and 21 is probably the roughest, caused by numerous deep ravines entering Eyehill valley. Much of the westerly portion being sandhills is also very rough. There are a few scattered clumps of small poplar in sections 4, 5 and 34, also clumps of willow growing along Eyehill creek. There are many acres of natural hay growing on either side of Eyehill creek, in fact sections 28, 21, 16 and parts of 9 and 4 through which it runs, may be considered as one large hay meadow. There are other small marshes scattered throughout the township. Eyehill creek, the most important water in this township, is a slightly alkaline creek, running through the centre from south to north. It was practically dry in July, but is surrounded by a large muskeg, which as it narrows down towards the north furnishes a considerable flow of fresh water. It will average about 15 feet wide, 12 to 18 inches deep and flows about one to one and one-half miles per hour. There is also quite a large alkaline lake in section 19 and some small fresh water ones in sections 14, 22 and 26. No water power exists in this township. The weather during the subdivision of this township was moderately warm and entirely free from summer frosts. There is very little fuel to be had upon this township, some small poplar only being found in sections 4, 5 and 34, but in township 41, range 27 and those to the north, there is a considerable supply of poplar wood available for some years to come. There are no stone quarries. There are no minerals known to exist. Duck, rabbits and a few prairie chicken were seen.—*J. W. Tyrrell, D.L.S., 1904.*

Township 41.—This township, which is situated about 65 miles west of Battleford is most directly reached from that place by what is known as Sounding lake trail, which passes some miles to the south of it. This trail is in good condition and runs for the most part through comparatively level country. Battleford, at the junction of the Battle and Saskatchewan rivers, is at present the most convenient supply station, postal and telegraph office. The soil of this township is almost altogether loose sand and in many places drifting. East of Eyehill creek, however, it is somewhat a better class, being mostly sandy clay with a clay subsoil. There is a considerable growth of grass in this township, which would be suitable for grazing purposes. This township, principally owing to the sand hills, is very rough, there being no level areas of any extent. Almost every section in this township has some poplar upon it, but in no case are there any extensive areas of large bush. The trees vary in size, from 1 to 8 inches and are both black and white poplar. There are no distinctive hay marshes in the township, but around the shores of some of the lakes, considerable hay might be cut. The largest body of water in the township is an alkaline lake, extending through sections 29, 32 and 33, but besides this, there are several other lakes, most of which are alkaline. Eyehill creek is the most important water, it being fresh in this township and of considerable volume. It varies from ten to twenty-five feet in width, is about twelve to eighteen inches deep and flows about one and one-half miles per hour. There is no water power in this township. No summer frosts were experienced during the subdivision, the weather being fine and moderately warm. Rain fell on August 2. There is a considerable supply of poplar wood to be had on almost every section. There are no stone quarries; and no minerals are known to exist.

Duck, brant geese, prairie chicken, rabbits and jumping deer were seen.—*J. W. Tyrrell, D.L.S., 1904.*

Township 42.—This township is situated almost due west of Battleford, about sixty miles, and can most easily and directly be reached by the old Sounding lake trail, which passes some miles to the south in township 38. This trail is in good condition and runs through comparatively level country, but has not been used much for some years. Battleford is at the present time the most convenient supply station, also telegraph and post office. The soil of this township is light drifting sand and would be useless for agricultural purposes. It might be used as grazing land or as a game preserve. The surface of this township is very rough, being a series of lakes and hills. Black and white poplar from one inch to ten inches is to be found in many sections, also some small white birch was noticed in section 27, however, there are no extensive areas of large timber. There are no natural hay marshes in this township, but a considerable quantity might be cut around the shores of some of the lakes and sloughs. There is a great abundance of water in every section of this township. Large lakes and extensive marshes, or muskegs, filled with willow bushes are to be found on every hand, and contain an abundant supply of fine fresh water. There is no water power in this township. The weather during the subdivision of this township was fine, dry and moderately warm, and entirely free from summer frosts. There is considerable supply of poplar wood on almost every section, which would meet the demand for fuel for some years to come. There are no stone quarries upon this township. There are no minerals known to exist upon this township. Duck, brant geese, rabbits, prairie chicken and jumping deer were seen in this township. The deer, while not numerous, were seen from time to time.—*J. W. Tyrrell, D.L.S., 1904.*

Township 43.—This township is about sixty miles due west of Battleford and can most easily and directly be reached by the old Sounding lake trail, which lies some distance to the south. This trail, though not used much for some years, is in good condition and passes through a comparatively level country. Battleford is at the present time the most convenient supply station, also telegraph and post office. The soil in this township is altogether sand, with frequent large areas of drifting sand. It would be useless for any class of farming, but might be used for grazing or as a game preserve. The surface of this township is very rough, the hills not being very high, but numerous. A sandhill country most fully describes this township. Almost every section upon this township, with the exception of those at the extreme north, and that portion occupied by Manito lake, has more or less bush upon it. This bush is black and white poplar varying from one inch to ten inches, with an occasional small tree of white birch, but these latter are not numerous. The most extensive area of bush is probably that to the south of Manito lake in sections 10 and 11. The largest and probably the only hay marsh in this township is to be found at the westerly extremity of Manito lake in sections 9, 10, 15 and 16. The largest body of water in this township is Manito lake, which occupies all of sections 19, 30 and 31 and the greater part of 18, 13, 14 and 10, besides extending into the townships to the east. This is strongly alkaline. Fresh water sloughs occur in various sections, and small fresh water springs or creeks appear on the east boundaries of sections 16, 3 and 14. There is no water power in this township. There were no summer frosts experienced in this township and the weather was fine and moderately warm. It was noticed that the sandhills were usually wooded on the north and northeast sides, but it is difficult to say whether or not this is caused by climatic conditions. There is a considerable supply of poplar wood to be found in almost every part of this township. It is more scattered towards the north, but even there, poplar bluffs are numerous. There are no stone quarries in this township. There are no minerals known to exist in this township. Many varieties of water fowl, including duck, geese and swans were seen in this township. A flock of about seventy-five of the latter were seen several times in Manito lake. Prairie chicken, rabbits, a few partridge, deer, and one black bear were also seen at different times.—*J. W. Tyrrell, D.L.S., 1904.*

Range 28.

Township 27.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the southeastern part of the township. The surface of the country is very rolling and hilly, with ridges and ravines in places, with small hay swamps. The soil is mostly sandy, in some places very hard. The township is more suitable for grazing than agricultural purposes. There are several lakes in the township, the water of which is strongly alkaline. There is a spring of good fresh water near the northwest corner of section 5, and there are several springs on sections 30 and 31. There are no minerals, quarries or water falls in the township. There were antelope and duck in the township, also several hundred range cattle.—*David Beatty, D.L.S., 1904.*

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes township 27, range 28, from which a good trail can be had. The surface of the country is rolling prairie, with scattered hay sloughs. There is a lake on sections 4 and 5, the water of which is strongly alkaline. Most of the sloughs are also alkaline. I found sufficient fresh water for camping purposes. The soil is mostly clay and is hard, requiring picks to dig the pits. The township is more suitable for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game seen was antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 29.—This township can be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the southeastern part of township 27, range 28, from which a good trail may be had into the township. The surface of the country is rolling prairie. The soil is generally clay, but too stiff to be good farming land, and is more suitable for grazing than agricultural purposes. There are two lakes of considerable size in the township, the waters of which are strongly alkaline. Some of the smaller sloughs scattered through the township contain fresh water. There are no minerals or quarries in the township. The only game I saw in the township were antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 30, range 24, from which a good trail can be had. The surface of the country is slightly rolling prairie, with some small hay sloughs. There are several lakes in the township, the water of which is strongly alkaline. The soil is generally hard clay and is more suitable for grazing than agricultural purposes. There are no minerals, quarries, or water powers in the township. The only game seen was antelope and duck.—*David Beatty, D.L.S., 1904.*

Township 31.—The readiest means of access to this township is by rail to Battleford thence by Battleford and Medicine Hat trail, as now travelled, to township 31, range 24, thence westerly across ranges 25, 26 and 27. The surface is broken, rolling prairie, rough and hilly in the northwesterly portion. There are six small lakes. The water is mostly brackish; the water in sloughs is generally sweet. The soil is generally hard sand or gravel with clay subsoil—not suitable for tillage, but fairly good grazing land. There are no minerals, quarries or water powers in the township. Antelope and duck were the only game seen.—*Walter Beatty, D.L.S., 1904.*

Township 32.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through township 32, range 24, from which a good trail can be had into the township. The surface of the country is rolling prairie with scattered small hay sloughs. There are several lakes in the township the water of which is strongly alkaline, although I found sufficient fresh-water sloughs for camping purposes. The soil is generally hard clay and is better adapted for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game seen was antelope and duck.—*Walter Beatty, D.L.S., 1904.*

Township 33.—This township is open prairie, very hilly and rough, class 3, soil sandy loam, gravelly and stony, particularly on the top of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds having alkaline and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation, and would only be fit for summer grazing. No hay marshes of any consequence were noticed, nevertheless hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild duck and various waterfowl are found in abundance. Antelope is about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about twenty-two miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, very hilly and rough, rating class 3, soil is sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds have alkaline and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation, but would be fit for summer grazing. There are no hay marshes of any consequence, but hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild ducks and various other waterfowl are found in abundance. Antelope is about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about 16 miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 43.—This township is situated due west of Battleford about sixty-five miles, and some distance to the north of what is known as Sounding lake trail, which is the best and most direct route to that section of the country. It has not been used much during the past few years, but is in first-class condition, and lies through a comparatively level country. The town of Battleford at the junction of Battle and Saskatchewan rivers, is the most convenient supply station. It is also a telegraph and post office. The sections to the north of this township are very suitable for general farming or grazing purposes, being heavy sandy loam from four to ten inches deep, with a sandy subsoil. Towards the south, however, it is almost altogether drifting sand, and sandhills, and of little use for agricultural purposes. The surface of this township is most unusual, having the appearance of a large artificial park. Everywhere are round dense clumps of young poplar and willow, with what appears to be driveways winding in and out between them. The western portion is also very hilly, but towards the east in sections 23, 24, 25 and 26 there is a gently rolling valley. There is very little natural hay to be found in this township. A small quantity might be cut on the east boundary of section 10 near the half-mile pits. There is an abundance of water in this township. The large bodies are saline, but many small fresh water sloughs are to be found. These are usually full of thick willows, which keep the water cool and splendid for drinking purposes in summer. The large saline lake in sections 1, 2, 11 and 12 has a firm sandy bottom and is all that could be desired for bathing purposes. During the subdivision of this township the weather was cool, but no summer frosts occurred. Rain fell during August 19.

There is considerable poplar wood on almost every section, which, though mostly small, is sufficient as a fuel supply for some years to come. The bush on this township is composed of black and white poplar and some small white birch. The latter is to be found on the shore of the alkaline lake in section 15. The poplar is, generally speaking, small, but a few trees eight to ten inches in diameter are growing around the shores of the large saline lake. There are no stone quarries in this township. There are no minerals known to exist upon this township. Game is quite plentiful in this township. Various kinds of waterfowl, namely, duck, brant geese and snipe were seen, also rabbits, partridge, prairie chicken, sandhill crane and several jumping deer. Bear tracks were often observed, but none of these animals were actually seen.—*J. W. Tyrrell, D.L.S., 1904.*

Range 29.

Township 27.—This township may be reached by taking the Battleford and Medicine Hat trail, which passes through the southeast corner of township 27, range 28, from which a good trail can be had. The surface is rolling, with some small hay sloughs. The water is mostly alkaline, but there is fresh water on section 25 at the southwest angle of a lake where the ground is boggy with springs. The northern portion of the township is sandy and the southern part clay. The country is better adapted for grazing than agricultural purposes. There are no minerals, quarries, or water powers in the township. The only game seen were antelope and duck.—*Walter Beatty, D.L.S., 1904.*

Township 28.—This township may be reached by taking the Battleford and Medicine Hat trail from either place, which passes through the southeast corner of township 27, range 28, from which a good trail can be had. The surface of the country is rolling, with a few small hay sloughs. The northern part of the township is sandy and the southern part is clay. The water is mostly alkaline. There is a small spring of fresh water in section 24 near the west side. The country is more suitable for grazing than agricultural purposes. There are no minerals, quarries or water powers in the township. The only game seen was antelope and duck.—*Walter Beatty, D.L.S., 1904.*

Township 29.—This township may be reached from either Battleford or Medicine Hat by the trail which passes through township 29, range 25, from thence a fair trail may be had across ranges 26, 27 and 28. The surface is mainly rolling prairie, with a few broken hills and grassy sloughs. The sloughs and hay swamps afford fresh water for camp use. The soil is principally clay of fair quality, but it is better adapted for grazing than tillage. There are no minerals, quarries or water powers. Antelope and duck are the only game.—*Walter Beatty, D.L.S., 1904.*

Township 30.—This township may be reached by taking the Battleford and Medicine Hat trail from either place. This trail passes through range 25 and from there an easy route may be had across ranges 26, 27 and 28. The surface is rolling prairie broken by occasional hay swamps or sloughs, in which good water may be found. On section 26 is a small alkaline lake. The soil is mostly all hard clay and unfit for agricultural purposes, but is fairly good for grazing. There are no minerals, quarries or water powers in the township. Antelope and duck are the only game.—*Walter Beatty, D.L.S., 1904.*

Township 31.—This township may be most readily reached by taking the Battleford and Medicine Hat trail from Battleford to a point opposite. Then an easy route may be had over the prairie westward across township 31, ranges 25, 26, 27 and 28. The surface of the country is rolling prairie, with occasional small hay sloughs with fresh water. The soil is generally either hard clay or sand with small tracts of sandy loam. There are no minerals, quarries or water power in the township. Antelope and duck are the only game.—*Walter Beatty, D.L.S., 1904.*

Township 32.—This township may be reached by taking the Battleford and Medicine Hat trail, from which a good trail may be had westward into the township. The northerly part of the township is gently rolling prairie. The southerly half is rougher. Fresh water for camping purposes may be obtained in the sloughs. The soil is sandy with sandy loam and clay in places and better adapted for grazing than farming purposes. There are no minerals, quarries or water powers in the township. Antelope and duck were the only game seen.—*Walter Beatty, D.L.S., 1904.*

Township 33.—This township is open prairie, rolling and hilly, class 3, soil sandy loam, gravelly and stony on the tops of the hills and ridges. A few scattered ponds and sloughs are met with, the ponds alkaline and the slough water fresh and fit for use. This township, while not very favourable for cultivation, is nevertheless well suited for ranching, as the grasses are abundant and rich. No wood of any kind is met with. No solid rock or mineral was noticed. The usual waterfowl are plentiful but large game is scarce, antelope being the only kind found. The most convenient outlet for this township is by the Sounding lake trail to Battleford passing through Tp. 37, R. 29, W. of the 3rd meridian.—*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, rolling and hilly, class 3, with sandy loam soil, gravelly and stony on the tops of the hills and ridges. A few scattered ponds and sloughs are met with, the ponds being alkaline, but slough-water fresh and fit for use. This township, while not being favourable for cultivation, is neverthe less well suited for ranching, as the grasses are abundant and rich. No wood of any kind is met with, and no solid rock or mineral. The usual waterfowl are plentiful but large game is scarce, antelope being the only kind found. The most convenient outlet for this township is by the Sounding lake trail to Battleford passing through Tp. 37, R. 29, west of the 3rd meridian.—*G. C. Rainboth, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FOURTH MERIDIAN.

Range 1.

Township 33.—This township is open prairie, very hilly and rough; about class 3; soil sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds having alkaline and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless, hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild duck and various waterfowl are found in abundance. Antelope is about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about eighteen miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, very hilly and rough, rating class 3. Soil is sandy loam, gravelly and stony particularly on the top of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds having alkaline and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scrub grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild duck and various waterfowl are found in abundance. Antelope is about the only large game found, but they are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about 12 miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 35.—This township is open prairie, very hilly and rough, class 3; soil sandy loam, but gravelly and stony, particularly on the top of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence, the ponds being alkaline, but the sloughs having fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless, hay could be cut around the sloughs in limited quantity. There is no wood, no rock and no minerals. Wild duck and various waterfowl are found in abundance. Antelope are about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about 6 miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 36.—This township is open prairie, undulating and rolling in the northeast quarter. Rolling in the northwest quarter and middle parts and extremely hilly in the southern part, class 2 and 3. Soil is sandy loam, with clay and gravelly subsoils. In the northwest corner of this township there is a range of small sandhills, with a few small poplar bluffs extending across sections 31 and 32. Two lakes were traversed, one in section 28, and the other mostly in section 15, but extending into sections 10 and 16. The water in these lakes is alkaline. Good fresh water sloughs are found in the hilly parts. This township is fairly well adapted to cultivation, but is best suited for grazing. There is no timber or wood, except as before mentioned in sections 31 and 32. No fixed rock or minerals were seen. Waterfowl as usual are abundant; muskrats are found in all ponds and sloughs, a few antelope are occasionally seen. The Sounding lake trail to Battleford crosses the northwest corner of the township, and is at present the shortest way to civilization.—*G. C. Rainboth, D.L.S., 1904.*

Township 54.—The most convenient and economical manner of reaching this township during the summer is by way of Edmonton and Saskatchewan river to Onion Lake landing, situated in section 8. From this point a trail leads northeast to the northeast corner of the township and joins one running east and west near the north boundary, making the whole township easily accessible. The soil is clay loam on the west side and sandy loam on the east side of the township and varies between these varieties. That portion around the Indian reserve and along the north bank of the Saskatchewan river would be suitable for mixed farming, but the whole of the township is admirably adapted for cattle or sheep ranching. Along the south side of the Saskatchewan the land is heavily timbered for from one-half to three-fourths of a mile back from the river with considerable poplar timber, three to eighteen inches in diameter and heavy willow brush, and is generally very rough and broken. On the north bank the timber is more scattered and extends from one-quarter to one-third of a mile back from the river and consists of poplar and cottonwood about five to one, varying from three to twenty-four inches in diameter and considerable willow and rose brush. Back from the river the surface is rolling with many groves of poplar and willow brush with occasional patches of poplar timber ranging from three to fourteen inches in diameter, which would be suitable for fuel. The only timber in the township is along the river and ranges from three to twenty-four inches in diameter and is composed of poplar and cottonwood about five to one. The supply would not be more than would be required by settlers on the respective sections. Hay was cut over all that portion of the township lying to the north of the river and to the east of the two Big hills last season and appears to be first class and would average one to two tons to the acre, depending upon whether it were low or high land hay, and also upon the season.

Saskatchewan river is the main source of water and was used by my party during the months of June, July and August, and although slightly brackish, is fair. The river is from twenty-one to thirty-two chains in width, three to six feet in depth, current two to three miles per hour, volume constantly changing. The land along the banks is liable to be flooded during the spring floods. The supply is permanent. There are no water powers available in the township. The climate during the past season was exceedingly fine, a few slight showers fell during the summer, just sufficient for crops, and cold weather set in about November 20, but no snow fell to speak of until after Christmas. The fuel most readily available is wood (poplar). Dry poplar may be procured almost any place on the south bank of the river, while green wood may be procured on either bank and in many places on the interior of the township. Drift limestone was the only economic mineral observed and that was found in considerable quantities along the river. Drift boulders were also observed throughout the township. Rabbits, muskrat, prairie chicken and grouse are plentiful. Duck were numerous during the fall, geese scarce; a few sandhill crane were seen. Indications of bear and deer were observed on the south side of the river. Wolves and foxes were quite numerous. One squatter was found in this township in section 8 on the bank of the river. He has about ten acres cleared and fenced, and besides his vegetable garden, had a nice field of barley and one of oats, about three and one half acres in each.—*Adam Fawcett, D.L.S., 1904.*

Township 55.—The most convenient and economical manner of reaching this township during the summer season is by way of Edmonton and Saskatchewan river, landing at Onion Lake landing. A good trail leads directly to this township, which is distant about seven miles, while from Edmonton to the landing would be about two hundred and seventy miles. The river is navigable for rowboats during the entire season, and for scows up to August 15 or September 1, and some seasons later, depending entirely upon the kind of season. The soil varies from a hard clay loam mixed with stones in the north part of the township, to a sandy loam in the south portion. Portions of the south half are well adapted for mixed farming, and on the whole I would say the township was well adapted for cattle or sheep ranching. The north half of the township is covered with a heavy growth of poplar and spruce timber in the ratio of about five to one. Some very fine spruce and a few tamarac being observed on the west side of the township; on the south half are many poplar groves with willow, with patches of prairie between, but very little timber of use except for firewood. The best spruce was observed on the west side of the township and would range from four inches to twenty inches in diameter; the poplar would range in size from three inches to sixteen inches, and exists in large quantities all along the north half of the township. The Northwest Mounted Police cut hay on sections 9 and 16, but the area that can be cut depends largely on the season, whether wet or dry. During the past season the area in the above sections would be about three hundred acres. Hay could also be cut in sections 1, 2, 3, 4, 10, 11 and 12. The water is generally slightly alkaline, although many sloughs of fresh water were found, and I think the supply in this township quite adequate for its needs and would probably be permanent. Tullibee creek is the only stream of consequence and some seasons is said to run dry, although during the past season it ran from eight inches to twelve inches deep and from ten to twenty links wide. I do not think the land is liable to be flooded to any extent, excepting perhaps along the south boundary, when during a wet season it might flood two to two and one-half feet more than during the past season—to cover perhaps eight hundred or one thousand acres. There are no available water powers in this township. The climate during the past season was unexcelled for surveying operations. Rain fell on about five days during the entire summer and snow did not fall to any depth until after Christmas. There were no summer frosts. The fuel most readily available is poplar wood and can be procured anywhere in the north half of the township. There were no stone quarries. Limestone was the only economic mineral observed, and that only drift boulders. No coal has been found in the township. Rabbits, muskrat, prairie chicken and grouse are very plentiful. Duck are numerous in season, geese scarce. Many indications of moose and jumping deer were seen. Wolves, foxes and bobcats are quite numerous. There are several squatters, but little land is cultivated beyond a few vegetables, as the owners go in for cattle raising almost exclusively and drive them to pasture in the favourable districts. The main trail Edmonton to Battleford passes through the south end of the township. The southeast corner of the township is about half a mile west of Onion Lake post office.—*Adam Fawcett, D.L.S., 1904.*

Range 2.

Township 33.—This township is open prairie, the eastern half being high, rolling and hilly, classes 2 and 3; soil sandy loam with clay, sandy and gravelly subsoil. There are a few ponds and sloughs in the southwestern part of the township, but water is scarce in the other parts. The western part only is fit for cultivation, as the eastern part is too rough and would only do for grazing purposes. There are no hay marshes of any consequence. Antelope were occasionally seen. No wood, rock or minerals were seen. Sounding creek flows northerly through section 6. The most convenient route from this township is by the Sounding lake trail, but it would have to be reached across the prairie.—*G. C. Rainboth, D.L.S., 1904.*

Township 34.—This township is open prairie, very hilly and rough, class 3, soil sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills; the ponds having alkaline and sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the top of the hills. This township is not well adapted to cultivation, and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless hay could be cut around the sloughs in limited quantity. No wood, no mineral and no fixed rock was found. Wild duck and various waterfowl are found in abundance. Antelope is about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about twelve miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 35.—This township is open prairie, very rough and hilly, class 3; soil sandy loam, gravelly and stony, particularly on the tops of the ridges and hills, the latter averaging about 60 to 100 feet high. Small ponds and sloughs are of frequent occurrence among the hills, the ponds containing alkaline and the sloughs fresh water. In dry seasons fresh water would be scarce. Fairly good grazing is found in the valleys, but scant grass and poor grazing on the tops of the hills. This township is not well adapted to cultivation, and would only be fit for summer grazing. There are no hay marshes of any consequence, nevertheless, hay could be cut around the sloughs in limited quantity. There is no wood, no mineral and no fixed rock. Wild duck and various waterfowl are found in abundance. Antelope is about the only large game found, but are not plentiful. The most convenient route from this township is by the Sounding lake trail to Battleford, which passes northwesterly about 12 miles.—*G. C. Rainboth, D.L.S., 1904.*

Township 36.—This township is open prairie, excepting a few small bluffs of poplar in the northeast quarter of section 36. It is mostly class 3; soil sandy, with sandy and gravelly subsoil. The northern tier of sections are undulating except sections 35 and 36, which are hilly and rolling. The rest of the township is hilly, being exremely so in the southwestern part. It is a fairly good grazing country, but with the exception of the undulating portion is unfit for cultivation. Two small alkaline lakes were traversed. There is no other wood except what is mentioned in section 36. No rock exposures or minerals were seen. Water is plentiful in the hilly parts in small grassy sloughs. The trail from Sounding lake to Battleford crosses the northern part of this township, and is the shortest route at present to civilization. Wild fowl are plentiful about all sloughs and ponds, antelope are still to be found and muskrats are found wherever there is water.—*G. C. Rainboth, D.L.S., 1904.*

Township 54.—The most convenient and economical manner of reaching this township during the season of open water is by way of Edmonton and Saskatchewan river. The river is navigable for small boats during the entire season of open water and until August 15 to September 1 or 15, depending upon the season, for scows. The distance from Edmonton would be about two hundred and eighty, or two hundred and ninety miles to the township. To reach the interior of that portion of the township lying south of the river, however, a trail leads from the south shore opposite Onion Lake landing in section 8, township 54, range 1, to the centre of the township. The soil in the north and south portions of the township is sand and sandy loam, while that of the interior is clay, and in many places mixed with sand. A number of places in the south half of this township are well adapted for mixed farming, but they are scattered, that is, there is no large amount lying contiguous; while along the river and on its north side the broken surface renders it more suitable for cattle or sheep ranching. That portion lying along the river is the only part that is heavily timbered and extends from one-quarter to three-quarters of a mile on either side. The balance of the township is a rolling broken surface with numerous groves of willow and poplar and many sloughs. The timber in this township is chiefly on the banks of the Saskatchewan, which are very rough and broken, and consist of poplar, cottonwood and spruce in the proportion 6, 3, 1, the poplar averaging two to ten inches in diameter; cottonwood four to twenty inches in diameter; spruce four to fourteen inches in diameter. In the south part of the township are some very fine hay lands, which would probably run four thousand five hundred to six thousand acres in extent on which hay might be profitably cut, lying chiefly in sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 21 and 22, and would average one to three and one-half tons per acre and is apparently first-class prairie hay. The main water supply is Saskatchewan river, which varies from twenty to twenty-eight chains in width, three to six feet deep, with a current of from two and one-quarter to three miles per hour. The land along the banks is liable to be flooded during the spring break-up from two to four feet deep. The only other stream of note is that emptying into Saskatchewan river through section 34, but this creek is said to cease running in a dry season. There are no water powers to be developed in the township. The climate during the past season was unexcelled for survey operations. Rain fell on only some five or six days (and then not excessively) during the entire season, and snow did not fall to any depth until after Christmas, and until the middle of November the frost was not severe. There were no summer frosts to speak of. The fuel most readily available is poplar, and may be procured any place along the river and in a few places along the correction line. There were no traces of coal in place, observed in the township. There were no stone quarries observed. Limestone was the only economic mineral seen and that only drift boulders. Rabbits, muskrat, chicken and grouse are numerous. Duck are plentiful in the fall, geese scarce; several red deer were seen. Wolves, foxes and lynx are quite numerous and traces of bear were observed along the river.—*Adam Fawcett, D.L.S., 1904.*

Township 55.—The most convenient and economical manner of reaching this township is by way of Edmonton and Saskatchewan river to Onion Lake landing on section 8, township 54, range 1, west of the fourth meridian. From this point a trail leads northward to the main Edmonton-Battleford trail, which passes through the township and is generally in fair condition. The river is navigable for row boats during the entire open season and for scows until August 15 to September 1, depending upon the fall rains. Onion Lake post office, situated on the Edmonton-Battleford trail, lies some seven miles to the east of the east boundary of the township. At this point there is also a government telegraph station, a Hudson's Bay Company store, Indian agency and a Roman Catholic and Anglican mission schools. The soil is almost all hard clay with clay and stone subsoil, the exception being along the south boundary comprising sections 1, 2, 3, 4, and the southern portion of sections 23 and 24, which are sandy loam and sand, and a large muskeg covering portions of sections 23, 24, 25 and 26. This township is probably best adapted for cattle or sheep ranching on account of the character of its soil and its very broken and rolling surface. The surface of the entire township is very rolling and broken with numerous sloughs and several deep ravies. The south half is prairie, with numerous groves of willow and poplar brush and occasional bluffs of larger poplar ranging from three to twelve inches in diameter, but generally short, and many sloughs and ponds. The north half is very broken with low rolling hills and numerous sloughs and ponds and generally heavily timbered with poplar, spruce and a few tamarac and an occasional pine. The poplar timber would average three to sixteen inches in diameter and is found over the whole of the north half of the township. Spruce is scattered over the two northern tiers of sections and would average four to twenty inches in diameter. The proportion would be poplar six to one of spruce. The tamarac and pine do not exist in any quantity and are found along the east boundaries of 35 and 26. There were no hay lands of any account observed in the township. In the northern portion of this township there are a large number of fresh water sloughs and ponds, but the larger sloughs and lakes are slightly alkaline. The only stream of note is the outlet to Stony lake and this was found to be almost dry until it reached section 10, when it is seven to one hundred and ten links in width and from eight to twelve inches deep. The water is slightly alkaline. There is no land liable to be flooded to any extent noticed in the township. There are no water powers available for development in this township. The climate was exceedingly fine during the past season; very slight rains occurred at intervals during the summer, with no frost or snow of account until after the middle of November and no summer frosts to speak of. The fuel most readily available is poplar wood and may be cut almost any place throughout the township, while there are considerable quantities of dry spruce, poplar and tamarac around the muskeg in sections 25, 26, 35 and 36. There were no economic minerals observed in the township. Rabbits, muskrats, chicken and grouse abound throughout the township, duck are plentiful during the fall, geese scarce, moose and deer seemed to be quite plentiful from the indications, and traces of bear were observed. Wolves and foxes are quite numerous, and a few lynx or bobcats.—*Adam Fawcett, D.L.S., 1904.*

Range 3.

Township 54.—The most convenient and economical manner of reaching this township during the season of open water is by way of Edmonton and Saskatchewan river, which flows through the eastern portion of the township. The distance from Edmonton being two hundred and seventy to two hundred and eighty miles, and the trip may be made in row boats at any time during the season of open water, or in scows up to August 15 to September 15, and some seasons may be navigated with safety much later. There are two trails leading from the river, starting one on either side of the mouth of Vermilion river, from which roads have been cleared and graded to the top of the banks; and last season several settlers to the south purchased supplies and machinery in Edmonton and brought them down the river to these points. The soil varies from sand to heavy clay loam, sand being found chiefly along the western tier of sections. That portion of the township south of the Saskatchewan is well adapted for mixed farming, excepting of course the valley of Vermilion river, but to the north the land is more broken and not quite so good but together with those sections in the valleys would be well adapted to sheep or cattle ranching. The surface south of the river and from the top of the valleys is a comparatively level plain covered largely with willow brush and scrub and a few groves of poplar timber, and numerous sloughs. To the north the surface is very broken and rolling with many sloughs and groves of poplar and willow. The valleys of both the Saskatchewan and Vermilion are very rough and broken and timbered, also considerable willow and rose brush and scrub. The size of timber varies about as follows: Poplar, four to sixteen inches in diameter; spruce, four to twenty inches in diameter; cottonwood, six to twenty-eight inches in diameter, and all three varieties are found in considerable quantities in the valleys. The greater portion of 29, 30 and 31 are also heavily timbered with poplar and a few spruce with occasional white birch three to six inches in diameter. There are also a few groves of poplar about the lakes in sections 25 and 36. The best hay lands observed are in sections 1, 2, 3, 4, 10, 11 and 12, and would amount to probably twelve hundred acres; the hay appears to be a good quality and would average from one-half to one and one-half tons per acre. The water in this township was fairly good, but few alkaline sloughs being noticed, Saskatchewan and Vermilion rivers providing an abundant and permanent supply. The Saskatchewan varies in width from twenty to twenty-five chains, depth three to six feet, current two and a half to three miles per hour. The Vermilion is good water, although slightly brackish. It is six to ten feet deep, one chain wide, current seven to eight miles per hour. The land in the valleys is liable to be flooded during the spring break-up from two to four feet deep. Irish creek, flowing into the Vermilion in sections 32, township 53, range 3, is two and one-half to three and one-half feet deep, twenty-five to thirty links wide, current four to six miles per hour. The fall on Vermilion river would range from eight to eighteen inches per one hundred feet and many places were observed where excellent water power might be developed; in fact owing to the rapid fall, almost any place along the creek could be utilized, probably a constant power of five hundred to eight hundred horse power might be economically developed, or more, depending upon the improvements. As to how this would be affected by winter frosts, I am unable to say. The climate was exceedingly fine during the past season; very slight rains fell during the summer, with very little frost or snow until after the middle of November and no summer frosts to speak of. Snow did not fall to make good sleighing until after Christmas. The fuel most readily available is poplar and spruce. It may be procured anywhere along the valleys, also in sections 30, 31, 25 and 36. There were no veins of coal observed in this township. There are no stone quarries in the township. There are no economic minerals in the township. Rabbits, muskrat, chicken and grouse abound. Duck were plentiful during the season, geese scarce. Several red deer and bear were seen along the valleys. Wolves and foxes are quite numerous; and a few lynx were seen.—*Adam Fawcett, D.L.S., 1904.*

Township 55.—The most convenient and economical manner of reaching this township during the season of open water is by way of Edmonton and Saskatchewan river, which flows through the southwestern portion of the township. The distance from Edmonton being about two hundred and eighty miles, the trip may be made in row boats at any time during the season of open water or in scows up to August 15 or September 15, and some seasons may be navigated with safety much later. The soil varies from sand to heavy clay loam, sand being found in the northwestern portion of the township. That portion of the township south of Alkali lake is well adapted for mixed farming, but the greater portion of the township is very much broken by low rolling hills and deep sloughs and is better adapted to cattle ranching or sheep raising. The surface south of the river is heavily timbered and rather broken. Numerous groves of poplar and willow are scattered over the whole township. Considerable poplar timber was found to the north and east of Alkali lake, three to ten inches in diameter. Along Frog creek are numerous groves of poplar and spruce and dense willow brush. Spruce, however, is not plentiful and averages four to sixteen inches in diameter. There is considerable timber along the Saskatchewan, poplar three to ten inches in diameter, cottonwood six to sixteen inches and spruce four to fourteen inches in diameter. All through the township are numerous groves of poplar, ranging from two to ten inches in diameter. The best hay lands observed are in sections 33, 28, 20, 21, 22, 16, 17, 8 and 9 and would amount to probably eight hundred or one thousand acres. The hay appears to be of good quality and would cut from one-half to one and one-half tons per acre. The township is abundantly watered by Saskatchewan river in the South, and Frog creek along its western boundary. The lakes are generally alkaline. The Saskatchewan varies in width from twenty to twenty-five chains, in depth from three to six feet, with a current of from two and one-half to three miles per hour. The water is fairly good, although when very low it is slightly brackish. Frog creek is sixty to seventy links wide, two to four feet deep, with a current of from four to five miles per hour. Lands adjoining both Frog creek and Saskatchewan river are probably liable to be flooded during freshets in the spring. Sucker creek is a small creek three to eight inches deep and three to ten links wide with a current of two miles per hour. Good water power may be developed in many places along Frog creek, the amount depending entirely upon the improvements made. The climate was exceedingly fine during the past season. Very slight rains fell during the past summer, with very little frost or snow until after the middle of November and no summer frosts to speak of. Snow did not fall to make good sleighing until after Christmas. The fuel most readily available is poplar wood and may be procured in many places throughout the township. It is, however, most abundant east of Alkali lake and along both banks of the river and also along Frog creek. There were no veins of coal observed in this township. There are no stone quarries in the township. No economic minerals, with the exception of drift limestone, which was observed along the river, were found in the township. Rabbits, muskrat, chicken and grouse abound; geese are scarce, but duck are plentiful during the season. Deer and bear were seen along the valley of Saskatchewan river. Wolves and foxes were quite numerous and a few lynx were seen.—*Adam Fawcett, D.L.S., 1904.*

Township 56.—The most convenient and economical manner of reaching this township is by way of Saskatchewan river from Edmonton to Onion Lake landing, in section 8, township 54, range 1, west of the fourth meridian, and thence by trail which leads directly into the township. With a small amount of work, however, a good landing might be made in township 55, range 3, in either section 7 or 8, and a trail now leads from the top of the bank in section 9. The river is navigable for small boats during the entire season of open water, and for loaded scows up to August 15 or September 15, and even later, depending upon the season. The soil is inclined to be very sandy although somewhat clayey in the valley of Frog creek. The land would be excellent for mixed farming over the whole of the township except when broken by the valley of Frog creek. The surface is rolling and generally timbered or scrubby. The north halves of sections 1 and 2 and the south halves of sections 11 and 12 are rather heavily timbered with poplar three to eight inches in diameter, and along the valley of Frog creek there is considerable poplar three to twelve inches in diameter, and a few spruce four to sixteen inches in diameter and very brushy. Some very fine hay meadows were noticed in the north portion of sections 8 and 9 and also in sections 3 and 4 at the west end of Clear lake, and would amount to four hundred or five hundred acres. The quality appears to be good and would cut from one-half to one and one-half tons per acre. The water in Clear lake and many of the sloughs is slightly alkaline as is that in Sucker creek. Frog creek is a little brackish but may be used without inconvenience. Frog creek is the main source of water supply and is probably sufficient and permanent. It is sixty to seventy links wide, two to four feet deep, with a current of from four to five miles per hour. Lands adjoining are probably liable to be flooded during freshets from one and one-half to three feet. Sucker creek is a small creek three to eight inches deep and three to ten links in width with a current of two miles per hour. Good water power might be developed by dams in many places on Fog creek, the amount depending upon the improvements made. The ruins of an old water power mill were observed on the Indian reserve to the north of northeast corner section 8. The climate was exceedingly fine during the past season. Very slight rains fell during the summer with very little frost or snow until after the middle of November and no summer frosts to speak of. Snow did not fall to make good sleighing until after Christmas. The fuel most readily available is poplar wood and may be procured in abundance in the north parts of sections 1 and 2 and the south parts of 11 and 12, also along Frog creek and in many of the groves that abound throughout the township. There were no veins of in many of the groves that abound throughout the township. There were no veins of coal observed in the township. There are no stone quarries in this township. No economic minerals of any kind were observed in this township. Rabbits, muskrat, chicken, and grouse abound. Duck are plentiful during the season, geese are scarce. Deer were seen along the valley. Wolves and foxes are quite numerous and a few lynx were seen.—*Adam Fawcett, D.L.S., 1904.*

Range 4.

Township 52.—From Lloydminster I proceeded by way of Edmonton trail to range 4, west of the 4th meridian, thence northerly across the prairie to township 52, range 4, west of the 4th meridian. The southeasterly portion of the township is clay loam averaging from four inches to six inches of black loam on top with a clay subsoil. The other portion of the township (more than half) is very sandy soil with an average of four inches to six inches of black loam on top with sandy subsoil. The soil would be good for agricultural purposes. About one-half of the township is prairie. The balance is covered with poplar and willow, some of the groves containing poplar trees averaging from two inches to six inches in diameter, some as large as ten inches to twelve inches, good for building purposes. Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 have very little timber on them. The other part of the township has groves of poplar and willow scattered over it, containing some good building timber and firewood—plenty for quite a number of years. There are considerable hay lands along the valley of Vermilion river and along Deer creek, good quality and easily cut, with good hard bottom to the lands. Vermilion river flows through the southerly part of the township. In the early part of the summer its banks are overflowed and the flats covered in many places to quite a depth. The stream, while the banks are overflowed, is very difficult to cross. The current is very swift and in many places the stream is over ten feet in depth. It can only be crossed by boat and then with considerable difficulty. Up to the middle of July it will average from forty to fifty feet in width, and in the channel very deep. In September and October it is quite low with very little current, ten to twenty feet in width, and would be easily crossed were it not for its soft, muddy bottom. The banks are soft clay covered with willow brush and the river contains very good water. Deer creek is a small stream entering the township in section 31 and running southeasterly, falling into Vermilion river in section 14. It is ten to twenty feet in width about eighteen inches in depth and a good current. The water is not very good there being too much vegetable matter in it. There are a few springs throughout the township, and there is very good water in the sloughs. There is very little alkali in the township. There are no water powers in the township. The climate is good with not much summer frosts. There are light showers of rain during the summer, sufficient for the growth of grain. The weather was fine up to the middle of November, with no snow up to that time. The only fuel in the township at present known is poplar wood of which there is a good supply scattered throughout the township, especially in the northern part. No stone quarries were observed in the township, but plenty of field stone for building purposes was seen. No minerals were seen in the township. Small game, such as wild duck, partridge, chicken and sandhill crane are quite plentiful. A few deer and an occasional bear were seen. This township is well adapted for ranchnig, plenty of good hay can be cut along the flats of the streams and around some of the sloughs. There is good pasture amongst the poplar groves, where there is an abundance of wild peas and wild vetches, also good grass. There are two persons by the name of Tremble who have commenced ranching in the township. They are located in section 10, commencing with about sixty head of cattle and a few horses.—*Lewis Bolton, D.L.S., 1904.*

Township 53.—Completing my party at Lloydminster, I proceeded by Edmonton trail westerly to range 4, west of the fourth meridian, thence northerly across the prairie to township 53, range 4, west of the fourth meridian. The soil throughout the township is sandy with an average of nine inches of black loam on top. All of the township, with the exception of the southwest quarter, is level, the greater portion thereof being hay meadow, containing red top grass from two to three feet in height, with smooth solid bottom—splendid opportunities for hay. These meadows have groves of dead poplar and willow in them. The balance of the township (southwest quarter) is rolling and contains fine pasture for horses and cattle. Wild pease and vetches grow very luxuriantly on the high lands amongst the groves of poplar and willow. Wild grasses also grow to a good length on the uplands and afford abundant feed for cattle and horses. Thousands of tons of hay could be cut and of the best quality, especially in the eastern and northern parts of the township. No streams or creeks were found in the township with water flowing in them. In a dry season water would be scarce in the township. There are a number of sloughs throughout the township with fairly good water in them, but none of these contain springs. There are a few small lakes in the southwest part of the township with fairly good water in them. There is very little alkali in the township. The climate is good. There are very few summer frosts. There are plenty of light showers through the summer months and nice open weather until late in November. The only fuel found in the township is poplar timber. There are a good many groves scattered through the township, a good portion of which are dead, having been killed by prairie fires a few years ago and are still standing. The timber throughout the township is poplar averaging in size not more than four inches to six inches in diameter. There is very little timber fit for building purposes in the township. No stone quarries were observed in the township, but sufficient field stone are scattered over the township for building purposes. No minerals were found in the township nor were any mineral bearing rocks seen. Small game, such as duck and chicken were quite numerous, but very few large game were seen. Prairie wolves and foxes were plentiful. This township is exceedingly well adapted for ranching. any amount of hay of choice quality can be had in the meadow lands, and the uplands are covered with wild peas and vetches and other vines and grasses, affording almost unlimited pasture and feed for horses and cattle. There were no settlers in the township at the time of survey. One log shanty had been put up the summer before, but partly finished and appeared to be abandoned.—*Lewis Bolton, D.L.S., 1904.*

Township 54.—Completing my party at Lloydminster, I proceeded by Edmonton trail westerly to range 4, thence northerly across the prairie to township 54, range 4, west of the fourth meridian. The soil throughout the township is chiefly sandy soil with an average of six inches of black loam on the surface. The greater part of the township is level or gently rolling, that portion lying along Spring creek being hilly. Very little of the township is clear prairie, a good portion being meadow land with bunches of willow and groves of poplar and willow scattered through them. Most of the timber in the township is small, averaging from two to three inches in diameter. In sections 8, 9 and 10 there is considerable poplar running as high as six inches to eight inches in diameter and some as high as twelve inches in diameter. Poplar and willow are the only kinds of timber found in the township. Large quantities of hay could be cut in the township, the greater portion of the land being meadow, producing red top grass. Considerable wild peas and vetches could also be obtained for hay along the edges of the meadow land amongst the groves of poplar and willow. A very fine spring stream averaging about eight feet in width, eighteen inches in depth with good current—excellent water—enters the township in section seven, flowing easterly four miles, thence southeasterly, leaving the township in section 1. A few sloughs scattered through the township and one lake in sections 19 and 20 contain fairly good water. The climate is good. There are few frosts, frequent showers of rain through the early summer months and very fine open weather until the middle of November. The only fuel found in the township is poplar wood of which there is sufficient for a good many years if the township were well settled. No stone quarries were observed in the township. Considerable field stone are scattered over the township, sufficient for building purposes. No minerals were found in the township nor any mineral-bearing rocks. Small game, such as partridge, duck, chicken, rabbits and sandhill crane were quite plentiful. A few deer and an odd bear and lots of prairie wolves and foxes were seen. The township is well adapted for ranching, there being plenty of hay lands, excellent pasture, and good shelter for cattle and horses. There are no settlers in the township. Two small log shanties had been partly completed on sections 1 and 2, but according to appearances had been abandoned.—*Lewis Bolton, D.L.S., 1904.*

Township 55.—I proceeded from Lloydminster westerly along Edmonton trail to range 4, west of the fourth meridian; thence northerly across the prairie to township 55. The soil is chiefly sandy loam averaging from four inches to six inches on surface with sandy subsoil. It is not very good for agricultural purposes, being rather sandy, and a very stony subsoil. The surface is generally timbered with very little prairie and is gently rolling, with the exception of along Saskatchewan river, where the banks of the valley are very high and very broken. The timber in the southerly part of the township is small and scrubby, in the northerly part along Saskatchewan river the timber is much larger, being chiefly poplar; there are some groves of spruce along the sides of the valley of the river, and some spruce and tamarac along the edges of the swamps and muskegs in the northwesterly part of the township, some of the spruce and tamarac being as large as eighteen inches in diameter. The poplar along the banks and in the valley of the river will average from six inches to eight inches in diameter and some as high as ten inches to twelve inches in diameter and a good height. There is not much hay land in the township. In sections 5, 6, 7 and 8 small quantities could be cut in the meadows amongst the groves of poplar and willow. There are not many sloughs in the township containing good water. The chief supply is Saskatchewan river, and small spring streams rising in the muskegs in the northwesterly portion of the township and flowing into Saskatchewan river. There are no water powers in the township, the streams flowing into Saskatchewan river being too small. The climate is very good. There are very few summer frosts, frequent gentle showers during the summer months, fine open weather until late in the month of November, and very little snow before the middle of December. Fuel is quite plentiful in the shape of poplar wood. In the southerly part of the township the timber is small, but there is plenty of it; in the northern portion of the township there is an abundance of good large timber for building purposes as well as for fuel. All along the Saskatchewan river the timber is large and of good quality. There are no stone quarries in the township, but plenty of field stone. No minerals of any kind were found in the township nor any mineral-bearing rock. Partridge and rabbits were plentiful. A few chicken, a large number of prairie wolves, an odd timber wolf, a few deer and an occasional bear were seen. This township is not well adapted for agricultural purposes. The soil is not rich enough and covered too much with scrub and timber, a limited number of cattle could be kept in the southwestern part of the township, but the township will be valuable for timber.—*Lewis Bolton, D.L.S., 1904.*

Township 56.—I proceeded to this township from Lloydminster along Edmonton trail to range 4, west of the fourth meridian; thence northerly across the prairie to Saskatchewan river, crossing it in a scow with our outfit, excepting horses and wagons, which I had to send around by way of Hewit's ferry, near Fort Pitt, to Onion Lake; thence westerly by Edmonton trail to township 56. The soil is chiefly sandy loam averaging two inches to four inches in depth with sandy subsoil. There is very little clay in the township. Along the north boundary and in the northeast corner of the township there is a light clay loam averaging two inches to four inches in depth with hardpan subsoil. All through the township the subsoil is full of stone, varying very much in size. The soil is not adaptable for agricultural purposes. The surface is generally rolling; in the northwest corner it is rather hilly especially along the north boundary. There is very little prairie in the township. There are several lakes of considerable size. Sections 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 15, 16, 17, 20, 21, 23, 25, 26 and 27, are fairly well covered with poplar timber from four to ten inches in diameter; some as high as twelve to fifteen inches—a few even larger. In sections 6, 9, 10, 11, 14, 15 and 16 there are considerable spruce, tamarac and jackpine, the same being from twelve to fifteen inches in diameter—a few even larger. In the northerly and westerly portions of the township the timber is small and scrubby with thick undergrowth of wild rose and other scrub. There is very little hay in the township. All the lakes and streams in the township contain good fresh water. Saskatchewan river, which enters the township in section 7, flowing southwesterly, and leaving the township in section 4, is a very large stream. It varies from eight chains to twelve chains in width, three to five feet in depth in low water (except in rapids), current two to four miles per hour and contains the best of water. Middle creek enters the township in section 32, flowing southwesterly, leaving the township in section 19. This creek, when flowing out of Lake Borden is very much larger than when entering the same lake, and is likely fed from the lakes in the central part of the township. The creek is sluggish until it passes partly through section 19, where it becomes quite rapid and continues flowing rapidly until it enters Saskatchewan river just outside of the township. Power to the extent of fifteen to twenty horse-power could be obtained on the lower part of this creek, there being sufficient fall and advantageous places along the stream to build dams. The climate is good, there being very little summer frost, frequent light showers of rain during the summer months, fine open weather in the fall until the middle and even later in November, a light snow fall during the winter, and the average of stormy days through the winter, small. Wood was the only fuel found in the township, of which there is a large quantity. No stone quarries were found in the township, but lots of field stone scattered throughout. No minerals were found in the township nor any mineral bearing rocks. Rabbits, partridge, duck and prairie wolves were plentiful; a few prairie chicken, and traces of a few deer and an occasional bear were seen. Fish were quite plentiful in the lakes. I had no way or means of taking any, so cannot give varieties. The township is not adapted for either farming or ranching. Timber will likely be the chief product of the township.—*Lewis Bolton, D.L.S., 1904.*

Range 5.

Township 37.—This township is accessible from Battleford by Sounding lake trail, also from Medicine Hat and Wetaskiwin by trails which are used by ranchers in the locality. The several trails present no greater difficulties to travel except those which affect all trails alike, viz.: periods of wet weather. The soil is either clay or sandy loam, both being found in the township. With the exception of the southwest corner of the township, which is occupied by the easterly projection of the Neutral hills, the surface is comparatively level. There is considerable poplar timber in the northeasterly part of the township suitable both for fuel and small building logs. Trees run up in size to 10 inches in diameter. There is considerable hay in sections 1, 2, 11, 12, 18, 19, 17 and 20. A nice spring of excellent water flowing all the year round rises in section 15 and flows across section 11, after which it disappears. In section 11, Wilkinson and McLeod Brothers, who brought into the Northwest some three thousand cattle a year ago last summer, have their headquarters. There is abundant fresh water in ponds in all parts of the township. Vegetables matured at the ranch without injury by frost. There is plenty of dry poplar to supply fuel for some time to come, but no coal nor signs of valuable mineral deposits anywhere. There are not many boulders except in the Neutral hills near the southwest corner of the township. Game consist of duck, geese, prairie chicken, rabbits, foxes, wolves and small deer. The township is well adapted to ranching or for mixed forming.—*Thos. Fawcett, D.L.S., 1904.*

Township 38.—Access to this township may easily be obtained via Battleford, Wetaskiwin or Medicine Hat, there being little difference in the choice of routes. The location survey of the G.T.P. Ry. lies within 10 miles north from the township. The soil is mostly of a sandy nature and would produce good crops in wet seasons, but when dry, not so good. The surface is mostly hilly with a considerable percentage of the hills in the east half of the township covered with scrubby poplar generally too short and brushy to be of value except for fuel. West of the centre meridian is prairie with the exception of two or three small poplar bluffs. There is some hay land in the vicinity of lakes and ponds, but no extensive area. The water is fresh and good in small ponds, but larger lakes are alkaline. There are no streams of running water except a small spring creek joining two lakes in section 30. The climatic indications are good, there being no marks or signs of summer frosts. The scrub poplar in the east part of the township will meet the demand for fuel for some years to come. No indications of coal or other mineral deposits were seen. The game consist of duck, geese, prairie chicken, foxes, wolves and jumping deer.—*Thos. Fawcett, D.T.S., 1904.*

Township 39.—This township is accessible either from Wetaskiwin by a trail or from Battleford, there being no great obstacles in the way from either direction. The location survey of the G.T.P. Ry. passes near the north boundary of the township. The soil is mostly a black sandy loam with either a sand or clay foundation and it is adapted for the growth of vegetables, oats, &c. The surface is hilly and broken by lakes, while there are many patches of inferior poplar timber. The hay supply is below the average, there being only a few hay marshes of small size. The ponds are usually surrounded with a fringe of poplar or scrub willow. Water in the small ponds is fresh and good, while in the larger lakes it is alkaline. There are no streams of running water in the township. Climatic conditions seem favourable, we did not see any indications of summer frost. There is plenty of poplar—in places dry—for fuel and some trees large enough for building logs, but the timber as a rule is scrubby. No indications of coal or of other minerals of economic value were seen. There are very few boulders and no outcrop of rock. Game consists of duck, geese, chicken, wolves, foxes and small deer.—*Thos. Fawcett, D.T.S., 1904.*

Township 40.—This township is accessible from Wetaskiwin by following a beaten trail or from Battleford by following the eleventh base line west from Sounding lake trail crossing Eyehill creek, being the only obstacle in the way. The G.T.P. survey for location crosses the township near the south boundary. The soil is a sandy loam with a sand subsoil and is adapted for growing either vegetables or grain. The surface is undulating. but not too hilly. There are several clumps of poplar timber in different parts of the township which would about meet the local requirements for fuel and building logs in the township. Trees will be found up to eight inches in diameter. There are small hay marshes in nearly all sections, but no large areas. Fresh water is plentiful in ponds. Some larger lakes are alkaline. There are no streams of running water. Vegetation seems luxuriant and there are no indications of summer frost. Plenty of dry poplar is found for fuel but there were no indications of coal or other minerals of economic value. There is no outcrop of rock and scarcely any boulders. Duck, geese, prairie chicken, rabbits, foxes, wolves and deer are about the only game to be met with. The township is well adapted for either ranching or mixed farming.—*Thos. Fawcett, D.T.S., 1904.*

Township 41.—This township may be reached from Wetaskiwin, via a trail to a ranch in township 40, range 6, or from Battleford via Sounding lake trail to the eleventh base, then following the base west, the only obstacle of importance to be met is Eyehill creek. The soil is a sandy loam with a sand subsoil and should be well adapted for growth of vegetables and grain in favourable years. The surface is broken by hills and many lakelets or ponds, while scrubby timber is found in nearly every section of the township; there is also some marshy ground, which is impassable with horses. Hay is found in small quantities on flats and around the ponds. The water in the larger lakes is alkaline, but there is an abundant supply of fresh in smaller ponds. A small stream which flows out of David lake in section 35 leaves the township in section 13, while Ribstone creek flows along near the west boundaries of sections 30 and 31, through a marshy flat which is very miry. Climatic indications are favourable. The timber found in the township will supply fuel, fencing posts and inferior building logs. There are few boulders or rock of any kind in the township and no indications of minerals of economic value. In game, we found duck, geese, prairie chicken, foxes, wolves, jumping deer, rabbits and muskrat.—*Thos. Fawcett, D.T.S., 1904.*

Township 45.—A trail runs from Lacombe to Ribstone creek, township 44, range 5, west of 4th meridian. and thence into this township. This trail is generally very good but is round about, keeping south of Battle river. The eastern part of the township is black loam on clay suitable for farming, while the eastern part is sandy and suitable only for ranching. The surface is generally prairie, with some bush and scrub in the south and around a few of the lakes. There is some six-inch poplar situated on sections 3 and 4, but all will be required by settlers. The water in the larger lakes is alkaline, but fresh in the sloughs. The supply is sufficient and permanent. One small stream drains the lakes in the eastern part of the township into the large lake at the west (Baxter lake). It is slow and probably dries up in the fall. There is no water power available. No summer frosts were observed. The climate was similar to that of western Saskatchewan. Wood is the only fuel available in the township. There are no coal or lignite veins, no stone quarries nor economic minerals. No game was seen in the township. There are some fine springs in a muskeg at the southwest corner of Baxter lake in section 8.—*C. C. Fairchild, D.L.S., 1904.*

Township 46.—The best route for reaching this township would be by the old Telegraph trail from Wetaskiwin to Battleford, as far as range 6, west of the fourth meridian, and thence southeast to and across Battle river and thence to the township. The main difficulty would be in crossing Battle river, otherwise the trail is good except in spring. The soil is generally of a good black loam, suitable for farming. The surface is generally scrubby. The southwestern and northeastern portions are more open while a great part of the township is about half covered with bush and scrub. There is some good poplar located on the northwest quarter of section 22, average diameter ten inches, about forty acres in extent. There are no hay lands. The water is generally fresh in the small sloughs and streams, but both lakes shown are alkaline. The streams are very small and probably dry up entirely in a dry season. There are no water powers available. No summer frosts were observed. The climate is that of western Saskatchewan. Wood is the only fuel available and can be procured in the township. There are no coal or lignite veins in the township, no stone quarries nor any minerals of economic value. Deer and prairie chicken were seen in the township. On the whole this is one of the best townships seen east of Battle river.—*C. C. Fairchild, D.L.S., 1904.*

Township 47.—A good trail from Edmonton and Wetaskiwin to Battleford passes about three miles to the north of this township. The soil is generally a good loam, but owing to the very rough surface it is not generally adapted for farming but rather for ranching. The surface is prairie with some scrub and cottonwood in the southwestern portion and along Battle river but barely enough for settlers for fencing and building. There is very little good hay in the township. The water is fresh in Battle river and in the small creeks shown. The river averages six feet in depth and two chains in width, with a strong current. There is little liability of flooding. There is no water power available except by dams, and that would hardly be practicable. No summer frosts were observed. The climate is good. Wood is the only fuel available, and can be procured along the river. No coal, lignite, stone quarries, or minerals of economic value were found. Jumping deer, duck, and prairie chicken were seen in the township.—*C. C. Fairchild, D.L.S., 1904.*

Township 52.—Completing my party at Lloydminster, I proceeded by Edmonton trail westerly to range 4, west of the fourth meridian; thence northerly across the prairie to township 52, range 4; thence westerly into township 52, range 5, west of the fourth meridian. The south half of the township is sandy soil with a black loam on top averaging from four inches to six inches in depth. The north half is chiefly clay with a black loam on the surface averaging about six inches. The soil is good for agricultural purposes. About one-half of the township is prairie; the other half is covered with poplar groves with willow undergrowth. The northern part of the township is hilly. The balance is rolling and the south mile across the township is level. Some of the groves of poplar contain trees averaging from six to eight inches in diameter and a few ten inches to twelve inches in diameter—chiefly in the east half of the township. There is very little timber in the westerly third of the township. The east half of the township contains a number of large sloughs also a number of small ones. Considerable hay could be cut around the sloughs throughout the township and along Campbell creek, also along the valley of Vermilion river. Campbell creek flows out of Somerset lake southeasterly into the Vermilion river, passing through sections 17, 16, 15, 10, 11 and 2. Vermilion river runs through section 1. These two streams contain good water. Somerset lake also contains very good water; the other small lakes and sloughs throughout the township contain fairly good water. There is very little alkali in the township. There are no water powers in the township. The climate is good. There are very few summer frosts until late in the season, light showers of rain through the early part of the summer and fine open weather until the middle of November. The only fuel in the township is poplar wood, of which there is sufficient for a good many years, situated chifly in the easterly part of the township. There are no stone quarries in the township. Plenty of field stone is scattered over the township for building purposes. No minerals were observed nor any mineral-bearing rock. Small game, such as wild duck, prairie chicken, partridge, sandhill crane, &c., are quite plentiful. There are a few deer and now and then a bear. Foxes and prairie wolves were very plentiful. This township is well adapted for agriculture. The soil is very productive. There is plenty of fuel and considerable building timber. It is also good for ranching, there being good pasture all over the township, and considerable hay lands. There are two settlers in the township by the name of Somerset, on section No. 18.—*Lewis Bolton, D.L.S., 1904.*

Township 53.—This township is best reached by the trail which follows the Canadian Northern railway along the south side of Vermilion river. This is a good trail. The north and east parts are a little light, but the rest of the township is first class and is suitable for mixed farming. In the north third of the township there is considerable poplar bush averaging six inches in diameter, the centre third is partly covered with poplar in bluffs, while the south third is nearly all open prairie. There is considerable hay land around the lakes and sloughs. It is of good quality. The water is all fresh with the exception of one or two alkaline marshes. There are no water powers. Dry poplar is available in sufficient quantity to supply settlers with fuel for many years. There are no stone quarries and no minerals. Deer and moose were seen.—*M. B. Weekes, D.L.S., 1904.*

Township 54.—This township is best reached by means of the old trail, which runs along the south side of Vermilion river, a branch running close to this township. The soil in this township is a little light, but on the whole is well suited to mixed farming. The surface as a whole is gently rolling and is covered in the southwest part with heavy poplar containing a large amount of dry poplar. The northeast part is somewhat open, the balance beng poplar and willow scrub. There is considerable hay available around the sloughs and lakes. The water is fresh and the supply is permanent. There are no water powers. No summer frosts were encountered. Dry poplar is available in large quantities in all parts of the township. There are no stone quarries. There are no minerals. Several bear were seen, besides numerous duck and chicken.—*M. B. Weekes, D.L.S., 1904.*

Township 55.—The best route for reaching this township from Edmonton is by Saskatchewan river. It can also be reached from Lloydminster by a trail which crosses Vermilion river in range 5, and joins the old Battleford trail a few miles south of the river. The soil is light except in the southwest corner, where there is some good land. The balance of the township is not suitable for farming. The surface, as a whole, is gently rolling except for a wide coulée which extends northwesterly across the township. The surface is all covered with poplar bush and scrub, the scrub being mixed with the poplar. The north two miles of the township is covered with heavy timber, poplar and scattered spruce and tamarac, south of that line the timber is smaller. There is no hay. The water is all fresh. There are no water powers. There were no summer frosts. There is plenty of fuel all over the township, dry poplar being mixed with the green. There are no stone quarries. There are no minerals. Bear and moose were seen, besides ducks, geese and rabbits.—*M. B. Weekes, D.L.S., 1904.*

Township 56.—The best route for reaching this township in the summer is by the Saskatchewan, which is navigable for large scows from Edmonton. A good trail also runs along the north side of the river, following the government telegraph line. The soil is very light on the north side of the river and is but little better on the south side. The township is covered almost entirely with poplar, spruce and jackpine, the poplar being by far the more numerous. The timber runs from 4 to 12 inches in diameter. It is especially heavy on the south side of the river. A few birch trees are also found. There is a little hay land on the north side of the river along the trail, but none on the south side. The water in this township is all fresh. Saskatchewan river runs across it. It is about 10 chains wide and is too deep to be forded, the water being 15 feet deep in places. The current is about 4 miles an hour. There are no water powers. The summer of 1904 was warm and bright. No frosts were encountered after the middle of May. Wood for fuel can be procured in large quantities in any part of the township. There are no stone quarries. No minerals were seen. Bear, moose, jumping deer and coyotes were frequently seen, also numerous ducks and rabbits.—*M. B. Weekes, D.L.S., 1904.*

Township 57.—There is a good road leading into this township from Moose telegraph station on the St. Paul de Metis and Onion lake trail. The soil is very good loam with clay subsoil and suitable for general farming. It is chiefly covered with scrub with numerous clumps of poplar and a few clumps of small spruce. There is not much hay land and in very small patches. The water is all fresh and good and in sufficient supply. The streams are small, of which the two branches of Moose creek are the largest. The land is not liable to be flooded. There are no water powers. The climate is delightful. Summer frosts are rare. There is sufficient wood for fuel. We saw no valuable minerals of any kind. Among game there are deer, moose, duck and bear.—*M. W. Hopkins, D.L.S., 1904.*

Township 58.—The good trail from Indian reserve No. 123 to Onion lake passes across the township from section 31 to section 2. The soil is number two and suitable for general farming. The surface is covered with scrub or brush with numerous patches of eight-inch poplar and clumps of spruce along streams. The northeast part is hilly and heavily wooded with larger poplar with a little spruce. There is no hay land. The water is abundant and fresh. The land is not liable to be flooded, and there are no water powers. The climate is delightful and summer frosts are rare. There is plenty of wood in the township for fuel. We saw no valuable minerals. Among game animals are to be found deer, moose, bear, fox, duck, rabbit and partridge.—*M. W. Hopkins, D.L.S., 1904.*

Range 6.

Township 36.—The means of ingress to this township is from Medicine Hat or Wetaskiwin, following trails made by ranchers or from Battleford via Sounding lake trail. The location survey of the Grand Trunk Pacific railway is distant about twenty miles to the northeast. The soil is mostly a clayey loam with clay subsoil. The northerly portion of the township is nearly level, while the south half is very hilly and broken. There is no timber except a fringe along the west side of Gooseberry lake, which is mostly fire-killed. Hay land is scarce, there being a few marsh meadows of small area. The water is generally of good quality, but is scarce in some parts of the township. There are no running streams of any size, but an overflowing spring sends quite a stream into Gooseberry lake at the southwest corner and several smaller springs deliver smaller streams at other points around the lake. There were no indications of summer frost noticeable, and climatic conditions seem favourable. No indications of coal or other minerals of economic value were observed. There is a sprinkling of boulders, both limestone and hard heads, which may serve a useful purpose. Game consists of duck, geese, prairie chicken, foxes and wolves. The township would be adapted for grazing and also for mixed farming.—*Thos. Fawcett, D.T.S., 1904.*

Township 37.—This township is easily reached from Battleford via Sounding lake trail or from Medicine Hat or Wetaskiwin via trails made by ranchers. The location survey of the G.T.P.Ry. lies fifteen miles to the north. The soil is generally a sandy loam underlaid with clay, and the surface fairly level in the north half of the township, while the south end is crossed by the Neutral hills, which rise to an elevation of about 400 feet. There is a little timber in the hills and fringes on the south sides of lakes on the flats, but not enough for requirements of settlers. Timber can be obtained in the township adjoining to the east. There is some hay land in the north and northwest parts of the township, and all hay is of good quality. Water is mostly fresh in both ponds and lakes. One or two small spring creeks flow from the hills but soon lose themselves on the flats to the north. A trail from Sounding lake runs west across the township at the foot of the hills on the north. Vegetation would point to a favourable climate, with no indications of summer frosts. No signs of coal or other minerals of value were observed. Boulders are scattered over the hills in spots and are very thick in some places. The township is adapted for either ranching or mixed farming. The game consists of duck, geese, prairie chicken, foxes, wolves, jumping deer, &c.—*Thos. Fawcett, D.T.S., 1904.*

Township 38.—At present this township is accessible from Battleford, Wetaskiwin or Medicine Hat, there being little choice as to which route is taken. The location survey of the G.T.P.Ry. is within ten miles to the north, and will be convenient when that part of the road is constructed. The soil is sandy loam on the east, merging into clay westward so that sixty per cent of the land would be classified as clay loam with clay subsoil. The east half of the township is hilly and broken with lakes and ponds, with some poplar around the southerly margins of lakes. The west part is undulating, mostly dry, with a few clumps of scrub and small poplar timber. There is some hay land around lakes and ponds but not in large quantities. The water in larger lakes is alkaline, but fresh in small ponds and muskegs, and there are several springs of good water flowing into the lakes. These in places form small streams which flow in spots, but generally in underground channels. Climatic conditions seem favourable, there being no indications of summer frost. The poplar around lakes would afford a limited supply of fuel, and more could be obtained in the adjoining township to the east. Boulders are scattered in spots, but no outcrop of rock or indications of coal or other minerals of economic value were observed. The game consists of duck, geese, grouse, foxes, prairie wolves and jumping deer. The country is adapted for either ranching or mixed farming.—*Thos. Fawcett, D.T.S., 1904.*

Township 39.—There are no travelled roads passing through this township, but it is easily accessible from either Battleford or Wetaskiwin, from which it is about equidistant. The location of the G.T.P.Ry. passes through the township joining this on the north. The soil is a sandy loam usually with a sandy subsoil, and is adapted for growing either vegetables or grain in seasons when the rain supply is normal or above. The surface is rolling and hilly, broken by lakes and ponds, which are usually surrounded with a fringe of poplar timber. The water in the larger lakes is alkaline or bitter, but fresh in ponds, and on the north boundary of section 11 is a flowing spring of delicious water. There is not much meadow land owing to the undulating surface. There are no running streams except Ribstone creek, which penetrates the township and follows it for some distance near the west boundary in a marshy flat. The poplar already mentioned would afford a limited supply of fuel and small building logs. There are a few sections containing patches of stony ground and a supply of stone for foundations, but no outcrop of rock or indications of valuable minerals were observed. The township is especially adapted for summer pasture, and in a second degree for mixed farming. The game consists of duck, geese, prairie chicken, foxes, wolves and jumping deer.—*Thos. Fawcett, D.T.S., 1904.*

Township 40.—The ranchers who live in this township, having their headquarters on section 4, use Wetaskiwin as a base of supplies, but Battleford is about the same distance away and equally accessible. The location survey of the G.T.P.Ry. crosses the township diagonally from southeast to northwest. The soil is for the greater part sandy loam with sandy subsoil, but there is some clay soil near the northwest corner of the township. It is well adapted for growth of both vegetables and grain during seasons when moisture is abundant. The surface is hilly and quite broken in places by lakes, clumps of timber and by Ribstone creek, which flows through the township diagonally from southwest to northeast. About two-thirds of the township at the northwest is open prairie. The best timber will be found along Ribstone creek, where building logs 8 and 10 inches in diameter can be obtained. A large quantity of hay can be cut in the flat along the stream also on the west side of Houcher lake, in sections 5 and 6, especially in dry seasons, similar to that of 1904. There are no rapids nor mill sites on the stream, which is generally sluggish. Climatic indications seem favourable, and there seems to be little if any injury from summer frosts. Dry poplar for fuel can be got along the creek and from bluffs in other localities. There are no indications of coal or other minerals of value, no outcrop of rock and but little stony land. Duck, prairie chicken, geese, foxes and wolves remain here part of the year. Houcher Bros., who have lived in the township some five years, have about 500 head of stock, which feed on the prairie a good part of the year.—*Thos. Fawcett, D.T.S., 1904.*

Township 41.—The means of access to this township is either from Wetaskiwin by trail or from Battleford by way of Sounding lake trail to the eleventh base line in range 23, then west following the base line to this part of the country. The G.T.P. Ry. location survey passes within three miles from the south boundary of this township. The soil varies from a sandy loam on the east to clay loam on the west and is well adapted for all purposes of agriculture. The surface is more or less undulating and hilly prairie, with the exception of a few sections along the east boundary of the township and willow muskegs which are scattered over all parts where the water is invariably fresh and good. A few small hay marshes will produce a limited supply of feed. Ribstone creek crosses the township in sections 2, 11, 13, 14 and 24 in a marshy flat. There are no rapids or waterfalls. The stream during the month of June would be from 3 to 4 feet deep with miry bottom and about 50 feet wide. There were no indications of summer frosts, but vegetation points to a favourable climate. There is some wood suitable for fuel in the easterly part of the township, also building logs of inferior quality. No indications of coal or of other minerals of economic value were observed. But few boulders were seen and no rock in place. The game consists of duck, geese, chicken, foxes, wolves and jumping deer.—*Thos. Fawcett, D.T.S., 1904.*

Township 46.—The shortest route to this township from the railway would be from Wetaskiwin via the Battleford trail to Buffalo coulée and thence along the coulée on the west side to the township. This trail would be good, except in spring. The soil is mixed, the north part being heavier, but more broken, while the south is level but sandy. It is suitable for ranching rather than grain raising. The portion along the river and the whole north half of the township is covered with patches of poplar, while the south part is quite open. The timber is poplar and cottonwood, but is not of sufficient quantity or quality for reservation. There is no hay. The water is generally fresh except the lake in section 1, which is unfit for use. There are numerous springs on the east side of Battle river which furnish beautiful water. Battle river furnishes a permanent supply of water of good quality. It averages from two to three chains in width and at time of survey (July 1) was not fordable at any point in the township. There is little danger of flooding. There is no place suitable for water power even with the construction of a dam. The climate is that of Saskatchewan; no summer frosts were observed. Wood is the only fuel obtainable and sufficient for settlers use can be obtained in the township. I saw no coal or lignite, no stone quarries nor economic minerals in the township. Deer, bear and chicken were seen in this township.—*C. C. Fairchild, D.L.S., 1904.*

Township 51.—The best route for reaching this township is by trail from Whitford lake, or by another trail from Vegreville. The soil is of various depths, from three to fifteen inches, with a subsoil of sand and clay. The subsoil along the banks of Vermilion river is sand and gravel. The surface may be called high rolling and in some places hilly. It is dotted with poplar groves and scrub and brush, which are to be found on almost every section, suitable for small buildings, fencing and fuel. The size of the poplar trees found in the clumps or bluffs varies from two inches to eight inches in diameter. These clumps or bluffs of poplar are to be found on almost every section. There is a large quantity of hay in the valley of Vermilion river, being cut by some ranchers, who own from two to three hundred head of cattle and horses, pasturing their animals on the high lands. These ranchers cut the hay required to winter their animals, in the marshes of Vermilion river. The hay is a coarse variety, growing very high. In dry seasons a large quantity of hay can be cut, in wet seasons not so much. The water found in this township is fairly good, a little being alkaline. The water found in the lakes and ponds tastes of vegetable matter. Vermilion river, which runs through this township from west to east, is a stream of from sixty to seventy feet wide and in low water from four to five feet deep. The water is a little alkaline, with a current about one mile per hour, well stocked with jackfish and suckers. The land in the valley of the Vermilion is liable to be flooded in the spring and summer. In an ordinary summer it is a stream of about a chain or so wide; when flooded it is from ten to fifteen chains wide in some places and two to four feet above the marshes. There are no water powers. The climate I found the same as at Edmonton, and I think there are no more summer frosts than at that place. The kind of fuel most readily available is poplar wood. It can be procured on every section within this township. No stone quarries were found. Boulders can be found on almost every hilltop and in watercourses. No coal or lignite was seen. Very little game of any description was met with. A few duck were seen on the lakes and ponds. Prairie chicken and partridge are very scarce.—*Robert W. Lendrum, D.L.S., 1904.*

Township 52.—The route for reaching this township is by a cart trail from Whitford lake or from Vegreville. In dry weather both of these trails are passable. The soil in this township is a dark brown loam of from three to ten inches in depth, on a subsoil of clay and is suitable for growing crops of oats, wheat and barley. The soil in its present state supports a fine growth of grass, making admirable pasture for cattle and horses. The surface is rolling and in places hilly prairie, overgrown in places with scrub, willows and poplar, with scattered groves of poplar trees averaging about four or five inches in diameter, suitable for small buildings, fencing and fuel. Several small lakes and ponds are scattered over this township, and two large lakes were traversed, one of them partly situate on sections 22, 23, 26 and 27, and the other on the eastern boundary of the township, part on sections 13 and 24. No large area of hay land was seen, but hay in small quantities could be cut around several of the lakes and sloughs. The water found in the lakes was fairly good; in the smaller ponds it is a little alkaline, but not unpleasant. The supply in the larger lakes is permanent. In dry seasons the smaller lakes and ponds would dry up. No streams of considerable width or depth were found, or waterfalls or mill sites. The climate I found to be similar to that around Edmonton, and no more liable to summer frosts than that place. The kind of fuel most readily available is poplar wood, of which the supply for a few years is sufficient. No indications of any veins or beds of lignite or any other coal were seen, and no stone quarries were discovered. Boulders can be found on many of the hilltops and in water courses. Prairie hens and ducks were the only game met with and these only in small numbers. The ranchers, who are settled along Vermilion river, are in the habit of setting prairie fires in the early summer months, for the purpose of (they say) improving the pasture for their herds of cattle and horses. These fires destroy the prairie hens' nests and burn up clumps of poplars, which would be very useful to incoming settlers.—*Robert. W. Lendrum, D.L.S., 1904.*

Township 53.—This is best reached by the trail which follows along the south side of Vermilion river. There is a good ford across the river in range 5. The soil is of fair quality, but part of the township is too rough to be called first-class farming land. It is suitable for mixed farming. The north two-thirds of the township is partly covered with bluffs of poplar and willows. The south third is almost all bare prairie. The poplar bluffs are large enough to provide building material for settlers and also fuel. There is some hay around the sloughs and marshes. Some of the sloughs and marshes are alkaline, but the majority are fresh. There are no water powers. There were frosts every night while surveying this township. There is plenty of dry poplar, to supply settlers with fuel, in the northern part of the township. There are no stone quarries. There are no minerals. Moose were seen in this township.—*M. B. Weekes, D.L.S., 1904.*

Township 54.—The trail along Vermilion river is the best way of getting to this township. There is a good ford on the Vermilion in range 5. The soil is fair and would be suitable for mixed farming if the land were more level. The surface is almost all covered with bluffs of poplar and willows. They are distributed evenly over the whole township, the poplar getting a little heavier towards the north. Poplar up to eight inches in diameter is abundant in all parts of the township. There is no hay land. The water is all fresh and the supply is permanent owing to the numerous large lakes. There are no water powers. The climate is the same as adjoining townships. All the small sloughs froze over in September. There is plenty of dry poplar for fuel in all parts of the township. There are no stone quarries. There are no minerals. Moose and bear were seen here besides duck, rabbits and coyotes.—*M. B. Weekes, D.L.S., 1904.*

Township 55.—This township is best reached from the west by means of the Saskatchewan, or by the trail on the north side of the river. It can be reached from the east by the trail which follows the proposed location of the Canadian Northern railway and a branch trail which runs north from it in range 5. The soil is fair on the average; consisting of about 8 inches of black soil on a clay or sand subsoil. If this township were cleared, it would be suitable for mixed farming. The surface is almost entirely covered with poplar mixed with heavy tangled willow scrub. The poplar will average about 5 inches in diameter. There is considerable good hay land on the north and west sides of Lake Louise. The water is all fresh, and the supply is permanent. There are no water powers. There were no summer frosts. Dry poplar for fuel can be procured in large quantities in any part of the township. There are no stone quarries or minerals. Bears, moose, deer and coyotes were seen.—*M. B. Weekes, D.L.S., 1904.*

Township 56.—This township is best reached from Edmonton by means of the Saskatchewan, or by means of the trail on the north side of the river, which runs along the government telegraph lines. This trail is in good condition. On the north side of the river the soil is light and sandy and is of very little value. South of the river it is better but it is all covered with a dense growth of poplar bush and scrub. On the north side of the river there is some open land, the balance being covered with poplar, scrub, and some spruce and jackpine. South of the river the surface is entirely covered with poplar bush mixed with willows. The poplar will average about 6 inches in diameter. Just south of the north boundary there is some spruce and jackpine, but not enough to be of any value except to settlers. There is no hay in this township. The water is all fresh. There are no water powers. There were no frosts after the end of May. Dry poplar for fuel is available in any part of the township. There are no stone quarries or minerals. Deer and moose were seen, also plenty of rabbits and coytes.—*M. B. Weekes D.L.S., 1904.*

Township 57.—The St. Paul de Metis and Onion lake trail passes through this township. This is a very good road. The soil is chiefly sandy loam with clay subsoil and is suitable for general farming. The northern half is wooded with poplar from two to twelve inches in diameter, with small clumps of spruce scattered in a few spots especially in the northeast part. The southern half is scrub and brush. There is some good hay land in sections 5, 6 and 24. The water is all fresh and good. Moose creek is sometimes a very small stream, almost dry. At others it is a river eight to ten feet deep. The land is not liable to be flooded. There are no water powers. The climate is delightful. Summer frosts are rare. There is plenty of wood for fuel for settlers. We saw no valuable minerals of any kind. Among game animals there are many deer, moose, bear and foxes. Duck are numerous. There are partridge, geese and cranes in season.—*M. W. Hopkins, D.L.S., 1904.*

Township 58.—This township is best reached by means of the trail running from Indian reserve No. 123 to the St. Paul de Metis and Onion lake trail from the south, and from said Indian reserve from the north. Both roads are fairly good. This township is the chief centre of the Moose hills and is hilly and broken. The northern part would be good for general farming. In the remaining parts there is good pasturage along some of the streams. The ground is covered with poplar from four to twelve inches in diameter, except in the valleys along streams and in the northern tier of sections. Along the streams in places are found scattered spruce up to fifteen inches diameter. However, for a radius of half a mile around the northeast corner of section nine there are some very fine spruce and tamarac up to thirty inches diameter. There will be enough good timber here for the settlers, but if this were disposed of there is no more obtainable on the south side of Moose hills. There is no hay land in this township. The water is fresh and good and abundant. There are many nice streams, but no water power. This land will never be flooded. The climate is delightful. Summer frosts are rare. There is abundance of wood for fuel. We saw no valuable mineral of any kind. Among game there are many deer and moose and bear.—*M. W. Hopkins, D.L.S., 1904.*

Range 7.

Township 36.—This township may be reached from Battleford via Sounding lake trail, also from Medicine Hat or Wetaskiwin via trails used by the ranchers in this locality. The soil is generally a clay loam with clay subsoil, but a few sections are sandy. The surface is undulating and hilly throughout. There is no timber except two clumps of small poplar in section 28. The hay supply is limited, but may be got in small quantities in nearly all sections. Water, both fresh and alkaline, is abundant, the good water is found in small ponds and marshes. There are no streams of running water. Climatic conditions seem favourable, with no signs of summer frosts. The nearest fuel will be found in the Neutral hills in the township adjoining to the north. No coal or other minerals of economic value were seen nor any indications of minerals. There are boulders in places but no outcrop of bed rock. In game, we found duck, geese, prairie chicken, foxes and prairie wolves. The township is adapted for grazing land, but may also be applied to mixed farming.—*Thos. Fawcett, D.T.S., 1904.*

Township 37.—This township may be reached from Battleford by following Sounding lake trail, also from Medicine Hat to Wetaskiwin by following trails used by ranchers in the locality. The location survey of the G.T.P. Ry. lies 18 miles to the northeast. The soil generally is a clay loam with clay subsoil. The surface is very rough and broken, the greater part of the township being in the Neutral hills, which are broken by many deep ravines and precipitous ascents. There is some poplar timber in the ravines, but it is difficult of access. Trees seldom exceed 6 inches in diameter. A limited quantity of hay may be obtained near the middle of the township, where there is a depression through the hills.. Water is good and fresh in the smaller ponds, but brackish in lakes covering any considerable area. There are no streams of flowing water. Climatic indications are favourable, there being no signs of summer frost. A limited quantity of wood for fuel can be cut in some of the ravines, also small poles for building and fence stakes. There is no coal deposit nor other minerals of economic value in sight. The only stone is found scattered over the hills in the form of boulders, both granite and limestone. Game consist of duck, geese, prairie chicken, foxes, wolves and jumping deer. The township is adapted for ranching or grazing purposes and is at present used as pasture land by ranchers in the vicinity.

The trail from Sounding lake crosses the township from east to west two miles from the south boundary.—*Thos. Fawcett, D.T.S., 1904.*

Township 40.—This township is accessible either from Battleford or Wetaskiwin. there being no great obstacles to prevent travel either way. The location survey of the G.T.P. Ry. passes through the township near the northeast corner. The soil is a clay loam underlaid with heavy clay, except the southeasterly sections where the soil is sand. The surface is undulating to hilly and in sections 1, 2, 12, 13, 11 and 14, is broken by clumps of poplar timber. The hay supply is about normal. What there is, is of good quality and found around ponds and marshy spots. The water is fairly good. One large lake in sections 25, 35 and 36 contains good water. The smaller ponds are always fresh. No injury from summer frosts was observed, but the climate seemed favourable. A limited supply of dry poplar for fuel is obtainable in the sections above mentioned as wooded, also house logs of small size. No indications of coal or of other minerals of value were seen or outcrop of useful rock. Some boulders are found near the westerly boundary of the township. Game consists of duck, geese, prairie chicken, wolves and foxes.—*Thos. Fawcett, D.T.S., 1904.*

Township 41.—This township may be reached either from the west with Wetaskiwin as a base, or from Battleford; being about equally distant from both places. The location survey of the G.T.P. Ry. runs diagonally across the township. The soil is a dark sandy or clay loam with clay subsoil, is very fertile and well adapted for all purposes of agriculture. The surface is mostly undulating prairie, but there are a few poplar bluffs and willow marshes. The best timber will be found in sections 17 and 18, where building logs reaching a diameter of 10 inches may be obtained. Some good hay marshes of small dimensions will afford a limited supply of forage. Water in small ponds and willow marshes is good and fresh, while larger lakes are alkaline. There are no streams of running water in the township. Climatic conditions seem favourable, there being no signs of summer frosts. Dry poplar for fuel will be obtainable for some time in the small bluffs, many of which are partly dead and dry. No indications of coal or of any other minerals of economic value were seen. There are few rolling stones and no outcrop of rock.—*Thos. Fawcett, D.T.S., 1904.*

Township 44.—This township is reached by means of Iron creek trail to Battle river in township 43, range 9, and thence across country. The trail is good as far as the river, but except in very low water the river cannot be forded. The surface is prairie with bluffs of poplar and scrub around the lakes. The soil is generally light, but some good sections are to be found in the southeastern portion, suitable for grain raising. The balance is suitable for grazing. Poplar to the size of eight inches in diameter is found in small quantities, while all the lakes in the south and west are surrounded with four-inch poplar. There is no timber except for settlers' use. The water is generally fresh in the smaller lakes and sloughs but alkaline in the larger lakes. Good water would be very scarce in a dry season. There are no streams or water powers. The climate is that of Saskatchewan, with no frosts noted in summer. Wood is the only fuel found in the township. There are no stone quarries nor minerals. Duck, geese, chicken and deer were seen in this township.—*C. C. Fairchild, D.L.S., 1904.*

Township 51.—The route for reaching this township is by trail from Whitford lake. This trail crosses the south end of the township. It is fairly good in dry seasons. The surface of this township is high rolling and hilly. The soil varies in depth from two inches to ten inches with subsoil of sand and gravel in the south, and clay in the north. The soil supports a very fine growth of grass. A large lake is situated on sections 8, 9, 10, 11, 17, 16, 15 and 14 and two smaller ones on sections 11, 12, 13 and 14. Vermilion river runs through a valley in the south portion of the township. In dry seasons it is a stream of about sixty or seventy feet wide, with a depth of from four to five feet. In the valley, or marshes, through which the river runs a large quantity of hay grows; in dry seasons this hay can be cut and would yield about two tons per acre; in wet seasons the valley is a wet marsh and hay cannot be saved. The river contains numerous jackfish and suckers. The water is fairly good. The climate is almost the same as at Edmonton. No summer frosts were observed till the end of August. No stone quarries were found. Boulders were found on the high land adjoining Vermilion valley and on several of the hill tops. No minerals of economic value were found. Game of all kinds is very scarce. A few ducks were seen on the lakes and ponds. I rate this township second and third class for agricultural purposes. The north side is suitable for mixed farming, the south for ranching and cattle raising. The located line of the Canadian Northern railway is about six or eight miles to the south. Water was found to be plentiful in the ponds and lakes and the quality was good. Timber for building small houses and stables, can be had in the north side of the township.—*Robert W. Lendrum, D.L.S., 1904.*

Township 52.—The route for reaching this township is by cart trail from Whitford lake or Vegreville, both trails are fairly passable. The soil is a dark brown loam of from two to ten inches in depth overlying a clay subsoil. The soil is suitable for the growth of wheat, oats, barley and hay. The surface is generally rolling and hilly, with an occasional flat between the hills. The surface is overgrown here and there with clumps of poplar, and willow scrub and poplar groves. The clumps or groves of poplar averaging four or five inches in diameter; but trees of eight or nine inches in diameter have been seen. There are several small sloughs and ponds. Three lakes large enough to be traversed were found, one on sections 1, 12, 11 and 13, another on sections 15 and 16, and another on the western boundary of the township, part on sections 6 and 7. No large areas of hay land were found; but hay in small quantities grows around many of the sloughs and ponds. On the north boundary of section 23 and the south of section 26 and on the east half of section 15 are large flats supporting a good growth of wild hay and vetches, which by drainage could be made good hay meadows. The water found in the lakes and ponds is a little alkaline, but not unpleasant to the taste; that found in the running creeks was good and sweet, and I think the supply would be permanent. No mill sites or waterfalls were observed, and no places suitable for making dams. The climate I found to be similar to that around Edmonton and no more liable to summer frosts than that place. The kind of fuel most readily available is poplar wood, of which there is a quantity sufficient to meet the demands of settlers for a few years. No veins or beds of lignite or other coal were discovered, and no stone quarries. Boulders are found on many of the hill tops. No deer of any description were seen. A few rabbits were observed. Prairie chickens are very scarce, but there are a few partridge and many ducks and pelicans on the lakes. This township is best suited for mixed farming, the soil supports a good growth of prairie grass, rendering it a good ranching township, if hay in sufficient quantities was grown to winter the stock.—*Robert W. Lendrum, D.L.S., 1904.*

Township 53.—This township is, for the greater part, timbered, with the exception of sections 1, 2, 3, 4, 10, 11, 12, 14, 13, 24 and 25, where the surface is prairie and bluffs. Poplar and large willow is the only kind of timber found here; the poplar averages in size from four to fifteen inches in diameter and can be used to build log cabins. The country is hilly and cut by ponds and sloughs; there are also seven small lakes. Hay is plentiful on sections 31, 32, 19, 20, 7, 8, 9, 14, 15, 22 and 23. The soil is composed of black loam, varying in depth from four to twenty inches, resting on a clay or sandy clay subsoil; it is very well adapted for farming purposes. Settlers will find in the southeast portion of the township good tracts of prairie. The northwest half is very hilly and thickly timbered. The water is fresh in every stream, lake, pond and slough and it is in such a large quantity, that I believe it must be permanent. A large brook crosses sections 2, 12, 13, 14, 23, 26, 35 and 34, 33 and 32, flowing into Saskatchewan river. This stream had an average width of eighteen feet, and the water was six feet deep during the month of June, with a current of two miles an hour. There are no water powers and no stone quarries and no minerals of any description have been found. Though I have not travelled south of this township, I believe that it can easily be reached by the Vermilion wagon road. About three miles east of the mouth of Stony creek, there is a fairly good road also; partly opened by me and partly by hunters from St. Paul. This road goes from the river to the centre of this township. The best way to travel from Edmonton to this part of the country is by way of Saskatchewan river. Scows of all dimensions are built in Strathcona at Mr. Walter's mill. The climate appears to be good; settlers from St. Paul report that they succeed well in growing oats, barley and potatoes. Summer frosts are not very frequent. I believe that when the country is well drained they will disappear altogether. The pasture is good; grass, mixed up with pea vines, grows abundantly on every tract of prairie and principally at the edges of bluffs. Prairie wolves, porcupine, foxes, muskrat, and a few deer are found. I have seen very few ducks, wild geese, partridge and prairie chicken in this township; wood for fuel is abundant all through the township.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 54.—This township can be reached by a cart road opened by me from the south shore of Saskatchewan river about three miles east of Stony creek and passing through township 55, range 7, and crossing this township from section 36 to section 4, making a bend to the west to turn some marshes and lakes on sections 21, 22, 23 and 24. I believe that the Vermilion wagon road can also be reached in passing through the southeast corner of 53, range 7, as the country south appears to be mostly prairie. This township is very hilly and the surface is prairie and bluffs through the west and south portions, the remainder being covered with poplar varying from six to twelve inches in diameter and with large willow. Good poplar logs can be procured on almost every section and wood for fuel is also plentiful. The soil is a black loam varying in depth from five to twenty inches, resting on a sand or sandy clay subsoil. This township is well adapted for farming purposes; tracts of prairie are found on nearly every section. There are eleven lakes in this township. The principal one is Lake Coté. On sections 1, 2, 3, 6, 19, 30, 22, 27, 23 and 26, there are hay sloughs and marshes producing very good hay. The only stream worth mentioning is the outlet of Lake Coté and lake No. 10, flowing in a northwesterly direction; this stream has a current of two miles an hour; it is almost eighteen feet wide and was five feet deep during the month of July. There is a great number of ponds and sloughs scattered all through this township. They containe fresh water, as well as the lakes and streams, and the water seems to be permanent. The pasture is good and abundant here. There are no water powers nor stone quarries and no mineral has been seen during the progress of the work. Duck, wild geese and cranes seem to be plentiful during the summer and a good number of muskrat, prairie wolves and foxes have been seen here. The climate is fairly good and summer frosts are not very frequent. Settlers will find here all they need to meet their requirements.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 55.—This township can easily be reached by Saskatchewan river, passing close to the northwest corner. From the south bank of the river, about three miles east of Stony creek, there is a wagon road entering the township on section 35. The surface here is thickly timbered with poplar, birch and large willow. Nevertheless there are here and there patches of prairie. There is a remarkable row of hills running nearly east and west from sections 7 and 18 to section 4, and from there turning to the northwest towards section 34. Some of these hills are two or three hundred feet high above the lakes and marshes at their foot; the hill on the east boundary of section 23, has an elevation of 310 feet. The soil in this township is well adapted for farming purposes, being a black loam five to fifteen inches deep, resting on a clay or sandy clay subsoil, stony in many places. A few spruce from four to fifteen inches in diameter are found in the neighbourhood of the lakes; they would prove useful to the settlers, coming to establish themselves here. There is a marsh on sections 10 and 11 producing a large quantity of good hay. The principal lakes in this township are lake No. 1, lake No. 2, lake No. 3 and lake No. 4, every one of them emptying into Death river. This stream in the spring time, had an average width of twenty-five feet, with a depth of four to five feet, the current being about three miles an hour. Fresh water is abundant in all the streams, lakes, sloughs and ponds in this township and it is permanent. There are no stone quarries; and no mineral of any description has been found here during the progress of the work. Game seems to abound here. Moose, bear and deer, rabbits, prairie wolves, foxes and muskrats have been seen in good numbers while surveying here. Duck of many species, wild geese and cranes are found in the numerous ponds and lakes during the summer. The country is hilly, but the slopes are long and rising gradually, and they may be cultivated as well as the flats adjoining the lakes and streams. The climate seems to be good, and summer frosts are not very frequent. Settlers will find here a good country and will succeed in growing oats, barley and vegetables.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 56.—This township can be reached by way of Saskatchewan river, or by a wagon road, from St. Paul de Metis, crossing this township from the northwest corner to strike the river nearly in the centre of the township. There is also another road east of Stony creek and parallel to that stream, going to the river near the mouth of the said creek. The soil here is composed of black sandy loam having an average depth of fifteen inches, resting on a clay and sandy subsoil, it is a little stony on the hills. The surface is prairie and bluffs, for that portion situated on the north side of the river, while south of the Saskatchewan, it is thickly timbered with poplar, white birch and large willow. Small bluffs of spruce are found here and there along the river and the creeks. The trees are from six to fifteen inches in diameter. The poplar in the different bluffs north of the river is only fit for fuel. Saskatchewan river, crossing this township from section 6 to section 24, varies in width from ten to seventeen chains; it is about ten feet deep in the fall, with a current of nearly two miles an hour. In the month of June the water is much higher than it is at the present time (October). A large quantity of hay is furnished by the numerous marshes and sloughs in this township; prairie grass is also plentiful here. The water is fresh in all the ponds, lakes and streams and the supply is permanent. Atimoswe creek, Death river and Stony creek are the principal streams flowing into the Saskatchewan. Death river, with an average width of ten and fifteen feet, and a depth of four and five feet, has a very swift current on reaching the Saskatchewan. Atimoswe creek is about twenty feet wide and four feet deep; it runs in rapids to the river. Wood for fuel and for the construction of log cabins is plentiful here. There are no stone quarries and no mineral has been found during the survey. Prairie wolves, foxes, muskrats and rabbits are plentiful, and a large number of duck, wild geese, partridge and prairie chicken have been seen. The climate is fairly good and summer frosts are not very frequent. A few fresh tracks of bear, moose and deer were seen in different portions of this township. Pike and pickerel abound in the Saskatchewan. Though the west and south portion of this township is hilly, some good farms can be found here and there.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 57.—The old and good trail from Edmonton to Battleford by way of Onion lake passes through the southern portion of this township. The soil is first class and good for general farming. The northern part of the township is covered with poplar from two to ten inches in diameter, with clumps here and there of same dimensions. The southern part of the township is covered with scrub and brush with some prairie, where Edmonton and Onion lake road passes. There is a little hay land in the prairie portion. The water is abundant and fresh. Dog creek enters the township in section 19 and passes out in section 2. This creek never dries up and is large in time of flood, but the land is not liable to be flooded. There are no water powers. The climate is delightful and summer frosts are rare. There is plenty of wood for fuel. We saw no valuable mineral in this township. Among game animals there are deer, moose, bear, duck, prairie chicken, fox and partridge. The old Lac LaBiche trail passes over sections 34 and 24, but is now grown up.—*M. W. Hopkins, D.L.S., 1904.*

Township 58.—This township is most conveniently reached by way of the old Lac LaBiche trail, which forks off from the St. Paul de Metis and Onion lake trail near the east boundary of range 7. The old Lac LaBiche trail is now grown up, but we cut it open into this township and the road is now good. The soil is chiefly loam with clay subsoil and suitable for general farming, and covered with poplar from two to eight inches in diameter. The southern part of the township is more scrubby. Around the east side of Bently lake there is some good spruce and tamarac, but not enough for a timber berth. There are no hay lands. All water is fresh and good and there will be plenty for use. There are no large streams, but numerous small ones. The land is not liable to be flooded. There are no water powers. The climate is delightful. Summer frosts are rare. There is abundance of wood for fuel. We saw no coal, nor lignite, nor stone quarries or other valuable minerals. Among the different kinds of game there is an abundance of duck, many deer and moose and some bear. There are wild geese in season and partridge. There are plenty of fish in Keheewin lake and probably in the other lakes.—*M. W. Hopkins, D.L.S., 1904.*

Range 8.

Township 36.—There are trails by which this township may be reached from Medicine Hat from Wetaskiwin and from Battleford. A trail from Sounding lake passes through this township, running south to Medicine Hat. The soil is a clay loam over a heavy clay subsoil. The westerly half of the township is gently undulating prairie, while the east part is very hilly and broken. There is no timber in the township, but fuel may be obtained in the township adjoining to the north from Neutral hills. A limited supply of good hay may be obtained from all parts of the township, but no large area of hay land exists. There is plenty of good water to be found in small deep ponds usually fringed with willow scrub, but there are no streams of running water during the dry part of the season. No marks of summer frost were visible and the vegetation would indicate a favourable climate. No coal or other minerals of economic value were in sight. Game consists principally of duck, geese, prairie chicken, foxes, wolves and small deer. The township is adapted for either grazing or mixed farming.—*Thos. Fawcett, D.T.S., 1904.*

Township 42.—The best and most convenient point, from present railway facilities, to reach this township is Lacombe, on the Calgary and Edmonton branch of the Canadian Pacific railway. Leaving Lacombe by the trail leading due east and passing by way of Content at the mouth of Tail creek and on, still travelling nearly due east, and passing McVittie's place on Beaverdam creek, then on to Nelson's place in township 39, range 11, and from there taking the new trail made by freighters for railway survey parties in 1903 and 1904, going northeasterly from Nelson's the vicinity of the southwest angle of this township is reached in about twenty-two miles therefrom. The trail is nowhere good, but is passable. This is not a good township in an agricultural sense as a whole. About one-third of its area only is good land. This good land lies in a strip about one and one-half miles wide from the southeast to the northwest corner, and the soil found in this strip is very good, being of sand and clay loams, with very few stones. The soil elsewhere in the township is very light and sandy. The good soil spoken of, is in every way suited to produce all ordinary farm products grown in Canada. The surface is mostly of a rolling character, with a good many small patches of poplar and willow bush distributed about. Some few patches of fair sized poplar are found here and there. On sections 9, 17 and 18 considerable timber (poplar) of a size suitable for building logs exists, with a large quantity of firewood and fence rails. It might be well to reserve what there is of these sections not covered by lakes for settlers' needs. There is no timber suitable for lumbering operations in this township. A good deal of natural hay could be got at places about the group of lakes in the southern part, and also a large quantity could be got on sections 25, 26, 35 and 36, where some quite extensive hay flats exist. A thousand tons might easily be cut on this last mentioned part, I fancy. This hay grass is a kind of red top of fine quality, and is generally about three feet in length, and would cut from one and one-half to two tons per acre. The water in the township is not good as a rule. Only in the smallest ponds and marshes is it at all possible to use. Of course all of it is quite good for stock. There are no streams in the township, and of course no places at which power by water can be obtained. I did not seen any indications of valuable minerals, or of coal or lignite, nor are there any places that I saw at which quarries for stone might be opened. Of game, duck and geese were abundant in the lakes, and prairie chicken and partridge were also frequently seen. I do not think any of the lakes, though they are of quite a size, contain any fish. Many attempts to capture some were made, but with no success.—*Fred W. Wilkins, D.T.S., 1904.*

Township 43.—This township may be best reached perhaps by using Lacombe as a starting point from the railway, and by taking the trail due east from this point, passing by way of the village of Content at the mouth of Tail creek, then easterly and finally following the freighting trail used last year and this to bring in supplies to the railway survey parties between Lacombe and Battleford, until the vicinity of the southwest angle of township 42, range 8, is reached, thence northerly across country until this township is reached. This trail is not a good one anywhere, but it is passable though there are a few very bad places along it, notably the places known as 'The Devil's Ash Pan' and 'Hell on the Wabash.' The surface of the township is from rolling to hilly in character, and is mostly open, that is free from timbered growth. A few clumps of small poplar and willow bush are found here and there on the township, but are of no consequence one way or the other, except that a little fuel is to be obtained in some of them. The soil is almost invariably a shallow sand loam on sand, and with the exception of a small patch in the southwest corner, is a light soil throughout. With an abundant rainfall and good husbandry, good crops of any of the farm products grown in Canada could be raised over a considerable part of the township, but of the first condition there is great doubt, and therefore I do not consider the township a good or even passable, one for general farming. As a summer range for stock, especially horses or sheep, is, I fancy, its best purpose, as there is a sufficiency of water, and, the grass is of very fair growth. It is, however, very liable to prairie fires, as the grass matures very early in the season, and is then very dry. There is no timber on the township of economic value. There are no large hay meadows, but in the southeastern part of the township and at the central part, some nice hay flats were seen, the prevailing grass being a species of red top, which would easily run about two tons to the acre of most excellent hay. I should fancy that I saw sufficient to cut about 1,000 tons taking all that I came across in the township. There are no running streams in the township except Battle river in the extreme northwest (almost inaccessible) and two spring brooks running into it at that point. Possibly a dam might be put in on the river to develop power, but it would be an expensive piece of work. The discharge of this stream at its lowest stage is about 400 cubic feet per second; and, at the highest is about 4,000. A possible head of ten or twelve feet might be obtained. The water throughout the township is fairly good and fresh. The water in Battle river, however, is peculiar in that it does not taste bad, but creates an unconquerable thirst, and, if it be used to make tea with, is absolutely undrinkable. Of mineral fuel of any kind I saw no trace, nor of any other valuable minerals. I did not notice any places suitable for stone quarries. There is a limited quantity of poplar wood for fuel to be found in small patches scattered over the township. The supply is not large however. Of game, there are plenty of ducks in the ponds and marshes. Prairie chickens were not numerous, nor were partridge. A few rabbits were noticed in the bush. A good many antelope were seen, and, though we did not see any living ones, the cast horns, and other remains of the red deer (Wawaskeshn) sometimes called elk, were seen in abundance. Tracks of bear were also seen along Battle river. Pike are abundant in this stream, of good size (6 to 10 lb.) and of very fair gastronomic consideration.—*Fred. W. Wilkins, D.T.S., 1904.*

Township 51.—The route for reaching this township is by trail from Whitford lake. This crosses the southerly portion of the township. It it fairly good in dry weather. The surface of the township is mostly high, rolling and hilly. The soil varies in depth from two to ten inches. The subsoil is sand in the south along Vermilion river, and clay to the north. The soil supports a good growth of grass and is very well suited for cattle grazing. Here and there, are patches of low scrub, poplar and willow, and clumps of poplar large enough for fencing and fuel. There are no spruce trees, or poplars large enough for sawn lumber. Vermilion river crosses the south end; in its valley are marshes where a large quantity of hay can be cut in dry seasons when the water is low. The river is a very crooked stream. In summer its depth is about three feet, with a current of about a mile an hour. The water is a little alkaline and contains numerous jackfish and suckers. In width it varies from one chain to ten, according to the height of water. There are no mill sites upon it and no great chance of making dams. The climate is almost the same as at Edmonton. I observed no summer frosts this year till about the end of August. No stone quarries were found, boulders are numerous on the high land adjoining the Vermilion valley. I found no minerals of any economic value. Game of all kinds is very scarce. A few duck were seen on the lakes and ponds, partridge and prairie chicken were very scarce. I rate this township as second and third class for agricultural purposes. I found no actual settlers in this township at the time of survey. The north part is fairly good and suitable for mixed farming and ranching. Water is plentiful and the supply I think would be permanent. Timber for building log houses and fencing, &c., can be had in the north end of this township. The located line of railway is about eight miles to the south, and contractors are busy making the railways towards Edmonton.—*Robert W. Lendrum, D.L.S., 1904.*

Township 53.—This township is all bush with the exception of a few small pieces of prairie adjoining the north boundary of the township. The timber is black and white poplar and large willow. Windfalls are met with all through this township with a growth of small poplar and willow in them. Most of the timber found here is only fit for fuel, it being rotten in the centre. The land in this township is rolling with the exception of the north portion, where it is hilly. The principal lakes are Lake Emilien and Lake Hivon. There is a great number of sloughs and ponds. The soil is composed of black sandy loam of a depth varying from four to fifteen inches, resting on a sandy or sandy clay subsoil. The pasture is not very good in the few openings found here. I have cut a road from section 25 to section 29 and from there going close to the west outline of the township and reaching Lake Emilien on section 9. The outlet of Lake Hivon, flowing into Lake No. 1, is the only stream in township 53, range 8; this stream has an average width of six feet with a depth of two feet and a current of one and a half miles an hour. Hay marshes are found in the neighbourhood of the lakes of this township and on the north boundary of section 35. Fresh water is abundant and permanent; there are no water powers and no stone quarries, and no mineral of any description. Game is not very plentiful; a few deer and wolves, rabbits and muskrats are about all that have been seen; duck are not plentiful during the summer season. The climate is the same as in the neighbouring townships—fairly good.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 54.—This township is hilly through the northeast and south portions, and rolling in the centre and adjoining the west boundary. Some good tracts of prairie are found here and there. Thick bluffs of poplar and large willow cover nearly half of the township. The poplar varies from four to twelve inches in diameter; logs can be procured here and there to build log cabins, but most of the timber is rotten in the centre. There is a great number of sloughs, ponds and muskegs and very few hay marshes. They are found on sections 8, 9, 20, 21, 25 and 32. Hay is inferior in quality to that of the neighbouring township. The soil is a black sandy loam from four to fifteen inches deep, resting on a sandy or sandy clay subsoil. On the hills the soil is very light and sandy. Through the centre and the western part of the township stones and gravel are found in the ground at a depth of six or eight inches. Lake No. 6 and Lake No. 5 are the two principal sheets of water, close to the centre of the township and emptying into a stream running in a northwesterly direction; this stream has an average width of eight feet, and was two feet deep, at the time of the survey in October, with a current of two miles an hour. This township can be reached by passing through township 54 and 53, range 7, where the prairie seems to extend as far as Vermilion river, where there is a wagon road; or by township 55, range 7, where there is a wagon road reaching Saskatchewan river. Rabbits, muskrat, prairie wolves, a few foxes and deer are about all the game seen here, with also a few partridge and prairie chicken. Good pasture is found on nearly every tract of prairie here. Settlers will certainly succeed to a certain extent in growing oats, barley and potatoes. Summer frosts are not very frequent. There are no stone quarries or water power, and no mineral of any description has been seen.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 55.—This township can be reached by way of Saskatchewan river or by the St. Paul wagon trail crossing this township from north to south. The river can easily be forded at low water at the foot of Fort island. The hill on the south side is long and steep in many places. The surface in this township is mostly bush. Pieces of prairie of medium size are found here and there. The timber is poplar, willow and white birch, with a few spruce near the lakes and river. Saskatchewan river crosses this township from section 18 to section 36; it is bordered on each side by high hills varying from seventy feet to two hundred and twenty feet in height. The principal lakes in this township are Lake Eliza, lake No. 8, lake No. 7 and lake No. 4. Outside the hills adjoining the river the country is also hilly through sections 4, 9 and 10 and in the vicinity of Lake Eliza. The soil appears to be a light sandy loam, stony and gravelly on the heights. Hay is not very plentiful in this township. Good water is found in all the lakes and streams; it is permanent. There are no water powers nor stone quarries; and no minerals of any description have been found in this township. Muskrat, wolves and rabbits are plentiful, but I have seen very few partridge and prairie chicken. The Saskatchewan abounds in summer time with fish of different kinds. Wood for fuel can be procured on every section of this township. I was told by Messrs. Ashworth and Craven, who live in this township, that the climate is good and that summer frosts are not very frequent. Taken as a whole the greater portion of this township is more adapted for ranching than farming. Nevertheless some good farms can be found in the neighbourhood of the different lakes and close to the correction line.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 56.—The north, east and west portions of this township are thickly timbered with poplar and willow, while the centre is prairie and bluffs. The soil, though a little light, appears to be very fertile as the grass in the different pieces of prairie is long and thick, mixed up with pea vines. This township is very hilly and will prove to be a good ranching country; it is dotted with lakes, ponds and sloughs. Hay is plentiful in the different sloughs and marshes, and also near the lakes. Good water is abundant and permanent here. This township can be reached by the St. Paul wagon trail, crossing the southwest corner of the township. This road is somewhat hilly, nearly all through. The principal lakes are lake No. 1, at the northwest corner of the township, lake No 6 (both are surrounded by thick bush and windfall) and Stony lake. The largest stream is Stony creek and the outlet of lake No. 1 flowing into Stony lake. Stony creek runs into Saskatchewan river. There are no water powers nor stone quarries, and no minerals have been seen here during the progress of the work. Wood for fuel is plentiful. Prairie wolves, muskrat, rabbits, with a few partridge, is the only game seen here. Pike of good size abound in Stony lake. The climate is fairly good and summer frosts are not very plentiful.—*J. B. Saint Cyr, D.L.S., 1904.*

Township 57.—The Edmonton and Onion lake trail enters the township in section 30 and passes out at section 13. This is a very good road. The soil is first class and suitable for general farming. The west half of this township is covered with poplar up to twelve inches in diameter with clumps of similar size spruce here and there. The east half is chiefly scrub and brush. There is no hay land. The water is fresh and abundant. Dog creek enters at section 36 and passes out at section 24. This creek never dries up and is large and eight feet deep in time of flood. The land is not liable to be flooded. There are no water powers. The climate is delightful and summer frosts are rare. There is plenty of wood for fuel in the township. We found no valuable mineral. Among game animals are to be found deer, fox, moose, bear, duck and partridge.—*M. W. Hopkins, D.L.S., 1904.*

Township 58.—This township is easily reached from the St. Paul de Metis and Onion lake trail which passes just south of it. The soil is loam with clay subsoil, and is very good and suitable for general farming. The surface is covered with scrub, with clumps of poplar and small spruce. Northeast of Bently lake, however, the trees are larger and there is some good spruce up to fifteen or twenty inches diameter. There is some good hay land around lake No. 15, but not much. The water is all fresh and good. Dog creek runs across this township in a southeasterly direction. It is sometimes a small stream four feet wide and six inches deep. At others it is eight feet deep and thirty feet wide. The land is not liable to be flooded. There are no water powers. The climate is delightful and summer frosts are rare. There is plenty of wood for fuel. We saw no valuable minerals of any kind. Among game animals there are deer, moose, bear and fox. There are plenty of duck to supply food in season, also prairie chicken, partridge, geese and cranes.—*M. W. Hopkins, D.L.S., 1904.*

Range 9.

Township 22.—This township can be most easily reached from Tilley, a station on the main line of the Canadian Pacific railway. From this place a good trail leads directly to it. The soil generally on the high lands is sandy loam and clay subsoil with clay loam occurring frequently, and is best adapted to ranching. Along Red Deer river on the north side through sections 17, 18 and 19 it is very much broken with willow swamps and old river beds for ten or fifteen chains back; this part evidently being flooded at high water to the depth of two or three feet. The rest of the valley is so much broken with hills and ditches that it is impossible to drive a vehicle down the valley on either side of the river. The valley on sections 18 and 19 is one and one-half miles wide extending from the northeast corner of section 19 south to the quarter section corner on the east boundary of section 18. On the north boundary of section 8 it narrows to about one-half mile, being all on the south side of the river. Then across section 4 the valley gradually opens to three-quarters of a mile, and nearly all on the north side of the river. On the east boundary of section 3 the valley closes in again to one-half mile, with the river in the middle, and from this line the valley continues to be about the same width the rest of the way through the township. The hills on both sides of the river are about four hundred feet high; four hundred and forty was the highest read by aneroid barometer. They are always very steep and in many places become cut banks. In the ravines are found narow strips of very thorny scrub. There are no trees that can be classd as timber, excepting about ten acres of black poplar on the south end of the island on section 24. Hay is scarce, it is not in sufficient quantity to be worth locating but is only scattered over the higher prairie lands in very small patches. Besides Red Deer river there is water to be found in numerous ponds scattered over the prairie, and occasional springs in the ravines—all of which is fresh water. There are no water powers at all. The climate was warm and pleasant with no appearance of summer frosts. The settlers are depending entirely upon drift wood for fuel. I saw no indications of coal or lignite. Stone quarries might be opened on the southwest quarter of section 13 and the southeast quarter of section 17, where freestone is found. I saw no indications of any minerals of economic value in this township. Antelope are very plentiful everywhere and prairie chicken in the valley. Wild duck and geese breed along the river.—*John J. Dalton, D.T.S., 1904.*

Township 39 (north two-thirds).—This portion of this township is as a rule hilly, some of it very much so, with great numbers of small marshes and ponds and a good many small lakes or lakelets. About one-tenth of its surface as a whole is occupied by a wooded growth consisting largely of willows and small poplar bush, with here and there a small grove of poplar trees, the largest of which might perhaps reach a diameter of 12 inches at the stump. There is not a large quantity of this large timber in the township. The soil (a clay loam in general) is good and well suited to raise all ordinary farm crops grown in Canada. There are no large hay meadows, though a good deal of hay can be obtained in small patches. There are no running streams in the township, and the water found in the lakes is more or less saline and alkaline and not good to use. In most of the marshes or sloughs, however, it is soft and fit for use. I should judge that there is at all times plenty of water for every need of the settler, who purposes to engage in mixed farming. There is no likelihood of flooding that I saw. There are no places where water power could be developed. I did not see any indications of summer frosts. From what I saw I do not think that the rainfall is large. There is at present an abundance of dry poplar for fuel, lying down all through the clumps and patches of the wooded growth before mentioned. I saw no indications of coal or lignite, nor of any other economic mineral. I saw no place at which it would seem likely stone quarries might be opened. On the tops of a great many of the hills surface stones (boulders) of Laurentian origin, were observed partly imbedded in the soil. Game, rabbits, partridge and pintailed grouse were fairly abundant with great numbers of wild ducks of several kinds. Muskrats were extremely abundant in ponds and marshes. Prairie wolves (coyotes) were constantly seen, and a few deer of a kind unknown to me, but of good size. In this township a good many nice farms, fairly easy to work, despite the hilliness could be gotten but this would involve a good deal of bush and brush cleaning, and the fields would of course be small and irregular in shape. The insect pests, such as black flies, mosquitoes and bulldogs, were numerous beyond compare, and as vicious as they were numerous. Lacombe is at present the nearest and easiest place of note to this locality, and from it a wagon trail by way of Content at the mouth of Tail creek, leads across the northwest corner of the township. This trail for a good part of the way east of Content was made last year by men freighting in supplies to railway survey parties between Lacombe and Battleford.—*Fred. W. Wilkins, D.T.S., 1904.*

Township 42.—By reason of the intervention of Battle river, an almost impassable stream at all seasons, Lacombe, on the Calgary and Edmonton line, is the best place of departure from present railway lines from which to reach this township. By taking the trail due east from this place and going by way of Pleasant Valley and Content, at the mouth of Tail creek, thence east through the Swiss settlement and beyond and following the trail used in taking in supplies to railway survey parties, this year and last, past Nelson's place thence northeasterly, the vicinity of the southeast corner will be reached about twenty-five miles from Nelson's, a distance of about, by trail, one hundred and forty miles from the starting point, Lacombe. The soil in this township varies from a light sand to a most excellent clay loam on clay subsoil, the greater part of the township being clay loam. In the central part of this township is a tract of about seven thousand acres in extent, that as a general farming country is not excelled by any in the Northwest. Plenty of good water, plenty of wood, rolling land, clay loam soil, good grass, &c., &c. In fact everything the settler going in for mixed farming could desire. The balance of the township is more suited for grazing and as a range for stock. The grasses found are good, with a great deal of pea-vine and vetches in many places. About one-tenth of the township as a whole is covered with a timbered growth, the balance being grass land, and ready for the plough at any time. This timbered growth consists, for the most part of young poplar and willows. With the exception of a few large balm of Gilead and white poplar found near Battle river along the west boundary of the township the wooded growth appears to be of not more than fifteen years' existence. In a number of places I noticed large quantities of dry poplar, twelve to fifteen inches in diameter, lying down among the young growth just spoken of, evidently the work of fires about twenty years ago. From this a very fair supply of fuel of excellent quality is to be obtained at the present time. In settlement, some clearing will probably be found desirable to get fields in regular shape, and, if the present existing groves of young trees are left to grow on, and fires are kept away, in a few years time every section will produce sufficient fuel of itself for future needs. There are no large hay meadows, but ample wild hay for ordinary settlement can be cut almost everywhere. In the marshes and sloughs the water is usually good and soft, but in ponds and lakes it is saline in character. I saw no traces of any useful minerals, or of coal or lignite, nor any places where stone quarries might be opened. As to water powers, Battle river runs along the western boundary of the township and could be dammed for the purpose in many places. Near the northwest angle of the township is a place where a dam could be put in across the valley of this stream, where a head of thirty or forty feet might be had, and in this way a very considerable power might be obtained. This work would be expensive, as such a dam would be one-half mile in length probably. The flow of the river, which averages from three to six feet in depth in ordinary times and ten feet more in high water, is about four hundred cubic feet per second in the lowest stage, and at the highest is probably four thousand. The valley of this river is about one mile wide from the top of one bank to the other with a general depth of from two hundred and fifty to three hundred and thirty feet. The bottom lands along the stream are generally of little value, being of light soil as a rule, and also very swampy, with a great deal of useless willow and alder brush, and practically no large timber. Of large game, tracks of deer were often seen, as also tracks of bear. Rabbits were very plentiful, with abundance of waterfowl, such as duck, &c. Partridge and prairie chicken were fairly abundant. Of fur-bearing animals, coyotes were very numerous, and in the ponds and rivers great numbers of muskrat were seen, also along the river a number of beaver colonies were observed, one of which I estimated contained two hundred members at least. One beaver house which I saw measured twenty-five feet across, being built of logs braced against the bank, which in this place was about fifteen feet high. Pike, and pickerel (doré) are found in Battle river, and are of good size and fat as well. I saw no indications of summer frosts, and the condition of the soil indicated a good rainfall for this season at least.—*Fred W. Wilkins, D.T.S., 1904.*

Township 43.—This township is reached by a good trail from Wetaskiwin called Iron creek trail. The soil is generally good, but owing to the hilly nature of the surface, is adapted for grazing rather than grain. The surface is prairie with scrub and some fair-sized cottonwood along Battle river, some of the trees reaching 12 inches in diameter; but the trees are scattered. There is probably a thousand acres of hay in sections 16, 21 and 22. The quality is very good. The water is fresh and a sufficient and permanent supply is found in Battle river and Iron creek. Battle river averages two chains in width by four feet in depth in September, but was much deeper earlier in the season. Iron creek averages about 20 feet in width by 2 feet in depth. Neither stream exceeds two miles per hour in low water, although there are some small rapids in both. There is little apparent danger from flooding. A small water power could be developed where Iron creek runs into Battle river valley, by means of a dam. The climate is good, no summer frosts being observed. Wood is available along the river, both growing and driftwood. No coal, lignite, stone quarries or economic minerals were seen in the township. Black bear, deer, duck, geese and prairie chicken were seen in the township. The township is very hilly, except a flat in the valley of the river at the junction of Iron creek.—*C. C. Fairchild, D.L.S., 1904.*

Township 53.—The surface of this township is generally undulating. The loam varies in depth from six inches to eighteen inches on a clay or sandy clay subsoil. The land is covered for the greater part with poplar. Here and there it is partly burned, and on the burned part is a second growth of poplar or willow scrub. A chain of lakes connected by a creek runs across the township from the southeast corner to the northwest corner. The great trouble with this township is the difficulty in getting into it in a wet season. There is no trail, and the land is liable to get very soft with just a little rain. There are no minerals, no stone quarries and no water powers. Wolves are plentiful.—*A. Michaud, D.L.S., 1904.*

Township 54.—The south half of this township is undulating and is almost all first-class land; the soil is a rich black clay or sandy loam with a good clay or sandy clay subsoil. Good water is abundant, and in dry seasons will be easily obtained by digging to a depth of three to four feet. A large hay swamp covers a good portion of sections 19, 20, 17, 16, 9, 10, 11 and 12; a creek runs through it, and will afford an easy means of draining that swamp. The north half is rough and hilly, and broken by numerous ponds and muskegs. The land is also first class. The growth of pea vine is especially rich. A trail from Vermilion river just stops on the northwest quarter of section 19. There are no minerals, no stone quarries and no water powers. There are a few bear, moose and deer.—*A. Michaud, D.L.S., 1904.*

Township 55.—Saskatchewan river crosses this township, flowing from section 18 to section 13, in a deep valley from twelve to fifteen chains wide, which is entered by several ravines. The banks of the river are from two hundred and fifty to three hundred feet high. North and south of the river this township is mostly rolling, rough and hilly. Nearly the whole of this township is covered with three-inch to four-inch poplar. There are also large tracts of dead timber and windfall grown up with small poplar and willows. On the sections adjoining the river on both sides, poplar and spruce are found of a diameter of from four to twelve inches. The soil is a second class clay loam on a subsoil of clay or sandy clay. All over the township the roughness of the surface is unfavourable to agriculture. There are no water powers and no stone quarries. Gold washing on the river paid well a few years ago. Small game, such as partridge and duck are plentiful; there are also a few bear and moose.—*A. Michaud, D.L.S., 1904.*

Township 56.—The whole of this township is covered with timber from three inches to eight inches in diameter, but which is of no commercial value, though there are some scattered large spruce and poplar. There are also large tracts of dead timber and windfall, grown up with small poplar and willows. The soil is second and third class, and is in no place well adapted for farming. There are several lakes, muskegs, spruce and tamarac swamps scattered over the township. The water in the lakes, with the exception of Eliza lake, is very good. The surface of the township is mostly rolling. A good trail crosses sections 18, 7, 8, 5 and 4, a timber trail crosses sections 34, 35, 27, 26, 25 and 24, but is very rough. Fish, such as pike and pickerel are found in lake No. 1. There are no minerals, no water powers, nor stone quarries. We noticed many tracks of moose, deer and bear.—*A. Michaud, D.L.S., 1904.*

Range 10.

Township 39.—This township is best reached from Lacombe, a good town to outfit at, on the Calgary and Edmonton railway. Leaving Lacombe by the road leading due east at first, and then to south of east, and so on, but generally in an easterly direction, and passing the settlement known as Pleasant valley and on through the village of Content, at the mouth of Tail creek, and still on easterly through the Swiss settlement, and on past Sullivan lake (the lake is just visible to the south), and following Ribstone creek trail past McVittie's place on Beaverdam creek, and on past Young's place and on to Nelson & Rich's place on Nelson creek. At this place the trail forks, the main trail to Ribstone creek turning to the southeast, the other fork—being a new trail made by men freighting in supplies to railway survey parties, turning to the northeast. The township is reached in about three miles on either trail from Nelson creek, the main trail passing close to the iron corner post at the southwest angle of the township, while the fork enters about one-half way up its western boundary, the distance being about one hundred and fifteen miles from the starting point. The trail is not a good one anywhere but is passable and, of course, will constantly improve as settlement advances. The soil is excellent over the whole township, being mostly black loam and clay loam, with clay subsoil, and is in every way suitable to produce all ordinary farm crops raised in Canada. The surface of the ground in the southerly part is rolling, gradually getting into heavily rolling to hilly country in the north, and is about one-fifth covered with clumps of small poplar trees and willow bushes, the country being park-like in character. This wooded growth does not furnish anything that could be called timber, but there is a large supply of firewood, fence rails and posts, together with a considerable quantity of building logs almost everywhere. There are no large meadows in which hay could be cut in large quantities, but almost everywhere a good bit of upland hay can be had of good quality, quite sufficient for early settlement needs. At the time I was in the township, water, good water, was only too plentiful, the many hollows being full, but I believe that by the end of the summer a great deal of this water is dried up. In any event, however, I am satisfied the supply of water is sufficient both for household use and for stock, and can be taken as about one-half bad, and the other half good in quality. Battle river is the only stream in the township, and is found in the extreme northwest part passing through sections 31 and 32, near the northern boundaries. This stream is, of course, a permanent one, with a minimum discharge of about four hundred cubic feet per second, and a maximum of perhaps ten times this. The water in it is not of a bad flavour, but is bad to take, as thirst is only aggravated by its use. Tea made with it is absolutely undrinkable. As to water powers, this stream could be dammed between its banks in one place that I saw at least, and most likely in other places also, where a head of from twelve to fourteen feet might be had. Also the whole valley in which it flows (being depressed about three hundred feet below the general level) could be dammed across, and a head of almost any desired height be got up to say three hundred feet. As there are no rapids or falls of any consequence along the river there could not be many dams put in along it. The grade of the bed of the river is about five inches per one thousand feet, as near as I could roughly estimate. There is no appearance of likelihood of flooding by water of any of the land in this township. I saw no signs of summer frosts. I believe that the rainfall is light. I did not see anything to indicate beds of coal or lignite, nor did I see or discover signs of any other valuable mineral. There is an abundance of wood (poplar) for fuel everywhere in the township. I saw no place at which in my judgment stone quarries could be opened. nor for that matter anything that I could identify as useful rock at all. I did not see any large game, but I believe that deer inhabit this district. Of small game large numbers of duck were seen, and a good many prairie chicken and some partridge were observed and great numbers of rabbits were also seen hopping about in the brush. Of fur bearing animals coyotes seemed numerous, and muskrat were plentiful in every pond or marsh.—*Fred. W. Wilkins, D.T.S., 1904.*

Township 40.—From present railway communication this township, seeing that it is divided into two parts by Battle river, an almost insurmountable natural barrier to travel, may best be reached for the northerly and westerly parts from Wetaskiwin on the Calgary and Edmonton branch of the Canadian Pacific railway, the trail from which place, I am told, is good, and the distance about one hundred and twenty miles. That portion to the south and east of Battle river is best reached from Lacombe, also on the Calgary and Edmonton line, and about the same distance, as from Wetaskiwin. Going out from Lacombe by the trail leading due east, and passing the village of Content at the mouth of Tail creek and straight on due east almost, through the Swiss settlement and on past McVittie's on Beaver dam creek, and farther on to Nelson's place and from there out about ten miles following the new trail made for supplying railway survey parties at work between here and Battleford, and leading to the northeast, thence due north two miles and the vicinity of the southeast corner of the township is reached. The trail is nowhere good, but is passable. The soil throughout the township is very good, with of course some little exception, such as sandy along the river and some saline land. In general the soil is clay loam with clay subsoil, and is in every way suited for the growth of ordinary farm products, such as grain and roots, &c., grown in Canada. In the westerly part, north of the river, there is a tract of about seven thousand acres of excellent land with rolling surface, with scattered clumps of brush and young poplar and plenty of fairly good water. This is the best part of the township. In the southeast also is a tract on the south side of the river of about two thousand acres of very good land, very similar in every way to that before mentioned. The balance of the township is very much broken, very hilly and with a good deal of stony ground. About five thousand acres lie in the gorge of Battle river, which is here depressed below the general level about three hundred feet, and is so broken and inaccessible as to be of little value. There is no quantity of timber suitable for lumbering operations, but along the river there are a few nice groves of poplar and balm of Gilead trees of fair size, from which a good many building logs can be got, if a way to get them up the steep bank of the gorge can be found. There are no large hay meadows that I saw, but a good deal of hay in small patches, can be cut all over the township, the quality of which is no doubt good. As to water, that in the lakes and large ponds is bad, but in the sloughs there is an abundance, mostly soft and good. The supply of water seems permanent. The water in Battle river is drinkable, but is bad to take, increasing thirst, instead of quenching it. The only stream in the township is Battle river, with a discharge, in low water, of about four hundred cubic feet per second, and, at high water perhaps four thousand. There are no falls or rapids of any consequence found along this stream, but there are places where it could be dammed between its banks, where a head of from ten to fifteen feet might be had and, thus a nice small power be obtained. Of course dams could be put in right across its valley, say one-half to three-quarters of a mile in length, and any desired head up to three hundred feet be obtained. This would, however, cost large sums of money, but a very considerable power could be developed. As to fuel, wood, poplar principally, is the only kind I saw, and a good deal is scattered over the township in the clumps before spoken of. I saw no useful minerals nor indications of coal or lignite. As to stone quarries in sections 11, 12 and 13, something of the kind might be found. At places along the bank of the river gorge it would seem that a soft sandy and clayey rock crops out, of cretaceous age. I did not see any of it hard enough for building purposes, but fancy prospecting would find the right thing. Game was very plentiful, both large and small. We constantly saw deer of a large kind, that would dress fully two hundred and fifty pounds, and there seemed also to be a smaller kind. Rabbits were countless in the bush along the river, and duck abundant in every marsh we came to. I saw no indication of summer frosts. Would judge the rainfall o be light.—*Fred. W. Wilkins, D.T.S., 1904.*

Township 43.—Iron creek trail, usually in good condition, runs from Wetaskiwin through this township. The soil north of Iron creek is generally a good loam, suitable for grain growing, while south of the creek it is lighter and for the most part only fit for ranching. The surface is generally prairie, with some fair-sized timber in the southwest portion. Some poplar trees reaching a diameter of 12 inches are found along the south boundaries of sections 4 and 3, probably 5 acres in all. The other timber in the township is small and of little use. Hay is found along the small stream in sections 3 and 10. About 100 tons were cut here in 1904 of slough grass. There is plenty of fresh water in the creeks, but the lakes are generally alkaline. Iron creek averages 20 feet in width and 4 feet deep with a slow current. There is no danger of flooding. There is no chance for water power either by dams or otherwise. The climate is good, no summer frosts were observed. Wood is the only fuel available and may be obtained in the vicinity. There are no coal or lignite veins in the township. There are no stone quarries nor economic minerals. The only game seen were wild duck and geese.—*C. C. Fairchild, D.L.S., 1904.*

Township 44.—This township is reached by Iron creek trail from Wetaskiwin to Battle river as far as section 1, township 44, range 12, thence across Iron creek near the centre of township 44, range 11, to this township. The soil is generally good but very broken in places. The western portion is suitable for grain, but the southeast only for grazing. The west half of the township is generally open, while the east half has numerous bluffs of poplar. The timber is usually small, and will all be required for settlers. There are no good hay lands in the township. The water is fresh, but the quantity is limited, except in the broken part in the southeast. There are no streams or water powers. The climate is that of northern Alberta with no summer frosts observed. Wood sufficient for settlers is found in the township. There are no stone quarries nor minerals. Duck, chicken and one jumping deer were seen in the township.—*C. C. Fairchild, D.L.S., 1904.*

Township 53.—The surface of this township to the west of the Battleford trail, is undulating, and also sections 1 and 2, 11 and 12. The balance is rough and hilly. Bluffs of willow and poplar are scattered here and there, but they are only fit for fuel. There is no timber suitable for building houses or stables, but the settlers can get poplar for that purpose in townships 53 and 54, range 11, and in township 54, range 10. Vermilion river flows across the township, in a southeasterly direction first, and then nearly south. It is flooded every spring for four or five chains on both sides. This country can be reached from all directions by the Battleford trail, which runs nearly north and south through the centre of the township. The southern two-thirds of the township is a good second class soil well adapted for ranching and mixed farming. The northern third is more stony. The growth of grass is very rich all over the township. Good water is plentiful everywhere. There are no minerals, no stone quarries and no water powers. There is no fish and no game with the exception of prairie chicken and duck.—*A. Michaud, D.L.S., 1904.*

Township 54.—This township is mostly rolling, except a few patches of land which are level. Sections 1, 25, 36, 35, 26, 18 and 19 are rough and hilly. The land is a good second class except to the northwest, where it is sandy. A lake, three miles long and a little over one-quarter of a mile wide, crosses sections 9, 10 and 11. At both ends of it, to the east and west, is a large swamp, which will be the best of hay land when drained. A creek flows out of this lake west, into Vermilion river. The land around the lake is the best in the township and is of easy access, by good trails on the north and on the south sides. The Battleford trail crosses sections 7, 8 and 5. I had to cut a trail through sections 17, 20 and 28. It is a good trail, and is the best way if not the only one to reach that part of townships 55, ranges 9 and 10, south of the River Saskatchewan. Vermilion river crosses section 6 with a rapid of about six feet of fall in a distance of seven chains, on the northwest quarter. The ranchers on Vermilion river above the rapid think of deepening the channel of the rapid to stop the flooding of their hay lands. That would also drain the big swamp in township 54, ranges 9 and 10. There is poplar and willow scrub everywhere; but on sections 15, 16, 17, 18, 19, 20 and 21, there was at the time of the survey some good spruce and tamarac; but a sawmill worked there all the winter of 1905, and I do not know what was left. There are no minerals nor stone quarries. Small game in the way of partridge, chicken and duck are found.—*A. Michaud, D.L.S., 1904.*

Township 55.—Saskatchewan river enters section 31, runs east, then south, then east again, leaving by sections 13 and 24. The river flows in a deep valley, which is entered by several deep ravines. The banks of the river on the north side and on the southeast are about two hundred and fifty feet or three hundred feet high; the southwest half is about one hundred and fifty feet or two hundred feet high; but the whole is a perfect chaos of deep and abrupt gullies. This township is almost useless for farming, except where the soil is not disturbed on sections 30, 19, 18, 7, 6, 8, 5, 9, 4, 10, 3, 11, 2, 12 and 1, where portions fairly undulating, with a clay loam soil is to be found. There is no water power and no stone quarries. Coal was found on section 32. Small game, such as partridge and duck, is plentiful. There are also a few bear and moose.—*A. Michaud, D.L.S., 1904.*

Township 56.—The surface of this township is undulating. That portion north of sections 7 and 8, west of section 16, and north of sections 16 and 15, and west of sections 23, 26 and 35, to the west and north limits of the township is good second class land, well adapted for mixed farming and ranching. The depth of the loam is from four inches to eighteen inches on a clay subsoil. The balance of this township is a poor third class, the soil being mostly everywhere sand and stones, without any loam, and is covered by poplars of a fair size, especially to the southeast. That portion is also covered by numerous muskegs and swamps. A large spruce and tamarac swamp covers all sections 4 and 9, the west of sections 3 and 10, and the north of section 8. There are no trees larger than eight inches in diameter. A good wagon trail crosses sections 30, 19, 20, 21, 22, 23 and 13, that trail branching off St. Paul road in township 56, range 11, reaches Saskatchewan river, in township 55, range 8. There is also another trail to St. Paul across sections 32, 33, 28, 27 and 22. There is a timber trail across sections 26 and 34. I opened one also across sections 22, 15, 10 and 3 to the south limit of this township, but it is very rough. Access to this township is easy from the east, west and north by the trails mentioned above, but it is almost impossible from the south. There is no water power, no minerals nor stone quarries. Small game like partridge and duck is plentiful. There is also a lot of wolves and muskrat. Two large lakes occupy sections 36 to the north and a good portion of sections 12 and 1 to the south.—*A. Michaud, D.L.S., 1904.*

Range 11.

Township 36.—There is a portion of the western part of the township that is rolling land, and the balance undulating, with clay loam soil and clay subsoil. It is generally first class although there are spots of second class land in places. There are several hay sloughs, and deep grassy sloughs to be found. Hay is plentiful both slough-hay and upland. The township as a whole is suitable for mixed farming. There is no timber except clumps of willow. I noticed no mineral of any kind. There are a few granite and sandstone boulders. Timber for fuel can be procured some twelve miles to the north. Large game is scarce but water fowl and prairie chicken are plentiful. There is a good road to this section of the country from the Calgary and Edmonton railway along the north side of Red Deer river, via Tail creek. I noticed a light frost on July 19, but no more until the middle of September.—*A. McFee, D.L.S., 1904.*

Township 37.—This is an undulating township, with a few level sections. soil is sandy and clay loam, with very hard clay subsoil and ranks first and second class. Grassy sloughs, ponds, and small hay meadows dot the surface. There are occasional alkaline spots to be found, and a few ravines with water courses, having standing pools of water in them. The watershed is eastward. Hay is plentiful, red-top, slough, blue-joint and upland. There is no timber, only clumps of willow and small poplar, excepting a few poplar bluffs (up to six inches in diameter) on sections 19 and 20. I came across no minerals of any kind. There are a few hardhead boulders to be found in places. Timber for fuel can be procured from five to eight miles to the north. Large game is scarce, but water fowl and prairie chicken are plentiful. There is a good road into this section of the country from the Calgary and Edmonton railway along the north side of Red Deer river via Tail creek. I noticed a very light frost on July 19, but no more until September.—*A. McFee, D.L.S., 1904.*

Township 39.—This township, which is divided into two parts by Battle river, an almost impassable barrier at all times, is best reached from two points on the railway (Calgary & Edmonton line). That on the west and north side of this stream being best reached from Wetaskiwin, and that on the south and east from Lacombe, both good places to outfit at. A good trail, I am informed, exists all the way from Wetaskiwin to the northerly part of the next township to the west, from which there would be no difficulty in getting the rest of the way by keeping well up to the north boundary of that township. The trail from Lacombe by which the rest of the township may be best reached, I can speak of with certainty, having travelled over it myself. It is nowhere a good trail, but is passable, and as it gets more used will improve. Leaving Lacombe the trail, or road, leads due east at first, then a little southeast and so on keeping, generally, an easterly course, passing by way of Pleasant Valley and the village of Content at the mouth of Tail creek, and on through the Swiss settlement past McVittie's, on Beaverdam creek, and about twenty miles farther on, reaching Messrs. Nelson & Rich's place on Nelson creek in section 10 of this very township, the distance being about one hundred and ten miles by trail. The soil throughout is good, mostly clay loam, clay subsoil and is eminently suited for all ordinary crops, such as grain and roots, &c. With the exception of that lying in the valleys of Battle river and its tributaries, the surface is of a rolling or undulating character, and well drained, having a good many clumps of small poplar and willow brush scattered about, giving it a park-like appearance. About 3,500 acres of first-class farming land on the Wetaskiwin side, and about 10,500 acres on the Lacombe side of the river, comprises all of the workable land in the township, the rest being very much broken and cut up by the valleys (eroded) spoken of. There is no timber sufficient for lumbering purposes, but in many places along the river valley and ravines good building logs of poplar and balm of Gilead are to be had; a good deal, fitted for firewood and rails, is found all over the township. There are no large hay meadows in the township, but a good deal of upland hay can be cut almost anywhere, of excellent quality. Permanent surface water in ponds and marshes is fairly abundant and well distributed, and is about equally divided between good and bad. The water in the several streams found is very good, except that in Battle river, which though not bad flavoured, creates an undying thirst. As to water powers, Battle river itself can be dammed, but there are no falls or rapids of any consequence along it. By damming this stream between its banks a head of from ten to fifteen feet can be had in several places, and as the discharge is at low water about four hundred cubic feet per second, with perhaps ten times as much at high water, very nice power can thus be had. Also dams might be thrown across its valley or gorge and any desired head up to three hundred feet be had; a very considerable power could thus be created. There are also four other creeks in the township, all of which are found in deep ravines, which would permit of very high dams being thrown across them. In the case of creeks named, Corby, Nelson and Sidney, dams of great height (perhaps two hundred feet) could be got. This would impound an immense quantity of water, and, although the discharge of either of these is small, considerable power could be so got. There is a very fair supply of fuel in the way of poplar wood, found pretty well everywhere in the township, but more especially along the river valley. I did not see any places at which stone might be quarried, but I believe that good building stone (sandstone) exists along the valley of the river, and also on Nelson creek. I saw no other indications of minerals, other than some small pieces of lignite along the river, and along Nelson creek. I believe that a bed or beds of this substance exist in the township. Game is abundant, both large and small. Deer of a large kind are often seen, and their tracks are very numerous in places. The bush swarms with rabbits, and partridge and prairie chicken were plentiful and immense numbers of duck in every marsh or pond. Coyotes (prairie wolves) were numerous, and along the river some beaver were found. No indications of summer frosts were seen. The rainfall is apparently light. Two men, as partners, have fenced in with wire (a good fence) about 4,500 acres in the central part of the township as a cattle pasture, and at present have running on it about three hundred head of cattle of a very common kind. They have been in here some seven or eight years. I do not think their venture much of a success financially. They have enclosed the whole of sections 21 and 22 and parts of sections 14, 15, 16, 17, 23, 26, 27 and 28 and also a part of section 10, where their house is, and their stables and yards. The name of the concern is Nelson & Rich, Red Willow post office, Alberta.—*Fred W. Wilkins, D.T.S., 1904.*

Township 42.—The route used at present to reach this township leaves Wetaskiwin and passes through to Spring lake. From this place there is a trail leading into the township. The soil is a clay loam with a hard clay subsoil. All but the north row of sections may be cultivated, grain and hay may be grown. The surface is a rolling prairie, except the north row of sections, which is cut up by deep coulées and high hills. The soil is a hard clay with gravel in places. There are also numerous bluffs of poplar in these coulées. A shallow sheet of water, extends from the west boundary of section 18 to the centre of section 4. The outlet of this lake leaves the township in section 30. There is no timber suitable for building, but a limited quantity for fencing and considerable fuel, may be found in the north row of sections. The water supply is not permanent, except in the lakes. General climatic indications are good. No coal or lignite was observed; a limited quantity of wood will be found in the north row of sections. There are no water powers, stone quarries, or minerals of economic value. Wild fowl are abundant and a few deer were seen.—*S. B. Lucas, D.L.S., 1903.*

Township 43.—A good trail from Wetaskiwin to Battle river runs through this township. The soil is a good black loam suitable for grain growing. The surface is prairie, with some scattered clumps of scrub, particularly in the south, and some timber around the lakes. There is some good poplar and cottonwood on sections 3, 4 and 5 around the lakes, but all will be required for the settlers. Hay can be cut on the prairie in considerable quantities, but there are no hay meadows. The quality would be good. The water is fresh and a permanent supply can be obtained in the sloughs and lakes. There are no streams nor water powers. The climate is good, no summer frosts being observed. Wood is the only fuel available in the township. There are no stone quarries, no coal or lignite veins and no minerals of economic value as far as I know. Duck and prairie chicken were the only game observed. This township has an excellent location on the proposed route of the Grand Trunk Pacific and is otherwise one of the best in the locality.—*C. C. Fairchild, D.L.S., 1904.*

Township 44.—This township may be reached by Iron creek trail from Wetaskiwin, which is generally in good condition. The soil is generally black loam and suitable for grain raising or ranching. The water is fresh, with a sufficient and permanent supply. Iron creek averages 30 feet wide, 3 feet deep with a 3-mile current. There is no danger of flooding. There is no hay, except highland, which may be cut in all parts of the township. A small water power might be developed with a dam, but I would not consider it practicable. The climate is good and no summer frosts were observed. Wood is the only fuel in the township and can be obtained north of Iron creek. There is some poplar reaching 10 inches in diameter on section 33 and considerable smaller timber north of Iron creek on the west half of the township, but it will all be required for the settlers. There are no stone quarries or minerals in the township. Duck and chicken were the only game seen.—*C. C. Fairchild, D.L.S., 1904.*

Township 55.—The land in this township is mostly rolling. A belt of thick poplar averaging four inches in diameter covers sections 6, 5, 8, 9, 16, 10, 15, 22 and 14; there is spruce on sections 13, 23 and 24. On these sections there is a chain of lakes, ponds, muskegs and swamps almost impossible to wade across even on foot in summer time. The part of this township, north of the muskegs to the west, is first-class land; to the east it is second-class. That portion to the south is third-class. There is a large hay meadow on sections 19 and 20. On the whole that portion to the north of the woods and muskeg is well adapted for mixed farming and ranching. The river Saskatchewan runs across sections 31, 32, 33, 34, 35 and 36; the banks on sections 33, 34, 35 and 36 are very steep; but access to the river is very easy on sections 31 and 32. I noticed traces of coal on sections 35. I was told that washing gold paid well a few years ago. I know nothing about the present. The current of the river is about six miles an hour. There is no water power and no stone quarries. Small game, in the way of chicken, partridge and duck is plentiful.—*A. Michaud, D.L.S., 1904.*

Township 56.—This township is conveniently situated for settlement, lying immediately south of Saddle lake and St. Paul reserve, with roads made, telegraph line and post offices. Saskatchewan river just south of it with many good landings, will afford easy means of freighting supplies from Edmonton. A large lake (Lake Santé) which runs in a southwest and northeast direction, occupies the centre; pike are plentiful in it and are easy to catch. The north and northwest portion of Lake Santé will range between first and second class. The south and southeast portion is not quite so good; but the whole can be settled on. As the soil is good, it would be suitable for grain growing, and I do not believe that there would be any early frosts. There is hay, and the grazing was first class all over the township. Good water can be got everywhere by digging to a small depth. The surface is undulating, except for sections 24 and 25 and the south of sections 1, 2, 3 and 4, which are rolling. To the south of Lake Santé is poplar suitable for building shacks and stables. On section 35 there is some spruce. There is firewood enough for the settlers for a few years. I noticed traces of coal on section 2, near Saskatchewan river. Small game in the way of chicken and duck is found here. There is no alkaline water or land. There are no water powers nor stone quarries. This township is of easy access from every side.—*A. Michaud, D.L.S., 1904.*

Township 57 (Secs. 1-6).—The six sections of this township which I surveyed are good second class land, well adapted for mixed farming and ranching. There is hay and good grass on each one, but more on section 5, where there is a large hay meadow. There is no timber suitable for building log houses or stables. A trail between Saddle lake and St. Paul de Metis crosses sections 5 and 2. Another very old trail crosses section 2 in a north and south direction. Small game in the way of chicken and duck is found here. There are no minerals, water powers nor stone quarries.—*A. Michaud D.L.S., 1904.*

Township 58.—The trail from Whitefish lake forks off to Saddle lake and St. Paul de Metis in this township. This is a good trail. The soil is black loam with clay subsoil and suitable for general farming. The surface is scrubby, with considerable poplar from two inches to ten inches in diameter. There is some hay land along the east side of the township. The water is fresh and in good supply. The streams are small and the land is not liable to be flooded. There are no water powers in the township. The climate is delightful and summer frosts are rare. There is enough wood for fuel. We saw no valuable minerals of any kind. Duck are plentiful and there are some moose and deer, fox and partridge.—*M. W. Hopkins, D.L.S., 1904.*

Township 59.—The trail from Whitefish lake that forks to Saddle lake and St. Paul de Metis passes across this township. This is a good road. The soil is a black loam with clay subsoil and is of number one quality, suitable for general farming. The surface is scrubby with clumps of poplar up to twelve inches in diameter. There are some good hay lands along the trail. The water is fresh and abundant. The streams are small. The land is not liable to be flooded. There are no water powers. The climate is delightful and summer frosts are rare. There is enough timber for fuel for the settlers. We saw no valuable minerals of any kind. As to game, there is abundance of duck. There are also moose and deer.—*M. W. Hopkins, D.L.S., 1904.*

Township 60.—The Saddle lake and Whitefish lake trail passes through this township from the south boundary to the west shore of Floatingstone lake, a good road. The soil is black loam with clay subsoil and is of number one quality and suitable for general farming. The southern and western part of the township is scrubby. The northeast part is heavily timbered with from two to ten inch poplar. On the islands of lower Mann lake there is some fine spruce, but scattered. There is some hay along the trail but in small quantity. The water is fresh and abundant. The streams are small. The land is not liable to be flooded. There are no water powers. The climate is delightful and summer frosts are rare. There is enough timber for fuel for the settlers. We saw no valuable minerals of any kind. Floatingstone lake is full of good whitefish and other kinds. Duck are plentiful. There are some moose, deer and fox.—*M. W. Hopkins, D.L.S., 1904.*

Range 12.

Township 5.—This township may be reached conveniently by wagon trail from Stirling, Alberta, which follows Etzikom coulée on the south side to range 15, where it crosses the coulée and extends along the north side of the coulée to this township. This trail is in good condition. The soil is a clay loam with a subsoil of clay, producing a good growth of grass, and is especially fit for growing roots and cereals. The surface is rolling prairie. The township is cut by Etzikom coulée running from west to east near the centre line of the township. The soil in the coulée and on its banks is principally clay and loose rock. There are signs of coal in this coulée, there being narrow flat veins cropping out on either side of the coulée. It is an inferior product near the surface, but increases in quality with the depth. The coal is soft and crumbles when exposed to the atmosphere. Etzikom coulée is about one-half mile wide and is over one hundred feet deep. It has water enough in it for watering stock. There are some small springs of saleratus water here. The coulée furnishes shelter for cattle, protecting them from the winds that prevail in this section. There is no timber in this township. The grass is almost large enough for hay this dry season, so in wet seasons must produce an abundance of hay. The only water is in Etzikom coulée and there is not a continuous stream there. The surface is not liable to be flooded. There is no water power. The climate is mild and very dry. It is tempered by the Chinook winds. Summer frosts are seldom seen. The only fuel is coal, most of which is brought from Lethbridge, Alberta. There are no stone quarries and no minerals. We saw a few antelope in this township.—*R. J. Gordon, D.L.S., 1904.*

Township 6.—The best route for reaching this township is by trail from Stirling, Alberta, which runs parallel with Etzikom coulée, as far as township five, range 12; thence across the prairie to township six, range 12. The trail from Stirling is a good one. The soil is a clay loam with a clay subsoil. It produces good grass and is suitable for producing roots and cereals. The surface is rolling and undulating prairie. Chin coulée runs from west to east across the northerly part of this township. This coulée is from one-half mile to one mile wide and about two hundred feet deep. The soil in this coulée is clay saturated with saleratus and produces a few weeds and a little short grass. There are a few small saleratus springs in Chin coulee. There is no timber on the township. A prairie fire had burned all of the grass in this township a few weeks before we reached it, but judging this township by the one just south of it, I concluded that good grass is produced here, and that hay is plentiful in wet seasons. The only water on the township is furnished by two or three alkali springs in Chin coulée. The supply is not sufficient. There are no streams, lakes or ponds and the surface is not liable to be flooded. There are no water powers. The climate is mild and very dry. It is subject to sudden changes of temperature in winter, as the Chinook winds prevail here. They keep the snow melted sufficiently that cattle may graze the year round. Summer frosts are few in this locality. Coal may be obtained at Lethbridge, Alberta. There are no coal or lignite veins in the township. There are no stone quarries, no minerals were seen. We saw a few antelope on this township.—*R. J. Gordon, D.L.S., 1904.*

Townships 7 and 8 (east outlines).—These outlines run through an open, undulating prairie country. There is no timber and no water outside of the coulées. We were obliged to carry water for man and beast. The soil is a clay loam with a clay subsoil. There was no grass on or near these outlines, as a prairie fire had recently passed over this section of country. The indications were, however, that good prairie grasses grow here. In wet seasons good crops of cereals and roots may be produced; but it is an unsafe place for a farmer to locate on account of drought, to which the country is subject. Stock raising is carried on successfully as animals travel several miles to the coulées for water. There are no coal or lignite veins here and no minerals or stone quarries. The climate is mild and very dry. The Chinook winds temper the atmosphere and make it possible for animals to run at large the year round. Summer frosts are not common. The only game is antelope.—*R. J. Gordon, D.L.S., 1904.*

Township 36.—This is a high rolling township, with a number of grassy sloughs, gravelly ridges and alkaline spots on the flats. The soil is sandy and clay loam with hard clay and gravel subsoil, and is generally second class, although about one-third of the township is first class. There is a creek near the south boundary which runs eastward at high water, but at its normal condition has only standing pools of water. There is no timber, only clumps of willow and poplar in places. I discovered no minerals, or quarries, but a portion of the township is rather stony, both loose and sunken granite and sandstone boulders. Timber for fuel can be procured about ten miles to the north. Large game is scarce, but waterfowl and prairie chicken are plentiful. There is a good road from the Calgary and Edmonton railway via Tail creek to this part of the country. In very dry seasons I would judge there would be a scarcity of water, but as a whole the township is suitable for ranching and light farming. There is quite a quantity of slough and upland hay in all parts of the township.—*A. McFee, D.L.S., 1904.*

Township 37.—This township is high, dry and undulating, with a few grassy sloughs, and some ravines with water courses, running eastward in high water but dry in the summer. There is one of these ravines with a number of tributaries which runs across the township from west to east, about two miles south of its north boundary. The soil is sandy and clay loam, with hard clay subsoil; mostly second class. The soil is gravelly on top of the ridges. There is some alkaline spots in the low places. There is a small lake of fresh water on sections 14 and 15. There is no timber only scattered clumps of willow and small poplar. I noticed no minerals. There are a few scattered sandstone and granite boulders. Timber for fuel can be procured about five or six miles to the north. Large game is scarce, but water fowl and prairie chicken are plentiful. There is a good road to this part of the country, from the Calgary and Edmonton railway along the north side of Red Deer river via Tail creek. There is abundance of upland hay, but no large meadows. In very dry seasons surface water would be scarce. I consider the township as a whole suitable for ranching or mixed farming. I noticed a very light frost on July 19, but did not see any more until September.—*A. McFee, D.L.S., 1904.*

Township 39.—This township is divided into two main parts by Battle river, which are practically inaccessible one from the other. This stream crosses this township from section 30 to section 1, cutting it into southwest (one-third) and northeast (two-thirds) parts. That belonging to the northeast part will be best reached from Wetaskiwin on the Calgary and Edmonton line, from which place, I am told, a good trail exists right into the township. The southwest part is best reached from Lacombe, from which point (also on Calgary and Edmonton railway line) a passable trail leads due east practically, by way of the valley of Content and on through the Swiss settlement and on until McVittie's place (section 2, township 38, range 14) on Beaverdam creek is reached. From this point, according as it is desired to reach the easterly or westerly part of the township a different way must be taken, the distance not being great, and easily made in one day with heavy loads. The soil (clay loam on clay subsoil mostly) with little exception, is excellent throughout the whole of the township, and in every way suited for agriculture. As to the surface of the land, that that is not cut up and washed out in the almost numberless gullies, ravines, gorges, &c., which exist almost all over the township, is of a rolling character, in admirable shape for farming. Battle river flows along in a gorge or valley from about two hundred and fifty to three hundred and fifty feet below the general level of the country, and Beaverdam creek is in much the same environment. Corby creek also runs in a large deep ravine. About one-half of the township is fairly accessible for farming purposes, the other half is best suited for a range for stock, the grass being good as a rule, and water plentiful. There is in this township a considerable quantity of very fine and valuable timber. Along Beaverdam creek, in sections 3, 4 and 5 are groves of some of the finest spruce I ever saw, many trees measuring thirty inches or more on the stumps and tall in proportion. Because of the inaccessible nature of the valley or gorge of this stream, I could not make, without spending a good deal of time, anything like a close estimate of the quantity, but there is at least 1,500.000 feet, board measure, of this beautiful spruce, besides a very considerable quantity of very fine white poplar and balm of Gilead, of good sound quality large and long. The spruce is of a kind that I am not acquainted with, is very white, and from the way it chops, will work almost as well and easily as white pine. There is not much valuable timber along Battle river, but in the very deep coulées and ravines which run into its valley in the eastern part of the township and those running into and forming Corby creek, some very fine poplar, balm of Gilead and white birch timber grows—any amount in fact for building logs for the whole settlement of the townships. The quality of the timber of the white birch is excellent, being almost as strong as rock elm, making splendid axe-helves and whiffle-trees. In sections 20, 29, 30, 31 and 32 is a considerable quantity of very level land of a swampy character. A great deal of fine low-land hay grows here, probably one thousand tons could be got in this tract in a favourable season. The quality is excellent. A good deal of upland hay can be cut almost anywhere in the township; and in the bottoms of the long coulées running into Corby creek in the east, large quantities of a coarse marsh hay can be obtained. The water found in the township is generally of a saline or alkaline character and mostly bad. That found in Corby creek and in the Beaverdam, is good, and in the many coulées some springs of good water are found. Battle river furnishes poor water, owing, I believe, to the many saline springs found along its valley. I should be inclined to think that borings made here would show beds of salt to exist in this locality. There are no falls or rapids of any consequence on any of the streams found in the township, and therefore no easily developed powers could be had from water. I saw several places along Battle river and along Beaverdam creek that could be dammed fairly easily so as to give a head of from ten to twelve feet perhaps, but this would not give a large power in either case. The flow of the Battle is at low stage about four hundred cubic feet per second, and about ten times this in very high stages. In Beaverdam creek the flow is perhaps one-tenth of this, and in Corby creek one-twentieth would be about its discharge. Dams of great height could, however, be erected across the valleys of these streams, and considerable power obtained thereby, but this would be costly work, except perhaps in the case of the Beaverdam, which flowing as it does in a deep narrow gorge cut through sandstone rock. could be dammed at a reasonable cost. A head of almost two hundred feet could by this be had on any of the above streams. Wood is the only available fuel, procured mostly along the valleys of the river and creeks, and ravines leading thereto. A few scattered clumps of small poplar are found over the level part of the township, but the supply from this source is small. A large supply is procurable in the valleys spoken of. Along Beaverdam creek in sections 3, 4 and 5 are places at which I would judge quarries of sandstone (buff coloured rock) could be opened up, the stripping light and the quality, I believe, good. Also I noticed sandstone rock of the same colour in sections 19 and 30 along Battle river valley. I noticed some brown shales in the valley of Beaverdam creek on section 5, and, I also saw pieces of float coal or lignite along Battle river. It is probable that beds of lignite exist in this locality. Of other useful minerals, except as before noticed about salt, I did not see any indications. No large game was seen, but rabbits exist in immense numbers in the bush along the river banks, and in the ponds and marshes are great numbers of duck. Prairie chicken and partridge were fairly abundant also. Of fur-bearing animals, coyotes were numerous, and muskrat countless in the streams and marshes. A man named Corby (not at home when I was in the township) has about eight thousand acres of the easterly part fenced in as a horse pasture and about two hundred head of horses running therein. I saw no signs of summer frosts. The rainfall is evidently light, as cacti were seen in the river valley.—*Fred W. Wilkins, D.T.S., 1904.*

Township 42.—This township will be most easily reached from Wetaskiwin, via Heatherbrae, and Spring lake, thence to the ranch of Messrs. Duggan & Co., thence across country into the township. The soil is a sandy loam in the two north rows of sections, and a heavy clay loam in the rest of the township; the subsoil is clay. Grain and roots will grow well in the north part of the township, and grain in the south part, but the central part of the township contains a good deal of low land that will require draining in wet seasons. The surface of the township is rolling prairie, high in the north and south, but low in the central part. A creek of from four to six feet in width crosses the centre of the township, coming from the west. A few bluffs of small poplar are met with in the north part of the township. The rest of the township is dotted with sloughs having a fringe of willows about them. There is no timber fit for building or fencing in the township. The growth of hay is luxuriant on the high land.

The water supply is not permanent. General climatic indications are good. There are no water powers, no coal or lignite, no stone quarries, and no minerals of economic value were seen. There is little or no wood to be had. Wild fowl are abundant.—*S. B. Lucas, D.L.S., 1903.*

Township 43.—The route used at the present time to this township, is from Wetaskiwin, going east and southeast to the head of Iron creek thence across country into the township. From Wetaskiwin to Iron creek a fairly good trail exists. The soil in this township is a sandy loam in the north half and a clay loam in the south half, and is suitable for the growth of grain and roots. The surface of the township is a rolling prairie. The sloughs are not numerous, but there are a greater number of poplar and willow bluffs than in the adjoining townships. There is no timber for building purposes, but there is considerable fencing timber, and fuel, in the bluffs. The upland grass is rank and will yield great quantities of hay of good quality. The supply of water is not permanent. There are no water powers. The general indications of the climate are good; light summer frosts were observed. No coal or lignite was observed, but the numerous bluffs of poplar and willow will supply fuel for some time. There are no stone quarries. Wild fowl were seen in abundance. No minerals were observed.—*S. B. Lucas, D.L.S., 1905.*

Township 44.—Iron creek trail from Wetaskiwin to Battle river passes through this township. It is in good condition. The soil on the north side of Iron creek is black loam, suitable for grain growing. On the south side of the creek the west part is low, suitable for hay and pasture, while the east part is suitable for grain. The surface is prairie with small patches of four-inch poplar and scrub north of Iron creek, but very little south of the creek. No timber suitable for building was seen. The southwest part of the township has about one thousand acres of good hay lands, the grass being the ordinary marsh grass. Iron creek runs through the township and the lakes shown are generally of good water. Iron creek was about two chains wide and six feet deep, with slow current, at the time of survey, and the banks marshy. These marshes are liable to flood in high water. No water power can be developed either with or without dams. The climate is that of the Edmonton district. No summer frosts were observed. Wood and lignite can be obtained to the north and northwest of the township. There are no stone quarries nor minerals in the township. Geese, duck, and chicken were the only game seen.—*C. C. Fairchild, D.L.S., 1904.*

Township 56.—From Saddle Lake agency a good trail crosses the township from section 34 to section 3. A spruce swamp of about twenty chains in width follows on a terrace on each side of the Saskatchewan. On the west side of the river the soil is light and sandy and rather poor for agricultural purposes, but on the east side of the river the soil is a rich black loam over a clay subsoil and is suitable for wheat raising and other kinds of farming. The west side of the river is thickly wooded with poplar and cottonwood and some spruce, except on sections 5 and 6, where it is more of a scrubby nature, and is broken by hills of about one hundred and fifty feet high. On the east side the country is open, rolling prairie with bluffs of young poplar and willows, except for the belt of spruce along the river. In the valley of the river there are patches of spruce from six to twelve inches in diameter, but the spruce of commercial value seems to have been cut several years ago. There are no hay meadows of any size in the township. The water is fresh and is found in the Saskatchewan, which flows through sections 33, 28, 29, 20, 17, 8, 5 and 4, also in a permanent lake in sections 13 and 14. The land is not liable to be flooded. There is no waterfall or any available water power. The climate is good, and there are no indications of summer frosts. Wood for fuel can be obtained in the hills adjoining the river. No coal has been discovered in the township. There are no stone quarries. No minerals of any value have been discovered in the township. Duck and chicken are the only game to be found.—*J. L. Côté, D.L.S., 1904.*

Range 13.

Township 4.—The best route for reaching this township is by wagon trail along the south side of Etzikom coulée from Stirling to the township considered. The road is a good one. The soil is a clay loam with a subsoil of clay. It produces good grass and is suitable for the growing of roots and cereals. The surface is rolling prairie. There is no timber. On account of drought the grass is too short for hay making. There is no water on this township, neither stream, lake, pond or slough and the surface is not liable to be flooded. There is no water power. The climate is mild, being tempered by the Chinook winds. The days are hot and the nights cool, in summer. There is enough rain and snow to produce good grass for grazing purposes. Cattle run at large the year round as the snow does not fall deep enough to cover the feed. Summer frosts are unusual. There is plenty of coal at Lethbridge and some in Etzikom coulée nearby. There are no coal or lignite veins in the township, no stone quarries and no minerals. Antelope is the only game.—*R. J. Gordon, D.L.S., 1904.*

Township 5.—There is a good trail from Stirling, Alberta, which follows the south side of Etzikom coulée to this township. The soil here is a clay loam with a clay subsoil. It produces good grass and is suitable for growing roots and cereals. Part of this township is too rolling for farming, but it is good for grazing purposes. The surface is open prairie with no timber of any kind. Etzikom coulée cuts through the south end of the township from west to east and forms the basin of Crow Indian lake. The only hay is obtained from the prairie grasses which, on account of drought are too short for hay making this season. Crow Indian lake is a permanent body of fresh water on the shores of which good wells may be dug. Several thousand animals drink at this lake daily. There are no streams except in flood time when water runs in Etzikom coulée. The surface is not liable to be flooded. There are no water powers. The climate is mild and very dry. Drought sometimes visits this section destroying crops to a considerable extent. The Chinook winds temper the climate, melt the snow and make it possible for cattle to graze the year round. There is a vein of coal in sections 11 and 12 in Etzikom coulée. It is a flat vein about two feet thick and fifteen feet below the surface, where the pit is shown in notes. The quality of this coal is inferior, being very soft, and it crumbles when exposed to the atmosphere. Most of the fuel is obtained at Lethbridge, Alberta, where coal mines are operated. There are no stone quarries, and no minerals were seen. Duck and geese are plentiful on Crow Indian lake. There are a few antelope in this township.—*R. J. Gordon, D.L.S., 1904.*

Township 36.—The land is undulating and rolling prairie, with a number of ponds and grassy sloughs, some of them fringed with willow. The soil is black and clay loam, with hard clay subsoil; classes 1 and 2. There are three small fresh water lakes in the township; one in section 31, with banks only from two to three feet high, surrounded by a fine meadow of blue-joint hay; the other two lie in sections 8 and 9, and 4 and 5; the banks of both are low. I found no minerals or quarries. Sandstone and granite boulders are scattered more or less all over the township. They are very thick in sections 7, 8, 10, 11, 14 and 15. There is no timber, only a few scattered clumps of willow. I consider this township very good for mixed farming and stock raising, as there is an abundance of slough grass, blue joint and upland hay. There is both wood and coal about ten miles to the north. Large game is scarce, but waterfowl and prairie chicken are plentiful. There is a good road from the Calgary and Edmonton railway along the north side of Red Deer river via Tail creek to this part of the country. I noticed a very light frost on July 19 this season; which was the only frost noticed until September.—*A. McFee, D.L.S., 1904.*

Township 43.—The route used at present to reach this township is from Wetaskiwin going east and southeast to the head of Iron creek, thence across country into the township. The road from Wetaskiwin to Iron creek is good. The soil is a clay loam from six to twelve inches deep, with a subsoil of clay, and is well adapted for the growth of grain and roots. The surface of the township is a rolling prairie, having numerous sloughs and small bluffs of willow and small poplar scattered over it. There is no timber suitable for building purposes and very little fit for fencing. Poplar and willow will supply fuel for a number of years. Hay may be had in abundance in wet years on the uplands and in dry seasons the sloughs will yield considerable. The water supply will be good in wet years only. General climate indications are favourable; light summer frosts were observed. No water powers, stone quarries, coal or lignite, or minerals of economic value were observed. Deer are scarce, wild fowl are abundant. The township is well adapted for grazing or grain growing.—*S. B. Lucas, D.L.S., 1903.*

Township 44.—This township lies on Iron Creek trail, from Wetaskiwin to Battle river. The trail is in good condition. The west part and south third of the township is of good deep clay loam generally, while the east central part is generally stony and marshy, with the extreme east light and somewhat stony. The west half and south third is suitable for grain raising, while the balance is suitable for stock raising. The surface is prairie, with a few bunches of scrub in the west part. There is no timber. Hay can be cut on the west part of the township and in many of the sloughs in the east part. It is of good quality and in considerable quantities. The water is generally fresh, but some of the sloughs are quite alkaline. There is always more or less water in the small streams, and Iron creek at its lowest is 12 to 15 feet wide, 1 foot deep and flows with a strong current. It sometimes overflows its banks, but only where the country is wet and unfit for cultivation. The creek is not suitable for water power. The climate is that of the Edmonton district and not much liable to summer frosts. Wood and coal (lignite) are the available fuels, and either must be obtained without the township. Wood is found both north, west and south, and coal up the creek a few miles. There are no stone quarries or minerals in the township. Water fowl and prairie chicken were the only kinds of game observed.—*C. C. Fairchild, D.L.S., 1904.*

Township 56.—The route for reaching the township is as follows: Starting from Paradis crossing, which is on the main trail from Edmonton to Saddle lake, and in section 1, township 57, range 14, a fairly good trail runs in a southeasterly direction to section 30 of township 56, range 13, and thence in a southerly direction to section 7, from section 7 the trail runs in a southeasterly direction; this trail has been built by the Russian settlers for their own convenience. The soil is generally of a sandy and stony nature over a sandy subsoil; the tier of sections adjoining the west and south boundaries of the township is suitable for mixed farming; the rest of the township is badly broken by lakes, swamps and hills covered with a thick growth of poplar, cottonwood and willow and only patches here and there are suitable for agricultural purposes. The surface is generally of a rolling or hilly nature. The sections adjoining the west and south boundaries of the township are covered with heavy willow scrub and young poplar, with occasional patches of open prairie, whilst the remaining sections are covered with thick poplar, cottonwood and willow woods, with some spruce around the lakes. No timber of any commercial value was seen. There is no hay meadow of any extent. The water is fresh and is found in three permanent lakes, besides numerous ponds and marshes. Sandy lake covers most of sections 21 and 28 and part of section 27, and its outlet, which follows the east boundary of section 32, is six feet wide and eighteen inches deep, with a current of four miles an hour. A second lake is situated in sections 12, 13 and 14, and a third in sections 3 and 10. The land is not likely to be flooded. There is no waterfall nor any available water power. The climate is good and there are no indications of summer frosts; the grain of the squatters had a good appearance. Wood for fuel can be obtained on every section, but no coal or lignite veins have been discovered. There are no stone quarries. No minerals of any value have been discovered. The following game is to be found: chicken and duck and some deer and bear.—*J. L. Côte D.L.S., 1904.*

Township 57.—There is a wagon road and telegraph line from Victoria to Saddle lake, which enters this township on the north boundary of section 31, to which point it is about twenty-six miles from Victoria, or one hundred and one from Edmonton. In view of the fact that this road is the only means of communication with the centres of distribution for a large district, it is not in anything like a satisfactory condition, it being apparently no one's business to see that it is kept in repairs; for instance, a small forty-foot span bridge across Whitemud river, which was washed out by the spring freshet on April 14 of this year, was not replaced by the 30th day of May, and for all I know to the contrary, may not be replaced yet. On the south side of the river there is a wagon trail between the current ferry, operated by the government, at the north-east corner of section 10, and Andrews; this is nothing more than a cart trail swamped through the bush. Saskatchewan river itself affords the best means of reaching this township or of bringing supplies to it, from Edmonton or Fort Saskatchewan, the river being navigable for the entire distance for light draft scows or boats. The soil consists of a varying thickness of black loam overlying a clay subsoil, for the most part, although it is sandy in places. The surface of that part of the township to the north of Saskatchewan river is steeply rolling, and the greater part of it is covered with bush although there are some fairly open tracts of land scattered all through it; owing to the irregularity of the surface, this land is more fit for grazing than for mixed farming. The surface of that part of the township to the south of the river consists of a high rolling plateau, almost entirely covered with thick poplar woods. There is some fair sized spruce timber along the left bank of Saskatchewan river in sections 7 and 18, although the best of it was taken out last winter by a party of hand loggers, while sections 30 and 31 contain about 450 acres of jackpine, which, however, is too irregular in its growth to be good for sawmill purposes. The rest of the township is all more or less covered with poplar, suitable to the needs of settlers, for building houses and fences. There are no hay meadows in this township, but, wherever the surface is open, or partly open, there is a good growth of hay. There is excellent feed for loose stock all over that part of the township to the north of the river. Saskatchewan river, which flows through this township, has an average width of 800 feet, and, at ordinary stages of the water, an average depth of three and one-half feet and current of three miles per hour; the channel is clear and unobstructed, but Crooked rapids, which are situated opposite traverse station No. 11 on the left bank of the river, in section 7, must make navigation difficult at low stages of the water. The rapids are caused by a lot of big boulders in the channel at that point, with probably, a high reef of bed rock at its upstream end. There are no permanent creeks of any size in this township, but it is abundantly watered by lakes and sloughs. All the water in this township seems to be fresh, and there is no liability to flood. There are no available facilities for the generation of water power in this township. This part of the country is, at the present time, liable to summer frosts, but it seems certain that, as the land is cleared, drained and ploughed, this liability will steadily decrease, until, in a few years time, it will have ceased to exist altogether. I know of no coal in this township, but there is abundance of wood fued available for many years to come. I know of no stone fit for quarrying in this township. I know of no minerals in this township. Owing to the proximity of Saddle Lake Indian reserve, there is very little game of any kind to be found in this township.—*R. W. Cautley, D.L.S., 1904.*

Township 58.—There is a wagon road and telegraph line from Edmonton to Saddle lake, which passes through the southwest corner of section 6, in this township. It is about 100 miles from Edmonton to the west boundary of said section. This road is in fairly good condition from Edmonton to Wostock, a distance of 51 miles, but so bad as to be almost impassable with a loaded wagon, in many places from Wostock to Pakan, a distance of 24 miles, then fairly good from Pakan for about 20 miles towards Saddle lake, and very bad again for the remaining 5 miles. The soil consists of a varying thickness of black loam on clay and sometimes gravel subsoil, while the surface is gently rolling, except in the southeasterly corner of the township, where it is a good deal broken up into low, but steep hills and wet marshy valleys. The westerly 4 tiers of sections are, for the most part, densely covered with poplar, willow and scrub, while the two easterly tiers of sections are much more open. Sections 36 and 35 comprise the best looking land I have seen in the whole season's work, gently undulating prairie, alternating with clumps of poplar and willow bush, and sloping easily towards Stony creek. There is a good deal of fair-sized poplar in the 4 westerly tiers of sections, but not much spruce and jackpine; the poplar is suitable for building houses, stables and fences. Good hay grows on the open hillsides in 2 easter- tiers of sections, and there are numerous hay sloughs all over the township, which yield very coarse grass at the present time, but which, in most cases, could be improved into first-class hay lands by a little draining. Stony creek passes the northeasterly corner of this township, flowing through a very pretty lake in section 25; it has an average width of 40 feet, depth of 3 feet and current of 2 miles an hour. There are several lakes, besides numerous sloughs, marshes and ponds scattered over this township, all of which contain fresh water. Before finishing my survey, all the lakes, hay sloughs, marshes, &c., were 2 or 3 feet deeper than I should have believed possible, but this spring flood does not affect much surface, although it has the effect of giving depressions which would be dry in a dry season all the appearance of small lakes. There are no falls or rapids available for the generation of power in this township. This section of the country is, at the present time, liable to summer frosts, but there seems to be no doubt that, as the surface is cleared, drained and ploughed, this liability will steadily decrease, until it finally ceases to exist altogether. I know of no coal in this township. There is any amount of wood fuel available for many years to come. I know of no stone or minerals in this township. Several tracks of moose, bear and deer were seen in the township. There are numbers of waterfowl in all the lakes, and grouse in the woods. Jackfish of a considerable size were seen in the lake on section 25 and smaller ones in the lake on section 28. There were not, at the time of the survey, any settlers in this township, but, before I left several Russian land seekers were seen.—*R. W. Cautley, D.L.S., 1904.*

Range 14.

Township 3.—The best route for reaching this township is by the wagon trail, which follows the south side of Etzikom coulée as far as township 5, range 15, thence southeasterly across the prairie to the township under consideration. The soil is a light clay loam with a subsoil of clay, producing a good growth of prairie grasses, and is well suited to the production of roots and cereals. The surface is open prairie, has no timber of any kind, and on account of the drought this season, the grass is too short for hay making; but in wet seasons hay may be cut from any part of the township. Bunch grass is the quality that makes hay here. There is no water on this township, neither spring, stream, lake pond or slough of any kind. The surface is not liable to be flooded. The Alberta Railway and Irrigation Company has made surveys in this township for the purpose of constructing canals, and in a short time water in abundance will be available. There is no water power whatever. The climate is mild and very dry. The temperature changes very quickly. The Chinook winds keep the snow from lying deep, and consequently the summers are long and the winters short. Summer frosts are very rare in this locality. Coal is the only fuel at hand. There is abundance at Lethbridge, Alberta. There are no coal or lignite veins in the township. There are no stone quarries and no minerals. Antelope are to be found in a limited number.—*R. J. Gordon, D.L.S., 1904.*

Township 4.—There is a good wagon trail on the south side of Etzikom coulée from Stirling to township 4, range 14, west of the fourth meridian. The soil is clay loam, with a subsoil of clay, producing a good growth of grass and is well adapted to the raising of roots and cereals. The surface is rolling prairie, having no timber of any kind. Because there is no water of any kind, there is no hay produced; but the Alberta Railway and Irrigation Company have made surveys in this township for the purpose of building canals and it is only a matter of time till there will be water and hay in abundance. There is no water power. as there is not a drop of water on the township. The surface is not liable to be flooded. The climate is mild and very dry. Chinook winds keep the snow away; cattle graze the year round. There are no summer frosts. There is plenty of coal at Lethbridge. There are no coal or lignite veins in the township, no stone quarries and no minerals. A few antelope are the only game.—*R. J. Gordon, D.L.S., 1904.*

Township 36.—The land is mostly undulating prairie, with some ponds and grassy sloughs, with occasional alkaline spots. The soil is nearly all first class; clay loam and hard clay subsoil. The eastern arm of Sullivan lake covers the central portion of the south half of the township with bad clay-coloured, muddy, alkaline water. There is a fresh water lake lying in sections 32, 33, 28 and 29, with low banks on its west side, and from ten to twelve feet high on its east side, and a creek flowing out of its southeast corner into Sullivan lake and there is another small fresh water lake lying in sections 11 and 14. This township is suitable in every way for mixed farming. There is plenty of hay both slough grass and blue point. Outside of a few bluffs of small poplar in the southwest corner of the township there is no timber, only scattered clumps of willow. I found no minerals or stone. There is timber suitable for fencing or fuel, and coal is found about eight miles to the north and another coal seam in township 37, range 15, on the north arm of Sullivan lake. There is a good trail from the Calgary and Edmonton railway that runs along the north side of Red Reer river, via Tail creek to this section of the country. Large game is scarce, but there is plenty of waterfowl and prairie chicken. The first frost that I noticed this season was on July 19, which was very light.—*A. McFee, D.L.S., 1904.*

Township 43.—The route used at present to reach this township is from Wetaskiwin. The estimated distance is eighty miles, over a fairly good road, which is being improved yearly. The soil is a clay loam of from six to twelve inches, with a subsoil of clay. suitable for growing grain and roots. The surface is rolling prairie thickly dotted with small sloughs, nearly all surrounded by a thick growth of small willow and poplar. There is no wood suitable for building timber, and not much for fencing. Hay may be cut in nearly all the sloughs in dry seasons, and in wet years considerable may be cut on the uplands of better quality. The water in these sloughs is good, but will only be available in wet seasons. A running stream of good water crosses the township near the centre, from west to east. This stream is from ten to twenty feet wide, and from one to four feet deep; the current is sluggish and does not overflow. There are no water powers. Summer frosts were observed, but they were light. Wild fruits were plentiful. Fuel is scarce, only small poplar and willow. No indications of coal or lignite or mineral of any kind were seen, and no stone quarries. All kinds of wild fowl are abundant.—*S. B. Lucas, D.L.S., 1903.*

Township 44.—This township lies on the trail from Wetaskiwin to Battle river called Iron creek trail. The soil is a deep. rich black loam suitable for grain raising. The surface is prairie, with small bluffs of poplar averaging four inches in diameter and with numerous small willow sloughs. Probably ninety per cent of the surface is prairie. Hay can be cut on almost any part of the open prairie of good quality and quantity. The water is fresh, but the supply of surface water is liable to run short in a dry season. The small streams shown have water in places all the year around, but do not run, and at no time are they liable to flood the land. There are no water powers. The climate is that of the Edmonton district with very few summer frosts, if any. Wood is the fuel obtainable in the township, but lignite coal is procured along Iron creek to the north of the township, but there are no indications of any coal in the township. There is no stone in the township. There are no minerals in the township. The only game seen in the township were duck and geese, with an occasional prairie chicken. This township is one of the best I have seen in the district east of Wetaskiwin.—*C. C. Fairchild, D.L.S., 1904.*

Township 58.—*R. W. Cautley, D.L.S.*

No report received for this township.

Township 59.—The trail from Victoria to Lac LaBiche enters this township on section 6 and leaves it on section 24, and is in a fair condition. The soil is generally of a sandy stony clay, though in some places sand prevails, and the whole township is covered with two or three inches of black loam; it may be rated as second class and is suitable for mixed farming. The southern and eastern portions are generally rolling, while the northwest portion is undulating. It is all covered with poplar of from two to eight inches in diameter, with willows and a few bluffs of jackpine. Stony creek is about twenty links wide and one foot deep, the current is about two miles per hour. This creek enters the township on section 34 to leave it on section 13, where it forms into muskegs. There are permanent lakes on sections 1, 2 and 8 with fresh water. No summer frost was observed. There is no lignite and no stone quarries. Two iron claims are surveyed on section 6. No game was seen.—*J. L. Côté, D.L.S., 1904.*

Township 60.—The nearest trail to this township is the Victoria to Lac LaBiche trail, which runs from section 6 to section 24, in township 59, range 14, and approaches to within two and one-half miles of the southeast corner of the township. There are no trails running through the township and I had to cut wagon trails to move from one camp to another. A large area of this township is covered with spruce and tamarac swamps and muskegs and Stony creek is entirely lost in them. Fair land is found on sections 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 24, although it is stony and would not be very suitable for agricultural purposes unless the swamps and muskegs were drained by deepening the channel of Stony creek. The township is covered with scrubby spruce and tamarac, except on the above mentioned sections, where there is poplar and cottonwood averaging from three to eight inches in diameter. There is no hay. The water is fresh and is to be found in all the swamps and muskegs and also in three permanent lakes in sections 8, 10 and 11. There is no water power. The climate is good, but probably liable to summer frosts owing to the presence of so much muskeg. Wood for fuel can be procured on every section. There have been no coal veins discovered in the township. There are no stone quarries. No minerals of value have been discovered in the township. The game consists of some deer and moose.—*J. L. Côté, D.L.S., 1904.*

Range 15.

Township 3.—The best route for reaching this township is along the Alberta Railway and Coal Company's railway as far as Brunton station, thence easterly across the prairie to the township. The road is not a good one. The soil is a light clay loam with a subsoil of clay. It produces a good growth of grass and is well suited to the production of roots and cereals. The surface is rolling prairie. Verdigris coulée extends from northwest to southeast through the township. The soil in this coulée is clay and gumbo upon which weeds and a little grass grow. This coulée is one-half mile wide and has many branch coulées which make the surface near the coulée too rough for anything but grazing purposes. There is no timber in this township. There was no hay produced on account of the drought prevailing in this section of the country. The only water in this township is Verdigris lake, which is alkaline. There are no streams, ponds or sloughs. The surface is not liable to be flooded. There is no water power. The climate is mild and very dry, with hot days and cool nights in summer. Summer frosts are very rare in this locality. There is an abundance of coal at Lethbridge, about fifty miles distant. No coal or lignite veins have been discovered. There are no stone quarries, but there is a little inferior sandstone along the outlines of Verdigris coulée. There are no minerals. There are some antelope here. The Alberta Railway and Irrigation Company (a corporation including the Alberta Railway and Coal Company, the St. Mary's River Railway Company and the Canadian Northwest Irrigation Company) is making surveys in this township for the purpose of constructing canals.—*R. J. Gordon, D.L.S., 1904.*

Township 4.—There is no wagon trail leading to this township, but there is one running from Brunton station on the Alberta Railway and Coal Company railway to Steed's ranch in township 5, range 15. This trail passes near the north boundary of this township, and is probably the best route to follow to this vicinity. The soil is clay loam with a clay subsoil. It is suitable for producing cereals and roots, and produces good grass. The surface is rolling prairie with no brush or timber of any kind. There is no hay except in wet seasons when prairie grasses are fit for making hay. There is one slough of good water in the southwest part of the township. This is the only water in the township. There is no water power. The climate is mild, being tempered by the Chinook winds. The rain fall is light and drought sometimes destroys crops. Summer frosts are not frequent, the snow fall is light, allowing cattle to graze the year round. There is an abundance of coal at Lethbridge on Belly river. There are no coal or lignite veins in the township and no minerals. The only game is antelope in a limited number. The Alberta Railway and Irrigation Company have made surveys here for the purpose of building canals and doubtless this section of country which is now unsettled will be converted into a wealthy farming district.—*R. J. Gordon, D.L.S., 1904.*

(Part) Township 36.—The surface is principally undulating prairie with deep ravines (or dry water courses) heading eastward towards Sullivan lake. There is a flat, from forty to sixty chains in width, lying along the west side of the lake in this township. It is considerably cut up with dry water courses, but the soil is fairly good. Along the ridge(west of this flat) there appears to have been a large quantity of coal burnt at some period, as the surface is of burnt clay, piled up in all shapes from thirty to eighty feet high. The soil is mostly clay loam, with very hard clay subsoil and is suitable for mixed farming or ranching. There is no timber worth mentioning, only some willow and young poplar along the ravines. The most readily available fuel is poplar timber, eight to ten miles to the northwest. I noticed some outcroppings of coal on the northeast quarter of section 19, but I believe coal could be found all along the ridge described above. There is a creek of fresh water running through the southwest corner of the township which apparently goes dry in dry seasons, with the exception of the deep holes along it. There is fresh spring water oozing out of the banks of these ravines, but the water in Sullivan lake is no good. It is just like Gough lake, clay coloured and alkaline. There is plenty of good upland hay, but there are not as many hay sloughs in this part as there are in the vicinity of Gough lake. The east boundary of section 7 runs through a good sized slough, which lies in the southeast quarter of 7 and the southwest quarter of 8, and another large one on the southwest quarter of section 6. There is no water power, or stone quarries, or anything of marketable value, except the above described outcropping of coal. The climate is similar to any other section of Alberta. The first frost was in September. Large game is scarce, some coyotes and porcupine, but any amount of geese, duck, prairie chicken, snipe, plover and some swans. This township (or Sullivan lake) can be reached by a fair road from Blackfalds station, on the Calgary and Edmonton railway. This trail runs east on the north side of Red Deer river and crosses Tail creek near its confluence with that river, from there bearing a little south of east to the north arm of Sullivan lake.—*A. McFee, D.L.S., 1904.*

(Part) Township 36.—On July 4, 1904, I commenced the survey of this portion of the township by continuing (from last season's survey) the second and third meridian from the west, northward across Sullivan lake, completing the balance of the township in accordance with the instructions in the Manual of Surveys. The east shore of (this arm of) the lake is rather crooked and runs across the township in a northeasterly direction, from the southeast quarter of section 1, to the northeast quarter of section 32. Sullivan lake is the largest body of bad water that I know of in this north country, it is muddy, clay-coloured and alkaline; and nearly as thick as syrup. There is no good surface water in this part of the township. The soil near the lake is second and third class, but fairly good along the eastern boundary and the northeast corner. The soil is clay loam with very hard sun-baked clay subsoil. There is no timber worth mentioning only scattered clumps of willow and small poplar. The nearest wood for fuel or fencing is about five or six miles to the north. There is a coal seam in township 37, range 15, on the north arm of the lake. I discovered no minerals or stone, with the exception of scattered boulders. Large game is scarce, but there is any amount of waterfowl and prairie chicken. The first frost I noticed this season in this part of the country was on July 19, which was very light. A good road runs along the north side of Red Deer river via Tail creek from the Calgary and Edmonton railway through to this part of the country. There are a few dry water courses with standing pools of water. The land is undulating.—*A. McFee, D.L.S., 1904.*

Township 45.—This is the last township that I reported and is at a distance by trail of about eighty miles from Wetaskiwin. I arrived there about the end of November and as the country had been swept over by fire, I found it necessary to rent a stable and buy feed for my horses. The township is slightly rolling and is covered with scattered willow and poplar scrub. Most of the old mounds were found and all corners were established. The soil is principally black loam, but for about a mile around Wavy lake it is either gravel or clay.—*G. J. Lonergan, D.L.S., 1904.*

Township 58.—There is a wagon road and telegraph line from Edmonton to Saddle lake which passes through the corner of this township, crossing the Saskatchewan at Fort Saskatchewan, and again at Pakan, by means of current ferries. It is about 88 miles by this road from Edmonton to the centre of the north boundary of the township at which point the road enters the township from the north. This road is very good from Edmonton to the Fort, a distance of 18 miles, fairly good from the Fort to Wostock, a distance of 33 miles, but so bad as to be almost impassable in places, from Wostock to Pakan, a distance of 24 miles and again fairly good from Pakan to the point referred to, a distance of 13 miles. The Saskatchewan flows through this township and affords the best means of transporting heavy freight from Edmonton, such as lumber or settlers' effects. The soil consists of a varying thickness of black loam on a clay subsoil, covered for the most part with poplar and willow scrub which may easily be cleared off and is adapted for mixed farming. The quarter sections adjoining the southerly 4 miles of the central meridian comprise a great deal of particularly fertile low lying land, which supports a heavy growth of natural grass at the present time, and only requires draining to make it fit for any class of agriculture. There is a thick fringe of heavy spruce and poplar timber along both banks of the Saskatchewan, but otherwise there is no timber of any value in the township. With the exception of the hay meadows adjoining the central meridian, already alluded to and that which grows on the southerly slopes of the hills, which are for the most part open, there is not much hay in this township; what there is seems to be of good quality. The Saskatchewan has an average width of 750 feet, and at ordinary stages of the water, has a mean depth of 4 feet and a surface current of 3½ miles per hour. It has steep banks, averaging 100 feet in height, closing right in on the channel which is well defined and clear of obstructions. There is no land in this township liable to be flooded. With the exception of two lakes in the southeasterly corner of the township which are distinctly alkaline, the alkali in the streams and ponds found within it, is not strong enough to make the water unwholesome. There are no falls or rapids available for the generation of power in this township. This section of the country is at the present time liable to summer frosts, but it seems certain that as the surface is cleared, drained and ploughed, this liability will steadily decrease, and finally cease to exist. I know of no coal in this township, but there is coal in township 58, range 17, which is mined from surface outcroppings and used locally to a certain extent. There is any amount of wood fuel available for many years to come. There are outcroppings of stone along the banks of the Saskatchewan, but I do not know of what kind it is; I know of none other in the township. No minerals were observed in this township. This township is too thickly settled to allow much game to be found on it. The township is almost entirely taken up by Russians, Galicians and Bukovinians (Austrians) without regard to the reservations from homestead contained in the regulations of the Crown. In taking up a homestead their only idea seems to be to get as near as possible to the last settler of the same race as themselves and, in consequence of this, there are, in some cases, three of them having houses built on the same quarter section. Those in this township have only been in the country three or four years—few of them are naturalized and a still smaller proportion of them can speak English; in the summer the wife lives and works on the homestead, while her husband goes away to work for wages as a section man on the Canadian Pacific railway; in the winter they enjoy an infinite capacity for loafing and visiting one another's homes. On the whole, and judging from the good work done in older settled districts by others of the same people, I should consider them desirable settlers.—*R. W. Cautley, D.L.S., 1904.*

Township 60.—There are no wagon trails leading to the township, but from a settler's house situated on section 36, township 59, range 16, there is a pack trail leading to township 60, range 15, which crosses sections 6, 8, 17 and 20. The soil is of a sandy or sandy clay nature overlaid with three or four inches of black loam and is generally stony in nature. The township is for the most part unsuited for agricultural purposes, only occasional patches being fitted for mixed farming. The surface is generally rolling in character covered with poplar from three to eight inches in diameter, with willows and some bluffs of jackpine; there is a great deal of muskeg and swamp land, especially to the north of the township, which is covered with scrubby spruce and tamarac. There is no timber of any commercial value. There is no hay. The water is fresh and is to be found in Stony creek (which is twenty-five links wide, one feet deep with a current of three miles an hour) on sections 25 and 26 also in numerous permanent lakes on sections 8, 17, 19, 25, 26, 27, 28, 35 and 36. There is no land liable to be flooded. There are no water falls nor any water power. There is a good deal of muskeg in and surrounding this township, which might cause summer frosts. Wood for fuel can be obtained on every section. There are no coal or lignite veins. There are no stone quarries. There are no minerals of any economic value. Moose and deer are to be found.—*J. L. Côté, D.L.S., 1904.*

Range 16.

Township 4.—This township was reached by trail along the Alberta Railway and Coal Company's railway from Stirling to Brunton, thence easterly to the township. The road is good. The soil is clay loam with a clay subsoil, producing grass and is suitable for grazing purposes only. The soil is stony in the vicinity of Verdigris coulée. The surface is prairie with no timber or scrub of any kind. There is no hay on account of the township being very dry. There are no springs, streams or lakes, except Verdigris lake, which is unfit for use. The surface is high and not liable to be flooded. There are no water powers. The climate is hot and dry in summer with no summer frosts, and cold and dry in winter. The snow fall is kept light by the influence of the Chinook winds. Coal may be obtained at Lethbridge. There are no coal or lignite veins in the township. There is an inferior sandstone in Verdigris coulée. No minerals were found. There are some antelope in this vicinity.—*R. J. Gordon, D.L.S., 1904.*

Township 58.—There is a wagon road and telegraph line from Edmonton to Saddle lake, which runs along the westerly boundary of sections 6 and 7 in this township. It is about 74 miles from Edmonton to the northwest corner of said section 6, by this road, which is in fairly good condition, from Edmonton to Wostock, a distance of 51 miles, but so bad as to be practically impassable with a loaded wagon from Wostock to the point referred to, a distance of 23 miles. Saskatchewan river flows through this township, and affords the best means of transporting heavy freight from Edmonton, such as lumber or settlers' effects. The soil consists of a varying thickness of black loam on a clay subsoil, and in sections 1, 2, 4, 6 and 7 is particularly deep and rich. The surface of this township is an almost level plateau, about 200 feet above the river, and is almost entirely covered by dense poplar and willow woods, and brulé, especially is this the case in all the central sections. There are a great many sloughs and marshes scattered all through the township. There is a thick fringe of heavy spruce, jackpine and poplar along the right bank of Saskatchewan river, and a good deal of poplar all over the township suitable to the needs of a settler, for building houses, stables and fences. There are patches of good hay land, interspersed among the bush, in sections 6 and 7, and a few big hay sloughs in sections 4 and 9, but with these exceptions, there is very little hay in this township, although loose horses or cattle would be well enough in the bush in many places. Saskatchewan river has an average width of 750 feet, and at ordinary stages of the water, has a mean depth of 4 feet and a surface current of 3½ miles an hour. The channel is well defined and clear of obstructions throughout, except in section 36, where an island occurs and where there are some big boulders in either channel, which make it necessary to be careful in taking a boat or raft down the river. There is a great deal of surface water in this township, but only one small creek in the southeasterly corner. There is no land in this township liable to be flooded. There are no falls or rapids available for the generation of power in this township. This section of the country is, at the present time, liable to summer frosts, but it seems certain that, as the surface is cleared, drained and ploughed, this liability will steadily decrease, and finally cease to exist. I know of no coal in this township, but there is coal in township 58, range 17, which is mined from surface outcroppings, and used locally to a certain extent. There is any amount of wood fuel available for many years to come. There are outcroppings of rock along the banks of Saskatchewan river, which seems to be a kind of soft sandstone. I know of no other in this township. I know of no minerals in this township. One of my party saw a moose in this township, and there are rabbits, coyotes, deer, grouse and prairie chicken. There are 6 or 7 Canadian and American settlers in the southwesterly corner of this township, of the best kind—farmers of experience and a little capital and stock to start in with. The rest of the township is, I believe, in a fair way to be absorbed by Galicians, of whom there were always several on the line—generally between the instrument and my back picket.—*R. W. Cautley, D.L.S., 1904.*

Range 17.

Township 27.—This township may be reached by either of two good trails from Gleichen or Bassano; the former trail is more generally used. The soil other than in the ravines and river flats is of about four to six inches sandy loam with clay subsoil, and in the river flats and ravines it is clay growing very little or no vegetation. The surface is generally hilly with deep ravines or canyons traversing it in a northeasterly direction; several of them start south of this township and cross through to Red Deer river and in these cases the ravines are impassable barriers to any horse conveyance. There is very little scrub and the only timber is black poplar, which is found only along Red Deer river in bits of margin. There are little patches of hay scattered all through on the upper lands. Red Deer river running through the township supplies the fresh water generally for live stock and in nearly all the ravines there are springs, the water being nearly all fresh at the heads of the ravines and all becoming alkaline as it approaches the river. Red Deer river does not often overflow its banks as the channel seems of sufficient capacity to carry off all the overflow. The river this year averages about six chains in width with banks from ten to forty feet high. The weather was all warm and I saw no signs of summer frosts. Fuel may be got scattered along the river banks and in some of the ravines, but this supply is very meagre. The settlers in the future will have to depend more upon coal, which is to be found in abundance in township 27, range 18. Sections 17, 21. 20, 29 and 30 have coal seams exposed in all the canyons running through them and coal is frequently washed down and deposited in the river. The coal seems to be all soft and very much like the variety known and sold in Ontario as cannel coal. Stone quarries may be opened up in many places along the cut bank hills of the river, which contain much freestone. I saw no other minerals. The usual game birds, such as prairie chicken, duck and geese are found here. I saw one deer. Antelope are scarce. There is no water power available anywhere in this township.—*John J. Dalton, D.T.S., 1904.*

Township 59 (Sections 5, 6, 7, 8, 17, 18, 19 and 20).—There is a wagon trail from Victoria or Pakan to Smoky lake, which passes through the above sections. It was covered with snow to a depth of two feet when I was on the ground, so I cannot inform you of its condition. The soil consists of a light covering of black loam overlying a clay subsoil, and the surface is gently undulating, covered with small brulé and very marshy in places. The timber on these sections is almost entirely brulé, and fit only for firewood. There is very little hay in these sections, what there is being along the banks of Smoky creek. Smoky creek flows through sections 7 and 8, but its bed is so marshy and all-defined that it is impossible to describe it with any accuracy. I believe it is the only outlet of Smoky lake, in which case it must carry a good deal of water, and it has low sloping banks. There are no indications of available water power in these sections. This section of the country is, at the present time, liable to summer frosts, but when once it is cleared, drained and ploughed, this liability is almost certain to cease. I know of no coal in this township. There is any amount of wood available for fuel for many years to come. I know of neither stone nor minerals in this township. I saw no game in these sections. There is a deserted house on Smoky creek, but I saw no signs of other settlers here.—*R. W. Cautley, D.L.S., 1904.*

Range 18.

Township 27.—This township may be reached by either of two good trails from Gleichen or Bassano; the former trail is more generally used. The soil other than in the ravines and river flats is about four to six inches sandy loam with clay subsoil, and in the river flats and ravines it is clay growing very little or no vegetation. The surface is generally hilly, with deep ravines or canyons traversing it in a northeasterly direction; several of them start south of this township and cross through to Red Deer river and in these cases the ravines are impassable barriers to any horse conveyance. There is very little scrub and the only timber is black poplar, which is found only along Red Deer river in bits of margin, but on the southwest quarter section 32, there is about twenty acres of this kind of timber, which runs from six inches to about twenty inches in diameter. There are little patches of hay scattered all through on the upper lands. Red Deer river, running through the township, supplies the fresh water generally for live stock and in nearly all the ravines there are springs, the water being nearly all fresh at the heads of the ravines and all becoming alkaline as it approaches the river. Red Deer river does not often overflow its banks as the channel seems of sufficient capacity to carry off all the overflow. The river this year averages about six chains in width with banks from ten to forty feet high. The weather was all warm and I saw no signs of summer frosts. Fuel may be got, scattered along the river banks and in some of the ravines, but this supply is very meagre. The settlers in the future will have to depend more upon coal, which is to be found in abundance. Sections 17, 21, 20, 29 and 30 have coal seams exposed in all the canyons running through them and coal is frequently washed down and deposited in the river. The coal seems to be all soft and very much like the variety known and sold in Ontario as cannel coal. Stone quarries may be opened up in many places along the cut bank hills of the river, which contain much freestone. I saw no other minerals. The usual game birds, such as prairie chicken, duck and geese are found here. I saw one deer. Antelope are scarce. There is no water power available anywhere in this township.—*John J. Dalton, D.T.S., 1904.*

Range 18.

Township 58.—There is a wagon road from Edmonton to Victoria or Pakan—a much more distinctive name—on the north side of the Saskatchewan, which passes through the Lobstick settlement. This road is in fairly good condition from Pakan to the centre of this township, a distance of about eleven miles, but I believe it is in very poor condition westerly from this township to a point opposite Fort Saskatchewan, where it joins the main road; I have not been over it. There is no wagon road to that part of the township south of the Saskatchewan, but a good winter trail to Star, a distance of about 16 miles from the centre of the southern boundary of the township, and there is a good wagon road from Star to Edmonton, passing through Fort Saskatchewan, a distance of 42 miles. The Saskatchewan passes through this township, and affords the best means of transporting heavy freight to it from Edmonton, which is the distributing centre of this district. In that part of this township lying north of the Lobstick settlement, the soil is composed of a light covering of black loam overlying a clay subsoil; the surface is entirely covered with poplar woods and thick scrub, together with numerous sloughs and marshes. In that part of the township lying to the south of the Saskatchewan, the soil is very light as a rule, as there is a good deal of open and partly open land, it would seem best for grazing purposes. In the northerly part of the township there is very little useful timber except for fuel; what there is is almost all poplar—green and dry. In the southerly part there is some jackpine and spruce and a fair amount of poplar, all suitable for building houses, stables and fences. There is no hay in that part north of Lobstick settlement. In the southerly part there must be a good deal of hay in the proper season, but the soil is light. The party were on snowshoes during the survey of this township (February and March). In the northerly part of the township are numerous fresh water sloughs and marshes. There is a good creek in the southerly part—12 feet wide, 2½ to 3 feet deep, with a current of 4 miles per hour and a valley about 75 feet deep. The Saskatchewan, which flows through the township, has such a steep and roughly broken bank for its southerly shore, that its presence cannot be said to enhance the value of the land adjacent to it, on that side. None of the township is subject to floods. It is probable that enough power to run a grist mill could be generated from the creek referred to in the preceding paragraph, since it must have a steep gradient near its entrance to the river. This section of the country is liable, at the present time, to summer frosts, but it seems certain that, as the surface is cleared, drained and ploughed, this liability will steadily decrease until it finally ceases to exist altogether. I know of no coal in this township, but there is coal in township 58, range 17, west of the 4th meridian which is mined from surface outcroppings and used locally to some extent. There is any amount of wood available for fuel for many years. No minerals or rock were observed. The township is pretty well hunted out, owing to the presence of the half-breed settlement in its centre. There were no settlers on that part of the township surveyed by me.—*R. W. Cautley D.L.S., 1904.*

Township 59.—There are no good summer trails for reaching this township, but there are two winter trails, one of which commences in the centre of Lobstick settlement and runs northeast striking the most southerly part of Smoky lake; the other commences at Victoria and follows the north shore of Smoky lake. This trail can be used in summer, but is poor; neither trail goes beyond the lake and both are used only by hunters. The soil is for the most part a black loam with a clay subsoil and is suitable for mixed farming. The surface is nearly all heavily timbered, although in the southwest corner of the township the timber is lighter and there is a good deal of willow brush. The timber is chiefly poplar and cottonwood from three to eight inches in diameter, but in sections 22, 27 and 28 adjoining the lake there is some spruce mixed with the poplar averaging ten inches in diameter suitable for building purposes. In dry seasons the shores of Smoky lake furnish up to sixty tons of hay, but the amount and quality depend on the season. The water of Smoky lake is fresh and is quite sufficient and permanent. Smoky lake creek, which is the outlet of the lake, is twelve feet wide, two feet deep and rate of current about three miles an hour. The land is not liable to be flooded. No water powers can be developed in the township. The climate is good and summer frosts are rare. The available fuel is wood and it can be found all the township. There are no stone quarries. No minerals of any value have been discovered in the township. There are some partridge and grouse, and moose are sometimes found. There are some fish in the lake but they are not plentiful.—*J. L. Côté, D.L.S., 1903.*

Range 19.

Township 58.—The trail from Edmonton to Victoria follows the north shore of Saskatchewan river and crosses township 58, range 19, on sections 31, 32, 33, 34, 35, 26 and 25, and is generally in a fair condition. The soil on the north side of Saskatchewan river is generally a black loam with a clay subsoil. While on the south side, the subsoil is generally sandy. It is suitable for mixed farming. The surface is generally undulating except for the hills of Saskatchewan river and two or three gullies coming to it. The north side of the river is a scrubby prairie with large bluffs, while the south side is thickly wooded. On sections 1, 2, 3, 4 and 5 there is a good deal of spruce suitable for building purposes. From thirty to fifty tons of good hay can be cut along the north side of Saskatchewan river. Waskatenow river is a small stream of fresh water twenty links wide, and twelve inches deep with a current of four miles an hour and flows into Saskatchewan river in section 33. No land is flooded. No water power can be developed. There are no water falls. There is no summer frost. Wood for fuel is available on every section. There is no coal or lignite visible in the township. There are no stone quarries. There is no mineral of economic value. Moose can be found on the south side of the river.—*J. L. Côté, D.L.S., 1904.*

Township 59.—The trail which follows the north side of Saskatchewan river, from Edmonton to Victoria touches this township on section 4 and follows the south boundary for a couple of miles. The soil is a rich black loam with a clay subsoil.

The surface is generally level or undulating and is timbered, with the exception of a small prairie here and there. Some spruce are scattered all through this township and are suitable for building purposes. There is no hay. Waskatenow creek enters the township in section 31 and leaves it in section 3. It is a stream of fresh water about 25 links wide, 18 inches deep and a current of 3 miles an hour. There are also numerous marshes and swamps in this township . There is no land flooded. There is no water power to be developed. Summer frost is very rare. Wood as fuel can be had on every section, but no coal or lignite was discovered. There are no stone quarries. No mineral of any description was located in this township. Grouse and moose are found in the township.—*J. L. Côté, D.L.S., 1903.*

Range 20.

Township 58.—The trail following the north shore of Saskatchewan river from Edmonton to Victoria crosses sections 3, 10, 14, 23 and 25 and is generally in fair condition. About 6 inches of black loam cover a gravelly clay subsoil, except for a belt of about one mile along the Saskatchewan where the subsoil is sandy. The surface is generally undulating except for the Saskatchewan hills and a few gullies coming into it. It is suitable for mixed farming. A belt along the north side of the Saskatchewan is a scrubby country but the remainder is thickly wooded with poplar from three to eight inches in diameter. and willows. There is no hay. There are numerous sloughs and swamps of fresh water, which in most cases could be easily drained. Namepi creek flows through sections 31, 32, 33, 34, 27, 26 and 23 and is a creek of about 30 feet wide, three feet deep and a current of three miles an hour. Saskatchewan river flows through sections 12, 13, 24 and 25. There are no water falls or water powers. No summer frost was observed. No coal veins, no stone quarries and no minerals of any value were observed. Moose and bear can be found here.—*J. L. Côté, D.L.S., 1904.*

Range 22.

Township 64 (north outline).—The country descends gradually to Tawatina river which is crossed in section 31, and then gradually ascends the east side of the valley, the top being reached about the middle of section 32. After this, although not as swampy as further west, the country is very poor, with a great deal of stone, and is third class. The timber has all been burnt and scrub has grown up.—*J. K. McLean, D.L.S., 1904.*

Township 65 (east and north outlines).—Section 1 is stony and covered with a heavy growth of scrub. A small creek is crossed on section 12, when the country becomes much better. A very good area of country is met, which continues to the middle of section 24. The country is then broken by a large muskeg which continues some distance into section 36. Along the north boundary the land to the south is poor, but towards the north is slightly better. However the ridges are very stony and the areas that are suitable for cultivation are limited. The main trail to Athabaska Landing is crossed on section 32 and Tawatina river at the corner of sections 33 and 34. The valley of Tawatina river is here somewhat rough and hilly. Ascending the valley the country has not the appearance of being of much value for agricultural purposes.—*J. K. McLean, D.L.S., 1904.*

Township 65.—Tawatina river enters this township in the southeast quarter of section 6, runs northeast to section 15, thence nearly north, leaving the township at the northeast corner of section 33. It is a very crooked stream, from 40 to 60 links wide with sharp cut banks 8 to 12 feet high. The valley is from one to one and a half miles wide with rough broken slopes, reaching an altitude of 200 to 250 feet above the river. All west of the river is rough and hilly, being really a succession of ridges with muskeg in the hollows. The general trend of the ridges is north and south. The soil is light and stony. The two tiers of sections on the east side of the township are fairly level; there are some muskegs. The soil is generally clay. Little Pine creek runs through sections 11 and 12. The whole township with the exception of the muskegs is covered with heavy poplar, alder and willow scrub with clumps and scattered trees of poplar. The muskegs are covered with small spruce and tamarac and considerable alder brush. There are some scattered spruce trees 10 to 14 inches along Little Pine creek. The trail from Edmonton to Athabaska Landing runs through sections 6, 7, 18, 19, 20, 29 and 32. A pack trail from Athabaska Landing to Lac LaBiche runs through the northeast quarter of the township. Good grass, pea and vetch vines grow in the greater part of the township. Only patches are fit for cultivation. Three squatters have settled in this township. There are no stone quarries or minerals of any kind. Large game is scarce. Rabbits, prairie chickens, and coyotes are numerous. Traces of mink were seen along Tawatina river.—*Wm. R. Reilly, D.L.S., 1904.*

Township 66 (east outline).—The surface is nearly level or slightly undulating. It has alternate stretches of poplar scrub and spruce and tamarac muskeg. A large lake surrounded by muskeg was crossed in section 13, and a hay marsh in section 36. Soil is sandy and too swampy for cultivation.—*W. R. Reilly, D.L.S., 1904.*

Range 23.

Township 43.—This township is mostly covered with poplar from four to six inches in diameter. The surface is undulating and there are many lakes and ponds. One rancher is running about four hundred head of cattle and had every appearance of prosperity. Asker post office is situated on section 15, and has a weekly mail service. On section 10 there is a modern school-house with an average daily attendance of about thirty children. A good trail is opened up along the boundary connecting with the town of Ponoka.—*G. J. Lonergan, D.L.S., 1904.*

Township 44.—Some of the best farming land in Alberta is situated in this township and as a consequence there is no vacant land. Soft water is found at a depth of fifty to seventy-five feet. In the southeast part of the township there are numerous small ponds while Battle lake takes up parts of sections 3 and 4. The soil is a good sandy loam and the crops appear to be about ten days in advance of those of other places.—*G. J. Lonergan, D.L.S., 1904.*

Township 63.—(East outline).—The first mile and one-half is covered with scrub and is third class. After this the whole of this boundary is muskeg with slight intermissions. The muskegs extend west nearly to and parallel with the Athabaska Landing trail, and the hunters say they extend east to the head of Sucker creek, a small stream running into the Saskatchewan river.—*J. K McLean, D.L.S., 1904.*

Township 64 (North and east outlines).—Section 31 is very poor, and broken and swampy. A small creek running northwest towards the muskeg creek is crossed on the commencement of section 32. Ascending from this creek the country is better across sections 32 and 33. The soil is clay loam with occasional large stones. The timber has all been burnt and a very heavy growth of poplar and willow scrub has grown up. Section 34 is badly broken by swamps, but 35 and 36 are better. The timber has been burnt and scrub now covers the country. At one time this country has been covered with very large timber. Several spruce trees about three feet in diameter, and still green were seen. Along the east boundary through section 36 we descend gradually along the side of the valley of Tawatina river. The unsurveyed trail to Athabaska Landing is crossed in section 36 and again in section 25. Small areas of good land are found along this river with occasional squatters. Tawatina river is crossed on section 24. The line gradually ascends the east side of the valley, the country being covered with a thick growth of scrub. The soil is clay loam and the country is fairly good, but is only class three. The surveyed trail to Athabaska Landing is crossed on section 1.—*J. K. McLean, D.L.S., 1904.*

Township 65.—(East outline).—The country is poor along the east boundary of this range. The timber has been burnt and poplar and willow scrub has grown up. The country consists of stony ridges running northerly with swamps intervening.—*J. K. McLean, D.L.S., 1904.*

Township 65.—(North outline).—Surface undulating, alternate stretches of poplar scrub and spruce and tamarac muskeg. Soil generally light, some good spots of sandy loam. Muskeg creek crossed at quarter post on 36 is a stream 40 to 50 links wide with strong current running in a rugged gulch 100 feet deep and 8 to 10 chains wide. A large lake surrounded by muskeg is crossed in section 31. Muskeg creek flows out of the east side of this lake. There are a number of good hay marshes in the interior of the township, and some patches fit for cultivation.—*W. R. Reilly, D.L.S., 1904.*

Township 66.—(East outline).—The country is much broken by swamps and muskegs along this line. None of the sections being more than third class. Athabaska river is crossed on section 25 and is about a quarter of a mile wide. The country is very poor north of the river. The timber has been jackpine on a sandy soil. The timber has been burnt of late years and much of it is now fallen.—*J. K. McLean, D.L.S., 1904.*

Township 66.—(East outline).—Going north the surface is undulating, covered with alternate stretches of poplar scrub, and spruce and tamarac muskeg, to river. North of the river, it is rolling to undulating (pretty rough for a half mile north), covered with heavy slash or windfall with scrub. Muskeg creek is crossed in deep ravine on north half of section 1. Athabaska river, 20 chains wide with long sloping banks is crossed in section 25. Some hay marshes lie in the centre of the township.—*W. R. Reilly, D.L.S., 1904.*

Range 24.

Township 43.—This township is mostly covered with poplar from four to six inches in diameter. The surface is undulating and there are many lakes and ponds. One rancher is running about four hundred head of cattle and had every appearance of prosperity. A good trail is opened up along the boundary connecting with the town of Ponoka.—*G. J. Lonergan, D.L.S., 1904.*

Township 45.—This half township is on the east side of the Ermine Skin Indian reserve, and is all taken and about eighty per cent is under cultivation. The farmers show every indication of prosperity and their dwellings and outbuildings would compare favourably with those of eastern Canada. The soil is a sandy loam and in places a black loam. Good soft water may be had by boring seventy-five feet or deeper. A boring machine for wells was kept in operation all last summer.—*G. J. Lonergan, D.L.S., 1904.*

Township 47.—The thriving town of Millet is situated in the northwest corner of this township. It is the trading centre for the people as far west as Pigeon lake and on the east to Coal lake. The Calgary and Edmonton railway cuts the township in a northwesterly direction, while Pipestone and Bigstone creeks join on section 10 and continue to flow in a southeasterly direction. The soil is a light sandy loam and the township is not so thickly covered with scrub as the fore-mentioned ones. This advantage was quickly taken by the settlers who have not much capital, as they can get a fair crop the second year and consequently all the land is homesteaded or bought.—*G. J. Lonergan, D.L.S., 1904.*

Township 48.—This township is settled almost entirely by Germans and it was necessary to engage the services of an interpreter. but once the work was started I had no more difficulty. About eighty-five per cent of the land is taken up but the settlers have been there but a short time and as yet they have very little improvements.

The soil is good, being mostly black loam. Two large lakes and numerous small ponds and an abundant supply of hay were found. A sufficient quantity of good timber is scattered through the township.—*G. J. Lonergan, D.L.S., 1904.*

Township 63.—(East outline).—Through sections 1 and about one-half of 12 on the east boundary of this township the country is fair agricultural land, but it is very stony. This land extends east to the valley of Towtinow river and for some distance east. The remainder of this line is very much broken by swamps and muskegs with occasional ridges. The timber has been generally destroyed by fire. A growth of poplar scrub now covers the ridges, while small spruce with willows cover the lower ground. This township is third and fourth class.—*J. K. McLean, D.L.S., 1904.*

Township 64.—(East outline).—The boundary of this township is almost entirely swamp and muskeg, with muskeg lakes. On the few ridges poplar and willow scrub is found. This is a fourth-class township.—*J. K. McLean, D.L.S., 1904.*

Townships 65 and 66.—(East outline).—The east boundary of township 65 starts on a gradual slope to the north, covered with thick poplar and willow scrub. Soil, sandy, slightly stony in spots, 3rd class. A small creek is crossed at quarter post on the east boundary of section 12, and muskeg met a few chains farther north. Alternate patches of undulating ground covered with poplar scrub, muskeg covered with spruce scrub and patches of spruce and tamarac trees 6 inches to 10 inches in diameter occur and extend for a considerable distance on either side of this line. Continual muskeg lies across north part of section 12 and on sections 13, 24, 25, 36 and 1. Township 66 runs into poplar scrub on the south side of section 12, with spruce and tamarac muskeg at a distance of from 10 to 20 chains on either side. Alternate spruce and poplar scrub from this to Baptiste creek 'a stream 30 to 40 links wide, 4 to 5 feet deep in spring time,' crossed in the north half of section 25. On the north side of this creek a belt of spruce was run through for about half a mile extending for a short distance on either side of the line. This belt contains timber from 12 inches to 24 inches in diameter suitable for lumbering purposes, and is the only timber suited for that purpose met with in the survey. From this belt of timber to the township corner, ground rolling, brulé overgrown with poplar scrub. Only small patches along this line fit for cultivation. Speaking generally the line runs across township 65 in a depression between a gradual rising ground on the east side and a range of high hills extending far into the township on the west side. Baptiste lake is in the north part of township 66, range 24. I was told that a settler is making a success of farming near this lake, his only road is a packtrail to the landing. The land is reported to be much better further west.' Small wild fruits, strawberries, raspberries, red currants, black currants and gooseberries grow in abundance here.—*W. R. Reilly, D.L.S., 1904.*

Range 25.

Township 43.—The town of Ponoka is situated in this township on the west bank of Battle river, in section 4, and is a thriving and industrious centre, having two banks, two sawmills and many large stores. The soil is rich sandy loam. Fine crops and splendid gardens spoke plainly for the success of the settlers. All the land is taken and most of the road allowances are opened and in places the road was graded. —*G. J. Lonergan, D.L.S., 1904.*

Township 44.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

Township 47.—In this township the soil is sandy loam, and about sixty per cent of the land is taken up by settlers. It is covered with a dense growth of poplar and willow scrub and in places poplar from six to eight inches in diameter. The township is traversed from east to west by Pipestone creek, which has high banks on both sides forming a valley about three-quarters of a mile in width, the bottom of which is low and has numerous lakes.—*G. J. Lonergan, D.L.S., 1904.*

Township 48.—This township is practically similar to the one east of it in every way, except that there are fewer settlers.—*G. J. Lonergan, D.L.S., 1904.*

Range 26.

Township 44.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

Range 27.

Township 43.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

Township 44.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

Range 28.

Township 43.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

Township 44.—This township is covered with thick poplar and willow scrub with but few large trees. The soil is light sandy loam and deteriorates towards the west. The surface is very rolling with ponds and creeks in the valleys, all of which drain into Battle river. About twenty per cent of the land is settled and as the farmers have been there but a short time they have made but few improvements. However, in every case they appear to have realized their expectations and are satisfied.—*G. J. Lonergan, D.L.S., 1904.*

TOWNSHIPS WEST OF THE FIFTH MERIDIAN.

Range 1.

Township 16.—This township may be reached from either of the railway stations, Nantion or High river, the trails are generally good. The country is very hilly, without timber and very little scrub. The soil is very variable ranging from eighteen inches black loam in the lower places to gravel on the tops of the hills, with clay and gravel subsoils. The water is all fresh. The southern portion of the township is watered by two branches of Mosquito creek, the northern portion by a few strong springs and a few ponds. There is no stream large enough for water power. The climate seems to be suitable for the hardy cereals and vegetables. I saw no indications of summer frosts. Fuel is very scarce as the settlers are using gray willow at the present, and in the near future will have to bring coal from a distance. I saw no beds of stone suitable for quarries and no minerals of economic value. Game is confined to duck and prairie chicken. This township is nearly all subdivided by wire fencing and occupied by ranchers.—*John J. Dalton, D.T.S., 1904.*

Township 23.—There are good roads leading to this township from the Canadian Pacific Railway stations, Okotoks and High river. The soil generally is a sandy loam, which in the lower situations becomes deep black loam, and on the higher ridges stony, and in some places rock protrudes. The surface is generally prairie, but on most of the northern slopes and along the streams there is much scrub and small poplar chiefly of the black variety becoming large along the river flats where it is mixed with scattered spruce and varies from six or eight inches to twenty-four inches in diameter. Hay is cultivated in this township and is pretty evenly distributed over the open country excepting on the higher hills. Water is very good and abundant and well distributed from Elbow river. There is also a convenient supply of water for domestic and ranching purposes from the numerous strong springs rushing out of the ravines. Water power might be obtained almost anywhere along Elbow river, but it would be very difficult to construct dams to withstand the floods, which become very violent and move stone banks or any other impediment down the river, though it appears seldom to overflow its banks. This township is largely cultivated. Coal is the fuel generally used and is found in abundance in several of the adjoining townships. Stone quarries are being worked in the north of section 33, and are to be found also on section 32, along Elbow river. I discovered no minerals. Game is rather scarce, even duck and prairie chicken were not plentiful, but in all these mountain streams two varieties of trout are very abundant. Specimens of one variety are said to weigh eighteen pounds but four or five pounds are more common. The other variety would average about sixteen ounces in the larger streams.—*John J. Dalton, D.T.S., 1904.*

Township 56.—The road from Edmonton to Peace river crosses this township, entering it on section 26 and leaving it on section 32. This road was repaired lately and is supposed to be in a fair condition. It was very bad before this in wet seasons. The soil consists of black loam with a sandy clay subsoil. It is good for farming. There are few muskegs but the lakes are numerous. The ridges are apt to be stony. Sand was found in very few pits. Tht township is heavily timbered for two-thirds of its area. The heavy timber which consists of poplar being southeast of a line that would run between sections 18 and 26. The rest of the township is covered by brush, bunches of big poplar with occasional open patches. The surface is pretty hilly along the east boundaries of sections 16, 21 and 28. The west and southwest side of the township is but little hilly. There are but few places where hay can be cut in the township. Slough hay is found in sections 9, 10 and 35 but not in great quantities. The water in Sandy lake is good but is bad in all or nearly all the other lakes. There is no important stream in the township and there is no water power. The climate is about the same as that of Edmonton. Though I was not in the township in the summer, I am inclined to think that the summer frosts felt in the adjacent townships in June and August must have been felt in this township as well. As there is no coal known in the township the only fuel is dry poplar which is not scarce. We saw no rock or minerals. Ducks must be as plentiful as in the adjacent townships. There were at least six settlers in the northern part of the township in September, 1904. The eastern and centre parts are heavily timbered and hilly though the soil is pretty good; but there is fine farm land in the southwestern and western part.—*Raoul Rinfret, D.L.S., 1904.*

Township 60 (north outline).—From the starting point across section 36 and part of 35 the base line passes over an undulating country covered with poplar of an average of 8 inches diameter; then it enters a floating swamp covering the range to within half a mile of the northwest corner; the remainder is over a level ground covered with poplar and willow scrub. Owing to the great area of waste land this range is practically worthless.—*L. E. Fontaine, D.L.S., 1904.*

Township 72 (east and north outlines).—Sections 1 and 12 lie mostly in a swamp of spruce and tamarac, the timber being, generally, of small size and the land of no value. Sections 13 to 36 are covered with woods of poplar and scattered spruce. The soil is of fair quality though the land is somewhat broken by small swamps of spruce and tamarac. In the same township and range, sections 36 to 31, both inclusive, are timbered with poplar and occasional spruce of fair size, with a few swamps of tamarac, &c. Excepting these swamps the land is slightly rolling and the soil of good quality.—*Edgar Bray, D.L.S., 1904.*

Range 2.

Township 46.—The route at present to reach this township leaves Ponoka and follows road allowances north and west for fourteen miles, thence by trail to Battle river, which follows to Battle lake which lies within the township. The estimated distance from Ponoka is forty miles. The road is bad and the trail is worse; both are being improved yearly. The soil is a strong clay, in most places the humus had been burned off, but grass grows luxuriantly on the burnt places, grain and roots will grow well in this soil. The surface is rolling except near Battle lake where, high, steep hills surround the lake. Nearly all of the township is covered with trees of dead spruce and poplar of large size,—many over three feet in diameter,—and a new growth of poplar, birch and willow. A great deal of the dead timber has fallen and made almost impassable windfalls. Considerable of this dead timber is sound and may be used for house building, or sawn into lumber for settlers' use. On the east side of the township there is considerable green timber, which lumbermen are cutting and floating down Battle river to Ponoka. Sections 1, 2, 12, 14, 35 and 36 contain nearly all the green merchantable timber in the township. There are no hay sloughs, though a rank growth of grass exists through the burnt district; it is not at present available, owing to the fallen timber. The township is well watered by small creeks and numerous springs; the water is good. Battle lake, four miles long, and from twenty to thirty chains wide, nearly crosses the township. The lake is very deep and stocked with whitefish and pike. There are no water powers. Climatic indications are good. The supply of fuel is inexhaustable. No coal or lignite was observed. No stone quarries were observed. No minerals were observed. Game consists of deer, bear and wild fowl.—*Saml. B. Lucas, D.L.S., 1904.*

Township 47.—This township lies immediately to the west of the northwest end of Pigeon lake and in fact the lake cuts into parts of sections 11, 12, 13, 14 and 24. The survey was commenced on August 1 of the present year and completed near the end of the same month. This township is reached by wagon roads from either Leduc, Millet or Wetaskiwin, which during the past dry season have been fairly good for travelling.

The southeast corner of the township is also accessible by wagon from the road leading from Ponoka to Battle lake. The soil consists of a light layer of black loam overlying a subsoil of clay and when the land is cleared should be suitable to the growing of hay and the coarser grains. The land adjoining Pigeon lake in sections 13, 14 and 24 is somewhat lighter on account of the presence of sand and stones. The surface of this township is generally rolling and a goodly portion has been badly burned over rendering it difficult to get about with even pack horses on account of so much fallen timber. The northeasterly half of section 34, sections 35, 36 and 25, and a part of the north half of section 26, comprise all the green bush in the northeasterly part of the township. The timber consists of large poplar up to fifteen inches in diameter with some good spruce up to twenty inches on the stump with occasional trees of thirty inches or more. Throughout this there is some birch of fairly good size. Likewise in sections 1, 2, 11, 12. the north parts of sections 9 and 10, parts of sections 14, 15, 16, 21, 22, 23 and 27 there is found similar timber with some fair sized pitch pine interspersed. Owing to the close proximity of Pigeon lake it would be advisable to reserve this timber for a timber berth or berths if it has not already been done and place it on the market at an early date so that it could be cut before many years thus obviating danger from destruction by fire, in some measure owing to the large areas of dead dry timber almost surrounding these green areas. A small quantity of hay lands is to be found in section 12 adjoining the lake shore. There is also a small patch on the southeast quarter of section 14. Pigeon lake being largely fed by springs and spring creeks its water is of excellent quality. The township is also fairly well watered with creeks, none of which is of any importance in size. Those on the north portion of the township are tributary to Strawberry creek while all the others flow to Pigeon lake. Their water is fresh and of excellent quality. There are no lands that are liable to be flooded to any extent worth mentioning. There are no water powers on any of these streams. The climate is similar to that of the rest of northern Alberta. Slight frosts were noticed in the latter part of August, but potatoes, grown by Mr. John Lee who lives on section 30, township 47, range 1, on the shore of the lake, were not injured in the slightest. Wood is the only fuel available but there is any quantity of it right at hand. There are no stone quarries; and no minerals of economic value were observed. There is practically no game in this township outside of a few grouse and rabbits. White fish of an excellent quality are found in Pigeon lake and quite a business is carried on in supplying the markets at Leduc, Wetaskiwin and Ponoka with this commodity. The only settlers in the township are some Stony Indians who are squatted on section 12. They are quite progressive and expressed their desire to renounce their treaty rights and take up homesteads. At one time the Hudson's Bay Company had a post on Pigeon lake. The ruins of their building is still to be seen on section 24. Pigeon lake is a fine sheet of water nearly fifteen miles long and will doubtless before many years become a summer resort for the residents of the many towns which are rapidly growing up to the east of it.—*B. J. Saunders, D.L.S., 1904.*

Township 48.—This township can be reached by pack trail from Pigeon lake along the Indian trail leading from the above named lake to Wabamun lake. This trail is not in very good condition for travel, being very crooked and filled up with fallen timber in many places. The soil consists of a black loam surface soil overlying a clay subsoil and it should be well adapted to the growing of hay and the coarser grains when the timber is cleared off. The whole surface of the township is timbered and it has suffered less from fires than the adjacent townships to the south and west. The timber is of mixed variety with some good areas of spruce suitable for lumber, with large poplars and some birch. Roughly speaking the east third and west third of the township are covered with green timber excepting parts of sections 5 and 6. In sections 12, 13 and 14 there is a patch of land which if burnt off would be valuable for hay land. The township is pretty well watered with creeks tributary to Strawberry creek, the largest of which, a stream known locally as Black creek, reaches a width of twenty-five or thirty links in high water and could no doubt be utilized to drive timber to Strawberry creek. The water of all the streams is of good quality and fresh. In sections 2, 3, 9, 10, 11 and 12, there is quite a large muskeg which has been shewn on some maps as a lake. There is only a very small body of water in this muskeg. It is situated on section 11. There are no water powers in the township. The climate is similar to that of other parts of northern Alberta, and frosts are liable to occur in the latter part of August. Wood is the only fuel available so far as was seen. There are no stone quarries, and no minerals of economic value were met with in this township. Game was very scarce and only an occasional grouse was noticed with the ever present rabbit. This township has no settlers although it is of easy access from Pigeon lake around which a few people have already located.—*B. J. Saunders, D.L.S., 1904.*

Township 56.—The road from Edmonton to Peace river passes about one mile north of the northeast corner of the township. There is a road going through sections 31, 32 and 33, connecting the Peace river road with township 56, range 3. The subsoil is composed of clay and sandy clay, covered by several inches of black loam. Stones were found in only about ten pits. The soil is good for farming. There are some hills in sections 31, 32 and 33, and along the south shore of Nakamun lake, and around Kakinasa lake. The remainder of the township is fairly level or gently rolling. There are no high hills or deep gullies. There is no prairie in the township. The greater part is covered with small poplar, willow and scrub, with scattered big poplar. There is big poplar as a forest, and not scattered, in the southeastern part of the township, and in bunches throughout; the tall timber forming hardly one-third in area. The southern parts of sections 5 and 6 consist of a large muskeg extending into townships 56, range 3 and 55, range 2. Besides the poplar distributed as stated above, there are patches of small spruce and tamarac in different parts of the township. Much hay can be cut in the muskegs and around the small lakes south of Nakamun lake, and in the muskegs situated in the southeast corner of the township. It is all slough hay. There are no streams of importance. The water is bad in the lakes, except in Nakamun, where it is passable. The water in the creeks is fairly good when not too near the lakes out of which it is running. There is no water power. The climate is about the same as that of Edmonton. There were frosts in June and August in township 56, range 3 and township 55 range 3, which must have been felt in this township. The most readily available fuel is the dry wood standing and fallen found in many places in the township. There is no coal known. No stone suitable for quarrying was seen and no minerals. Ducks are numerous. There are likely to be deer and bears, as in the township adjoining. There are four or five settlers in the township. There are many good quarter sections lying south and southwest of the lakes, and the greater part of them would be easily cleared. The ground is not hilly and should be good for farming.—*Raoul Rinfret, D.L.S., 1904.*

Township 58.—The road to the township was the route used during the Klondike excitement. I understand that it is in bad condition during the summer especially if the season is wet. The soil is a sandy and gravelly loam and I should judge it to be very suitable for raising the various grains and vegetables. As a whole it is a very good soil. The land is rolling and the surface is covered with timber. The original growth has been more or less destroyed by fire and is now replaced by a growth of small poplar and thick willows. A fair amount of good spruce, tamarac and poplar however still remains and is available for use. The large poplar is from ten inches to twelve inches in diameter, and the spruce is from ten inches to twenty-four inches in diameter. As far as could be judged in the winter the sloughs contain an excellent quality of wild hay and the supply I judge is plentiful. The water supply is ample. There are quite a number of small creeks. The township is traversed by a creek of considerable size. The northwest corner is traversed by Pembina river which is about 5 chains in width and there are several lakes of considerable size, in all of which the water is fresh and wholesome. I understand that if the ice jams badly in Pembina river that some of the flats are at times flooded for twenty-four or forty-eight hours. Water power I judge is not available. The indications are that the climate is good. Grain and vegetables are raised every year and summer frosts are rare. The fuel is wood; good poplar, spruce, tamarac and birch can be obtained almost everywhere. No stone quarries, coal or economic minerals were observed, but I am informed that indications exist. Duck, geese, prairie chicken, grouse, rabbits and fish can be obtained in plenty. There are also deer, cariboo, moose, bear and the various fur animals.—*Thos. Drummond, D.T.S., 1904.*

Township 60 (north outline).—Throughout the whole of this range the ground is slightly rolling and heavily timbered with poplar and spruce of 10 and 15 inches diameter respectively. The soil is poor and sandy and rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—Range 2 has a narrow belt of good land along Moose river in section 34, and another and wider belt along Driftwood river in section 33, each belt being wooded with poplar of good quality. Elsewhere in this range there is nothing except mossy swamps of small tamarac and spruce. mostly dead, with no land of any value.—*Edgar Bray, D.L.S., 1904.*

Range 3.

Township 18.—This township may be reached either from Okotoks or High river by good trails. The soil generally is black sandy loam on the lower flats and extending well up on the hill sides, but on the tops of the higher hills a crumbly sort of rock protrudes and renders the ground almost barren. This township is generally hilly. The hills on the east boundary of section 17 are about seven hundred feet above the river north of them; on the boundary of sections 5 and 6 the ridges are about four hundred feet and on sections 13 and 24 about five hundred feet. This township is, for the greater part occupied by ranchers, and is altogether better adapted for this purpose than any other. The timber is black poplar and spruce located only along Highwood river in small quantities. About one-third of sections 17, 20, 28, 34 and 35, that is south of the river, is covered with scrub. Sections 24, 26, and 27 are about one-eighth brush, the rest of the township is pretty clear, prairie and meadow. Hay is cut on the hills and on the lower levels and is found everywhere, except on the hill tops. The water is fresh; besides Highwood river there is Bull creek in the south and numerous strong springs and ponds. Water powers might be obtained on Highwood river, but it would be extremely expensive to construct the necessary dams. Rock is plentiful, but I saw none suitable for stone quarries. Wood is the chief fuel at present, but coal is procured in the adjoining township a little further down the river. Minerals are not found here. Prairie chicken and partridge with a few duck are the only game found, though trout of large size are caught in the river and are very plentiful.—*John J. Dalton, D.T.S., 1904.*

Township 19.—There are good roads leading to this township from the Canadian Pacific Railway stations, Calgary, Okotoks and High river. The soil generally is a sandy loam, which in the lower situations becomes deep black loam and on the higher ridges stony, and in some places rock protrudes. The surface is generally prairie, but on most of the northern slopes and along the streams there is much scrub and small poplar, chiefly of the black variety, becoming large along the river flats, where it is mixed with scattered spruce and varies from six or eight inches to twenty-four inches in diameter. Hay is plentiful in this township and is pretty evenly distributed over the open country excepting on the higher hills. Water is very good and abundant, and well distributed from Sheep river. There is also a convenient supply of water for domestic and ranching purposes from the numerous strong springs rushing out of the ravines. Water power might be obtained almost anywhere along Sheep river, but it would be very difficult to construct dams to withstand the floods which become very violent and move stone banks or any impediment down the river, though it appears seldom to overflow its banks. With the exception of a few oats and hardy vegetables nothing is cultivated owing chiefly to summer frosts. The settlers find ranching the more profitable occupation and pay some attention to it. Coal is the fuel generally used, and is found in abundance in several of the adjoining townships. I discovered no minerals. Game is rather scarce, even duck and prairie chicken were not plentiful, but in all these mountain streams two varieties of trout are very abundant. Specimens of one variety are said to weigh eighteen pounds, but four or five pounds are more common. The other variety would average about sixteen ounces in the larger streams.—*John J. Dalton, D.T.S,. 1904.*

Township 20.—There are good roads leading to this township from the Canadian Pacific Railway stations, Calgary, Okotoks and High River. The soil generally is a sandy loam, which in the lower situations becomes deep black loam, and on the higher ridges stony and in some places rock protrudes. The surface is generally prairie, but on most of the northern slopes and along the streams there is much scrub and small poplar chiefly of the black variety becoming large along the river flats where it is mixed with scattered spruce and varies from six or eight inches to twenty-four inches in diameter. Hay is plentiful in this township, and is pretty evenly distributed over the open country excepting on the higher hills. Water is very good and abundant, and well distributed from Sheep river. There is also a convenient supply of water for domestic and ranching purposes from the numerous strong springs rushing out of the ravines. Water power might be obtained almost everywhere along Sheep river, but it would be very difficult to construct dams to withstand the floods, which become very violent and move stone banks or any other impediment down the river, though it appears seldom to overflow its banks. With the exception of a few oats and hardy vegetables nothing is cultivated owing chiefly to summer frosts. The settlers find ranching more profitable occupation and pay some attention to it. Coal is the fuel generally used and is found in abundance in several of the adjoining townships. I discovered no minerals. Game is rather scarce, even duck and prairie chicken were not plentiful, but in all these mountain streams two varieties of trout are very abundant. Speciment of one variety are said to weigh eighteen pounds, but four or five pounds are more common. The other variety would average about sixteen ounces in the larger streams.—*John J. Dalton, D.T.S., 1904.*

Township 45.—This township was reached from the adjoining township to the north by means of pack horses. A pack trail from the valley of Blindman river strikes the township in the northeast corner. There is also a wagon road from Lacombe running through the southeasterly portion of the township. The soil consists of a black loam overlying a clay subsoil and it should be well adapted to the growing of hay and the coarser cereals when the land has been cleared of timber. The surface of the township is rolling with quite a number of small swamps and muskegs. The whole township is covered with timber, but it is somewhat more open in the southerly portions. The timber is of mixed variety, with poplar prevailing, and although considerable fallen timber is found there is not so much encountered as in the townships to the north. The largest trees noticed would not exceed 15 inches in diameter on the stump. There is one lake in this township; it is situated in section 32 with a small portion extending into the township to the north. There are quite a number of creeks in the township, the waters of which with one or two exceptions, flow into Blindman river. These waters are all of good quality and are fresh. Being near the height of land there is little or no current excepting in extreme high water stages, and for the same reason they are not liable to overflow the adjacent lands to any extent. There are no water powers. There are no hay lands in the township so far as was seen. Climate is similar to other portions of northern Alberta, and it was exceptionally fine during the survey. I cannot speak as to summer frosts as survey was made in spring time. Wood is the only fuel available from outward indications. No stone quarries were observed, neither were any minerals of economic value found. Game is practically extinct with the exception of a few grouse and rabbits. Owing to the excellent waters found in this township, it should prove an ideal ranching spot if the land was cleared so as to produce feed for horses and cattle in sufficient qauntities to warrant settlers locating.—*B. J. Saunders, D.L.S., 1904.*

Township 46.—The survey of this township was commenced by running the north boundary beginning at the northeast corner of the township, which point was reached by cutting a road in along the north boundary of township 46, range 2, west of the fifth meridian, from the wagon road leading from Pigeon lake to Battle lake. This road is only fit for travel during the winter months when the ground is frozen, on account of the number of muskegs and swamps through which it passes. There is also an Indian pack trail leading from the valley of the north branch of Blindman river into the soutnerly portion of the township. This trail is difficult to travel owing to the amount of fallen timber lying in it, besides it appears to have fallen into disuse during late years. The soil of the township consists generally of a thin layer of black loam over a clay subsoil and is of a rather poor quality owing to its having been burnt by fires. The surface of the whole township is timbered, but the greater part has been badly burned over with the result that fallen timber in depths of from one to six feet and even deeper is met with nearly everywhere, rendering it difficult for anyone to get about on foot to say nothing about using horses. It was no uncommon thing to travel for half a mile or more on the fallen timber without ever putting foot to the ground. Throughout this fallen timber there is a varying growth of small poplar, birch, willow and alder with some pitch pine. The patches of green timber consist of spruce, poplar and birch with some pitch pine and a small quantity of tamarac found in swamps and muskegs. Some of the spruce is of good size making a diameter of 20 inches on the stump. It is located chiefly in the central western portion of the township. There are no hay lands in the township. The townsmp is fairly well watered with small creeks which are more or less permanent according to the dryness of the season ; their water is fresh. A small lake is situated on sections 9 and 10, and there is another in sections 2, 3, 10 and 11. Their waters flow to the northwest. The north end of a third lake lies in section 5. The land adjoining the creeks and the lakes is not likely to flood to any extent during high water. There are no water powers in the township. The climate is similar to that of other portions of northern Alberta, but summer frosts are liable to occur. The only fuel available is wood and no stone quarries were noticed. No minerals of economic value were met with and there is positively no game. In conclusion it may be well to say that without considerable labour intending settlers to this section of the country will find it difficult to make much headway unless the practically worthless growth of small timber is cleared off by fire.—*B. J. Saunders, D.L.S., 1904.*

Township 47.—The survey of this townsnip was commenced in the month of March of the present year, but owing to the nature of the country, work was discontinued in the springtime after the snow had disappeared and the frost had left the ground. The survey was resumed in August and completed in the following month. This township was reached by a road cut by my party along the north boundary of township 46, range 2, west of the fifth meridian, from the wagon road leading from Pigeon lake to Battle lake and is only fit for winter travel when the ground is frozen up, owing to the prevailing swampy nature of the ground over which it passes. The only practicable route into the township would be by using pack horses from Battle lake through township 46, range 2, west of the fifth meridian and through the northeast portion of the township to the west of the latter where there were some indications of Indian pack trail having been used, but as it was so nearly obliterated no mention of it is made in the notes. The soil of this township consists of a thin layer of black loam overlying a subsoil of clay and clay loam generally, and it is much deteriorated as a result of forest fires which have swept over this section of the country. It will no doubt be adapted to the growing of grasses and the coarser cereals once the land is cleared. The surface of the township is mostly rolling and it is covered with timber throughout, all of which has been more or less burned leaving only patches of green timber here and there. In the burned sections there is a growth of small poplar, birch and some pitch pine with willows and alders. The green timber consists chiefly of spruce and poplar with some pitch pine. The difficulties experienced in the township to the south of the one in question were repeated in 47, range 3, on account of the great amount of fallen timber met with. There are no hay lands and the township is rather poorly watered there being only two creeks of any importance. One enters on the south boundary of section 2 flows northwesterly and leaves the township in section 19. It is said to flow to Birch lake creek. The other stream is a tributary of Strawberry creek and runs through the northeasterly sections of the township, passing out in section 33. The first mentioned stream reaches a maximum width of 12 feet with a depth of about one and one half feet, while the latter is a stream of less than one third that size. The water in these streams is fresh and palatable and in high water they do not overflow their banks. There are no water powers on these streams. The climate is similar to that of other portions of northern Alberta with a tendency to frosts in August. The only fuel available is probably wood but it is quite possible that lignite could be found along the tributary of Strawberry creek already referred to. No stone quarries were observed, neither were there any minerals of economic value met with. Game is very scarce, and outside of an occasional grouse nothing was seen.—*B. J. Saunders, D.L.S., 1904.*

Township 48.—This township was reached by my party from the township immediately to the south by the north boundary of that township and a temporary pack trail. It can also be reached on the north boundary by following the bare line westerly along the north boundary of township 48, range 2 from where it is intersected by the pack trail leading from Pigeon lake to Wabamun lake, a distance of two miles from the northeast corner of township 48, range 3. but this route is only fit for travel on foot or with pack horses. The soil of this township consists largely of clay, and clay and sandy loams. There is practically no surface black loam, it having been burnt off by forest fires. The soil should, however, be capable of growing hay and the coarser grains when once the timber is cleared off. The surface of the whole township is covered with timber with somewhat less burned and fallen timber than met with in the township to the south. In sections 2, 3, 4, 9, 10, 11, 14, 15, 16 and 22, there is some very good green timber consisting of spruce and poplar chiefly. Sections 3 and 10 have already been selected and applied for as a timber berth or part of one. To the west and east of this area of green timber the country has been badly burned and travelling throughout it one meets with the difficulties experienced in getting through fallen timber. As you proceed north the second growth timber (poplar and birch) becomes larger, and the fallen timber somewhat less, indicating that considerable time has elapsed since fires swept over this portion of the township. There are no hay lands. In this township Strawberry creek or rather two main branches of this stream take their rise each flowing in a general northerly direction. They have been called the east and west branches of Strawberry creek in the field notes. They are comparatively insignificant streams at the south end of the township, but where they cross the north boundary on sections 34 and 32 they have a width of eight and twelve feet respectively. Their water is of good quality but the flow was very small and sluggish at the time of the survey. Both streams could no doubt be improved to enable timber to be floated down during high water in the springtime and early summer. The climate is similar to that of other portions of northern Alberta. Summer frosts are liable to occur in August. The immediately available fuel is wood but in all probability lignite could be found along one or both branches of Strawberry creek if diligently prospected for. No stone quarries were noticed neither are there any minerals of economic value found. The only game seen consisted of grouse and rabbits.—*B. J. Saunders, D.L.S., 1904.*

Township 49.—This township was reached from the township to the south of it. It is also accessible by pack trail from the pack trail leading from Pigeon lake to Wabamun lake which passes through the northeast corner of the township in section 36. This being an Indian pack trail it has been allowed to fill up with fallen timber and is in consequence very crooked. The soil consists of black and clay loams overlying a clay subsoil and it should be a soil adapted to the growing of hay and the coarser cereals when the land is cleared. The surface of the whole township is rolling, generally speaking, and is covered throughout with timber. Standing and fallen burnt timber is not met with so extensively as in the township to the south although the country has at one time been burnt over probably from fifty to sixty years ago so that it has now the appearance of a green bush country. The timber consists chiefly of poplar from four inches to twelve inches in diameter with spruce, birch and pitch pine interspersed throughout. This timber is only fit for firewood, fencing, logs for buildings, and a small quantity might be used for lumber, but there is not sufficient to advise any areas being set aside for timber berths. There are no hay lands worth mentioning in the present condition of the township although there is fairly good grazing for horses along Strawberry creek in section 13. The township is fairly well watered by creeks, the waters of which are all fresh and of good quality. The east and west branches of Strawberry creek enter the township on sections 3 and 5 respectively, flow northerly and easterly uniting on section 10 forming a stream with a width during ordinary flow of from fifty to seventy-five links. This stream then flows in a northeasterly direction passing out of the township on section 24. It could be utilized without much improvement during high water for driving timber from the south to Saskatchewan river. The banks are high and the river could do no damage by flooding during the high water stages of the stream. There are no water powers in this township. The climate is like that of other portions of northern Alberta, but there would likely be summer frosts in the latter part of August. There is an abundance of wood for fuel, and coal or rather lignite could no doubt be found almost anywhere along Strawberry creek if properly prospected for. An outcropping of lignite was noticed on section 13 in the banks of Strawberry creek. No stone quarries were seen, neither were there any minerals of economic value found. The game in this township is very scarce, and with the exception of an occasional grouse and the everywhere present rabbit nothing was seen. With the opening of roads west from Leduc, this township will doubtless soon be settled by people who are satisfied with small holdings and who are prepared to do a certain amount of clearing of land to enable them to start in a small way.—*B. J. Saunders, D.L.S., 1904.*

Township 55.—This township is easy of access. The public road reaches the east end of lake St. Ann, a few chains south of section 2; thence there is a road going northwards through the whole length, reaching its north boundary in section 34. The subsoil is composed of sandy clay in most cases; decayed moss and other vegetable matters being found in the muskegs. The top soil, black loam, has an average depth of a few inches. That part of the ground not covered with muskeg is good for farming. In no place can the surface be called rough and hilly, though there is a ridge following the north of Lake St. Ann. The rest of the township is rolling and slightly rolling. The township is heavily timbered, except in the southeast and southwest corners, where it is scrubby and covered with a new growth of timber, the only open places being in the hay sloughs. The area of the muskegs is from one-sixth to one-eighth of the township. Outside of spruce and tamarac the only timber found is poplar with occasional cottonwood. The poplar is big throughout the township, except in the southeast and southwest corners, and in the muskegs. In these muskegs small tamarac and spruce and scrub are found with willows. A good part of the forest in the south half of the township has much fallen timber. The only hay is slough hay along a string of muskegs and small lakes which extend from the southeast to the northwest corners. Several hundred tons of hay can be cut throughout the township. The water in the lakes is putrid and not fit to drink. The water of Lake St. Ann in summer is full of tiny pieces of grass or moss, which render the water unfit to drink, though it is not as bad as in the smaller lakes. They say that this green matter disappears from Lake St. Ann when the water gets cooler in the fall. The watershed between the Pembina and the Saskatchewan rivers passes through the township; so there is no stream of importance. The water in the creeks is not as bad to drink as that in the lakes. There are no water powers. The climate is the same as that of Edmonton, except that it might be slightly warmer along Lake St. Ann. The nights are apt to be cooler along the muskegs. We had two nights of frost about June 21. There is no coal known to exist but dry wood is common. No minerals were found and no rock in place. Ducks and partridge are found and we saw fresh tracks of bears several times during the summer. The heavy timber will delay the opening up of this township. There are two squatters.—*Raoul Rinfret, D.L.S., 1904.*

Township 56.—A road crosses the whole township from north to south and connects Lakes la Nonne and St. Ann. The subsoil consists of sandy clay covered by an average of a few inches of black loam. Stones are found in the ground on the little ridges. The soil is good for farming. The quality averages a little better than class No. 2. Fire has burned the eastern half of the township (in 1887 some say). This is how Onion prairie was formed. This prairie is about one-third of the township in area with occasional bunches of big poplar, of new growth and scrub. The rest of the township is covered with fairly big poplar with bunches of spruce for lumber in the southwestern part. Onion prairie does not produce much good hay. Slough hay is not abundant as the muskegs are mostly timbered or covered with moss. But a few hundreds of tons could be cut. The water in the creeks is fit to drink. These creeks which were big at the time I surveyed the township, were nearly dried up in October. The only lake wholly in the township has very bad water. There are no water powers. Climate is about the same as that of Edmonton. There was a pretty severe frost for two nights about June 21. No coal is known to exist. Dry wood can be procured nearly everywhere. Dry stumps cover part of Onion prairie. No stone fit for quarrying was seen. No minerals were observed. Two deer were seen. There were tracks of bears, while partridges, prairie chickens and ducks are numerous. There were some 12 settlers in the township on October 1.—*Raoul Rinfret, D.L.S., 1904.*

Township 57.—The road to the crossing of Pembina river and to this township passes through St. Albert, Rivière Qui Barre and the various settlements en route. It is a good road in the winter, but I understand not very good in summer. The soil is a sandy and gravelly loam, which in places is rather light, especially in the southern portion of the township, but as a whole, it is fairly good so far as I could judge in the winter. It is suitable for growing the various cereals and vegetables. The surface is covered with timber. In some places the large timber has been destroyed by fire and has been replaced by smaller poplar. The timber is mainly poplar, but a considerable amount of spruce, tamarac and birch is also found. Plenty of hay can be cut in the sloughs, marshes and old river beds. It is the usual wild hay but it is good. There is a plentiful and permanent supply of good fresh water. Lac la Nonne and Majeau lake are both large lakes. The township is also traversed by various creeks, one of which is of considerable size, and is the inlet and outlet of the above two lakes. Pembina river also runs through section 31. It is a river about four and one-half to six chains in width and a depth of from four to ten feet, and a current which is not very swift, probably two and one-half miles an hour. There are also numerous small spring creeks. Along Pembina river the bottoms are flooded at times by ice jams to a depth of about two to four feet, but only for a short time in the spring and not regularly. There are no falls and I judge that water power is not available either naturally or by damming. The climate is favourable, and I am informed that summer frosts are rare. The various grains and vegetables are raised annually in a small way. Wood is the available fuel, and it can be procured anywhere. I understand that there is indication of coal at one point on the north shore of Lac la Nonne, but I could not tell on account of the snow. No minerals of economic value were discovered. The various game birds, such as duck, prairie chicken, grouse, geese, &c., are plentiful, as are rabbits. There are a few bear, deer and cariboo in the vicinity, and there are plenty of white-fish and jackfish in the lakes and streams.—*Thos. Drummond, D.T.S., 1904.*

Township 58.—The road to old Fort Assiniboine and further passes through this township, but is not in good order. The soil is good and it is suitable for raising the various grains and vegetables as proved by existing work. The surface is completely covered with timber, namely, poplar, spruce, tamarac, birch and willows, some of which is from eight inches to twenty-four inches in diameter, and suitable for building lumber, rails, fence wood, &c. Many sloughs are found affording, under ordinary conditions, fine hay in large quantities. Many of these sloughs, owing to last years wet season, could not be cut, but this was exceptional. Good wholesome fresh water is plentiful in the shape of numerous small lakes and streams. Pembina river is the only stream of any size. It is from four and one-half to six chains in width and four to ten feet in depth, with a current of about two and one-half to three miles an hour. It traverses the whole township. The bottom land along the river is sometimes flooded in places for a depth of two to four feet, but it is due to ice jams and it only lasts for a few hours. Natural water power is not available and the probability is that the banks are not high enough to allow it to be artificially formed by means of dams. The climate from the reports of settlers is suitable for farming and summer frosts apparently are rare or unknown. A plentiful supply of good fire-wood can be obtained almost everywhere. No minerals of economic value were discovered. Duck, geese, grouse, prairie chicken, rabbits and fish are common, and deer, cariboo, bear and the various fur animals such as mink, otter, martin, muskrat, &c., are also caught—*Thos. Drummond, D.T.S., 1904.*

Township 60.—North outline,.—Across range 3 the line passes over a brulé country covered with a second growth of poplar and willow scrub. On the northwest quarter of section 31 the east shore of Shoal lake is intersected. The soil is similar to that of range 2 and rated 3rd class.—*L. E Fontaine, D.L.S., 1904.*

Township 72.—(North outline).—Range 3 is practically all a mossy swamp, covered mostly with small tamarac and spruce, mostly dead, with soil of no present value.—*Edgar Bray, D.L.S., 1904.*

Range 4.

Township 34.—A trail from Innisfail and also one from Olds (both stations on the Calgary and Edmonton railway) afford easy routes for reaching this township. Bridges across Little Red Deer river have been erected on both of these trails. Both trails, however, are very soft in wet weather. The surface of this township is generally high rolling land becoming very hilly near Red Deer river. Along the valley of the Red Deer very good spruce, up to 14 inches in diameter, is met with. The whole surface of the township is more or less timbered with poplar, spruce, jackpine, balm of Gilead, &c., in large bluffs. There is no prairie, what open land there is being covered with a short growth of willows and scrub. Good hay for pasture occurs all over the township. Some large hay areas (upland) occur in sections 26, 27, 35 and

36. Hay can be cut in all open areas after the removal of the scrub. The water is good in all the numerous springs, spring creeks and in Red Deer river ,which flows diagonally across the township. There are also a large number of grass sloughs containing fresh water. There are no falls in Red Deer river, but it has a very strong current. Power could be developed on it, but I am of the opinion that the expense would be too great to make it a paying proposition. From the inquiries I made I consider the country suitable only for ranching. The climate is too uncertain for mixed farming. Grain does not ripen. Wood is the only fuel. Sandstone outcrops were seen in the cut banks of the Red Deer in several places, but there is a large deposit of soil overlying it. No minerals were met with. Tracks of deer were seen, bears are reported, also wolves, numerous chickens, partridge, ducks and geese are found. The soil is black, clay and sandy loam of varying depths, with clay or sand subsoil.—*H. B. Proudfoot, D.L.S., 1904.*

Township 35.—I reached the above township from Markerville P. O., on Medicine river, from there west to Rocky Mountain House trail, thence south following this trail about three miles. From this point it was necessary to cut a new road across the valley of Raven river into and through the above township. This road might be made passable for summer travel with a little work and a bridge over Raven river. The soil in this township is a light, sandy loam well adapted for dairy and mixed farming, owing to an abundance of springs and spring creeks, which rise almost without exception within its boundaries. All the water is pure and free from alkaline matter. The only marketable timber is found in the north and northeastern portion of the township, but is not of a very good grade. The remainder of the township is covered by small poplar and very dense willows and scrub. There are a few hay sloughs but not of any considerable value. The climate is similar to that found in other portions of Central Alberta. There is no available water power, building stone, outcropping of coal or any minerals of economic value. A few jumping deer is the only game in the vicinity. There is a small stretch of prairie in section 1 following the valley of Red Deer river.—*A. E. Farncomb, D.L.S., 1904.*

Township 51.—Of this township I surveyed the part east of the meridian going south from the northeast corner of section 34. The principal feature isLow-water lake, situated in the eastern part and extending north and south mostly through the whole depth of the township, fifty chains only, of the west boundary of section 31 being out of water. The eastern part is reached by a wagon trail coming fromMewassin. The northwestern part can actually be reached only by a trail coming from the Indian reserve, situated east of Wabamun lake, two miles north of this township. This trail leaves the Indian reserve on the south boundary of section 14 to enter the subdivided part of 52—4 on section 11, crossing this last township in a southeasterly direction it comes into 51—4 on section 32. From this last trail, there is an old Indian pack trail going south towards the Saskatchewan through sections 32, 29, 20, 17, 8 and 5. It is so lightly marked that it escaped our attention in winter ; this is the reason why it is entered in the notes only approximately north of section 8. The soil is a coat of six inches of black loam over a clay subsoil. However towards the south, for the depth of two sections, the soil is mostly sandy loam. The whole of the township is suitable for farming. The country is slightly hilly toward the north, but for the remainder it may be taken as heavy rolling with good patches of level ground. The three northern miles may be considered as thickly wooded, for that part of the country, but from there south, many patches of prairie and small poplar or scrub offer good chances for prompt settlement. The timber is mostly poplar, but there is some good spruce along the north boundary and also a good amount of it along the eastern boundary of sections 6 and 7. The water is good in lakes, sloughs and creeks, but as in all that section of country it may be scarce in dry years. There are no water powers. Poplar is the fuel mostly available. It can be procured all over the township, but it is more abundant towards the north. I have heard that along the Saskatchewan, not far south, coal is available. I know of no stone quarries nor of any minerals. Game is not plentiful. There must have been an immense quantity of beavers in this country once, if we judge by the number of beaver dams found along the creeks in the township.—*Geo. P. Roy, D.L.S., 1904.*

Township 51.—There is a wagon trail from Mewassin to Fraser's sawmill in section 36 in good condition, from that place to Saskatchewan river, the road goes nearly south. The north part of the township for two miles is thickly wooded with spruce of fair size, poplar and cottonwood, but the best spruce has been cut. So, it was a hard job to run and measure the lines over that rough country covered with windfall. Every care has been taken in consequence to obtain accurate measurement. I was obliged to open a pack trail in bush all around this township. The surface is roughly rolling and in some places broken by several creeks with banks 150 feet high. These creeks seem to run all the season, but I think when the timber will be cut they will be dry the greater part of the summer. Setflers coming to this township in view of farming will have hard work to locate themselves in a suitable section on account of thick willow and brush, but they will not regret their trouble if they intend to keep stock. There is enough hay for the needs of settlers who will find, at the same time, good land with black loam and clay subsoil. So, in conclusion I may state that in my opinion this township is better suited for stock raising than for farming purposes.—*C. E. Bourgault, D.L.S., 1904.*

Township 52.—Wabamun lake and an Indian reserve, situated north of sections 10, 11 and 12, bound on the north the sub-divided part of this township. This township can be reached only by a trail passing through the Indian reserve from Mewassin, that is, first running northwest from Mewassin till it nearly reaches the 14th base line, and from there going southwest till it strikes the subdivided part of this township on section 11. It runs from there nearly southwest until it leaves the township on section 5. The soil is black loam in most places. The surface is slightly hilly all through, the elevations being covered with poplar of a fair size with spruce in the muskegs. The line between sections 9 and 10 passes through a fine grove of spruce averaging eight to ten inches in diameter. The only place where hay can be found to any extent is along Wabamun lake, especially in the part bordering on sections 9 and 16. Whitefish are plentiful in the lake. The water is good in the lake, and in the creeks, which are of little account, and consequently there are no water powers. Wood as fuel will be abundant for a while, moreover coal exists on the next range along Wabamun lake on the north side. There are no stone quarries nor minerals, and very little game.—*Geo. P. Roy, D.L.S., 1904.*

Township 52.—There is a trail from the reserve around the lake crossing the township, but it is in a very bad condition. I could not use it. I was obliged to carry my outfit with pack saddles, and I cut my trail in bush, which was a cause of delay. On the south part the first two miles is rolling and in some places hilly, sloping to the lake and covered with poplar, spruce and birch. I noticed especially the southeast corner, which is thickly wooded with spruce. Messrs. Fraser & Co. were cutting logs during the winter. The soil is either clay loam or sandy loam, containing very good land for agricultural purposes, and can produce all kinds of cereal and root crops. The only objection to this township for settlers is the labour involved in clearing a forest country. The climate is very fine; this is due to the warmth of the water of the lake, which tempers the atmosphere for a distance of a couple of miles around the lake. This township is well watered with Wabamun lake and several creeks of good water running to the lake. Wabamun lake is a large sheet of water, measuring twelve miles long and two miles broad. It empties its water through Wabamun creek into Saskatchewan river. It abounds in fish of different kinds such as whitefish, pike, carp, &c. To give me an idea of the value of the fishing, a merchant told me that during the winter he had exported to United States 375.000 pounds, besides all other exportations made by other persons. Several half breeds of Lake St. Ann settlement spend the greater part of the season fishing in that lake. If we add to that number about 500 fish that are caught daily for the consumption of the reserve and settlement, we will form an idea of the great destruction of fish that is going on at Wabamun lake. Care should be taken to allow fishing only at the proper season. There are no water powers, minerals or game. Notwithstanding some objections for the settlement of this fractional township, on account of bad roads and heavy bush, I will not be surprised to see all quarter sections taken around the lake for the fine site and the advantage of being near a lake full of fish.—*C. E. Bourgault, D.L.S., 1904.*

Township 55.—The public road reaches the east end of lake St. Ann. In summer, wagons follow along the marshy ground in the lake on the north shore, for a couple of miles to a wagon road that goes to section 6, after going through Alexis Indian reserve. Section 36 is reached by a wagon road going northerly from the Indian reserve. The soil is good for farming. The pits show, except of course in muskegs, a sandy clay subsoil, covered by a few inches of black loam. Stones are apt to be found in the ground on the ridges. The surface is rolling throughout the township, but no high ridges or steep hills were found. Fire has raged over the township, and the only timbered parts which have fair sized poplar are a strip a couple of miles wide on the eastern part of the township; and along the north boundary of the reserve. and that part of the township lying west of the reserve. In this latter part the timber is only in patches. The rest of the township is covered with a new growth of timber. Dry wood standing and fallen is found throughout the township. With the exception of a very few spruce and tamarac big enough for logs, and a few bunches of the same timber, but of smaller size, the timber found is poplar of good size in the places above described. The rest of the timber is small poplar and scrub. Marsh hay is found in the muskegs. There is some hay growing in the open spaces, but it is poor. The water found in the little lakes of the township is not fit to drink. The only creek of any consequence is in section 6. It was almost dry at the end of August. There is no water power. The climate seems to be somewhat warmer than that of Edmonton. A few balsam trees and jackpine are found, and wild gooseberries and red currants. The most readily available fuel is the dry wood scattered throughout the township. No minerals were found and no rock in place. Ducks are plentiful in the lakes. Partridges are seen occasionally.—*Raoul Rinfret, D.L.S., 1904.*

Township 60.—(North outline).—In range 4 the surface is broken and heavily timbered with spruce and poplar. Shoal lake with the hay marsh surrounding it covers part of sections 35 and 36. On the northwest quarter of section 35 the line intersects the Canadian Northern railway exploration line and on section 34 crosses Chalmers trail. Soil is 3rd class.—*L. E. Fontaine, D.L.S., 1904.*

Township 72.—(North outline).—Lesser Slave river crosses the 19th base line near the middle of section 35. For a distance of between one-half and one mile on each side of this river we find good land, but being rather low, it will be better suited for grazing than for any other purpose. The remainder of the range is mostly a mossy swamp of small tamarac and spruce and is of no value until drained.—*Edgar Bray, D.L.S., 1904.*

Range 5.

Township 28.—This township may be entered from the south, at the southeast corner of section 3, by a timber trail, leading in from the east. Again it may be entered from the northeast corner of section 24, and there is a fair wagon trail along the hill north of Dogpound creek, to the middle of section 22. The soil of the part of the township surveyed by me is chiefly gravel. It is generally stony. The surface is broken and the subsoil is stony—loose stones and gravel. There is good grass along

Dogpound valley, where the scrub and trees are not too dense. There is good hay cut on the west side of the township, in the centre of section 18. There is a deserted house on the northeast quarter of section 18. There is also a deserted timber camp in the northwest corner of section 9. There is some merchantable timber in Green valley in the northeast corner of 22 and northwest corner of 23, mostly spruce and pine from six to eighteen inches in diameter. There is also some good timber in section 6, but this section is very rough, so it would be difficult to get timber out. South of the Dogpound the timber has been burnt. There is much fallen timber and windfalls, and the timber is chiefly second growth pine and poplar from two to six inches in diameter, except the merchantable timber, previously referred to. North of Dogpound creek and east of the muskeg in 28 and 33, there is less fallen timber. The part of the township surveyed by me is suitable for grazing purposes. There is plenty of good fresh water. There are no water powers. The climate is healthy. The days are warm and the nights are cool. There were slight frosts in August, but they did no damage. There is no coal, but plenty of wood for fuel. No stone quarries were located. There is good trout in Dogpound creek and partridge are plentiful. No mineral specimens were found. The surface is generally broken and the streams flow in deep coulées. This combined with some large hills on the west gives the country a rough appearance.—*John Aylen, D.L.S., 1904.*

Township 29.—The route to this township is by way of Bradbourne post office, which may be reached from the south or from the east or from the southeast. From Bradbourne, the route is about west to the southeast corner of the township, from which point, a wagon can be taken northwest as far as the eastern boundary of section 15; or it can be taken into section 11 and thence along the right bank of Stony creek, to a point near its confluence with Little Red Deer river, and by crossing the creek, a point can be reached on the northern boundary of the township, two miles west of the northeast corner. There is also a road from the northeast, leading from a saw-mill on Little Red Deer to a lumber camp on the same river, by which a point in section 29, on the bank of Little Red Deer can be reached. The soil of nearly all the township is good, being a black vegetable mould over clay or loamy clay and is classified as No. 1, but along the westerly part of the base line, and along the westerly limit of the township as far north as Little Red Deer river, the hills are for the most part of cemented gravel or of loose rock. The township is well fitted for grazing. Where the woods are not so dense as to obscure the light, there is good grass amongst the trees and scrub. The streams flow in deep valleys, forming in some places ravines, and the effect is a rather rough surface. To the west of the township, the surface is hilly and broken and too rough for agricultural purposes. There is a great deal of timber in this township especially of large poplar and spruce, and a great quantity of poles suitable for fencing. These poles in places grow so densely that it is difficult to get a line through them, there being no place to let them fall, after they have been cut. The merchantable timber and poles are chiefly to the west of the meridian, forming the east boundary of section 3 produced across the township, and to the south of Little Red Deer river. Along the right bank of the river in sections 35 and 36, there is also a dense growth of large spruce. The poles previously referred to are chiefly from 2½-inch to 6-inch in diameter and from 25 to 50 feet long. Poplar and spruce up to 10 inches in diameter are plentiful and poplar of 18 inches and spruce of 30 inches in diameter are found. The balance of the township is covered with scrub and grass and small poplar, and a few clumps of spruce. There is very little hay. On the east side of the township, there are a few patches of hay of an acre or less. Very little of the prairie grass is available as hay, because of the great quantity of scrub. The chief streams are Little Red Deer river and stony creek, in both of which the flow is permanent and the water fresh and good. There is no indication that either of these overflows its banks to a troublesome extent. The Little Red Deer is suitable for driving logs. It is made up of pools and rapids. Last spring, logs from section 29 were floated down the river to a sawmill further down. There are no water powers. The climate is agreeable and temperate. There were no summer frosts to cause damage during the present season. There is an abundance of wood for fuel. Wood is hauled during the winter season from this township to the villages along the Calgary & Edmonton railway and to ranches at intervening points. There is a coal mine on section 17, which was worked last winter and a considerable quantity of coal taken from it. No stone quarries were observed. No minerals were observed except the coal mentioned. A few deer were seen and a considerable number of partridge and prairie chicken. Trout are plentiful in Stony creek and in Little Red Deer river.—*John Aylen, D.L.S., 1904.*

Township 30.—This township may be entered from the northeast by a wagon trail, that leads to the Little Red Deer river, and is on the north bank of the river in section 4. The soil of most of the township is black vegetable soil over clay. In the valley of Fallentimber creek the subsoil is gravel. The township is suitable for grazing and where the growth of timber is not so dense as to shut out the light, there is good grass amidst the brush and trees. East of the eastern boundary of section 3 produced, the surface is covered with scrub, small poplar and some spruce, also good grass. This is the most lightly timbered part of the township. To the west of this line the surface is densely covered with poplar and spruce, ranging from two to fifteen inches in diameter but chiefly from four to ten inches. There are a few scattered patches of small pine and a few less densely wooded spots along the valley of Fallentimber creek. There is also a muskeg of considerable area, extending from the southern boundary of section 15, in a direction a little east of north and extending beyond the north boundary of the township. There are two small lakes along the north boundary of section 20, the water of which is of the character of slough water. There is some hay along the east side of section 36. There are large springs on section 16, that feed a creek, that discharges into Little Red Deer river. This creek seems to have a permanent flow. The water of all the streams is fresh and wholesome. There are no indications of floods to cause damage. There are no water powers. The climate is agreeable. While the sun is up the air is warm and it cools off rapidly as the sun sets. No coal nor lignite was observed in the township, but there is an abundance of wood suitable for fuel, for building, and fence purposes and for making pulp. No building stone was observed, as the surface is well covered with soil. No minerals were observed. There are a great many partridge. Black bears are also numerous. There are splendid trout in Fallentimber creek and in Little Red Deer river. A few deer were also seen. A word might be said regarding sections suitable for timber berths. In the following quarter sections there is some good spruce and poplar.—In section 8, also in N.E. and S.E. quarter sections of 21 ; N.E. and S.E. quarter sections of 22; S.W. quarter section of 26; S.E. and N.E. quarter sections of 27; S.E. quarter section of 7.—*John Aylen, D.L.S., 1904.*

Township 31.—This township lies about 18 miles due west of Didsbury, a small town on the Calgary and Edmonton railway. The roads are fairly good up to the northeast corner of this township or could be made so with slight expenditure of time and money. It is easiest of access by way of Mr. Robert Brown's ford of the Little Red Deer on section 17, township 31, range 4, thence by a trail along McDougall coulée, which crosses the northeast quarter of section 36 of this township. This is about the only way, at the present time, of getting into this township, it would be necessary to make some slight improvements for crossing the creek in the bottom of this coulée. The soil varies from a light sand to a stiff clay, overlaid generally by a depth of black loam varying in thickness from 2 to 12 inches. It would grow any kind of crop, if the climatic conditions were favourable. This is virtually a bush township, the first one coming in from the east, the timber consisting of poplar, banksian pine and spruce, but not in sufficient quantities to be of any commercial value. The best timber has already been removed, there being a sawmill only four miles distant. Settlers from the prairies to the east come in here in the winter, camp here, cut their logs and haul them to the sawmill, from where after being sawed, they haul the lumber to their homesteads. There are numerous marshes and meadows distributed over the township, some of which are of the nature of quaking bogs and retain the frost until late into the season. Water is good and plentiful, and I think, permanent. A large stream, Fallentimber river, divides the township into east and west halves, and appears at certain seasons to reach extraordinary dimensions, to judge by the scattered driftwood and other debris caught on standing trees, in some instances 10 or even 15 chains away from the main bed. These flats or bottoms are mostly stony, having been denuded of the soil by frequent overflowings. There are no falls but the current in the river is very rapid. At the time of survey (May) almost nightly frosts were experienced. The timber being of no particular value, except for local domestic supply, if once removed this township would well adapted for cattle raising. Fuel is plentiful, such as poplar, banksian pine and spruce, but no coal of any description was found, neither was any stone found suitable for quarrying, nor any other minerals. Signs of game, such as deer, partridge and a few grouse were occasionally seen, but the animals that make themselves most conspicuous were the bears, both black and brown, as they on several occasions made serious inroads into provisions that had been cached by me in various places. Speckled trout and greyling were also taken out of Fallentimber river, although not in such numbers as in the townships higher up the stream.—*C. F. Miles, D.L.S., 1904.*

Township 31 (north boundary).—This boundary was surveyed to complete the survey of township 32, range 5, west of the fifth meridian. The country traversed by this line is generally hilly, well timbered with poplar, jackpine and spruce of various sizes, but with a few small patches of prairie. Fallentimber river, about 1 chain in width, is crossed, and although it has a swift current there is no place available for the development of power to any extent. No minerals were found on this line.—*H. B. Proudfoot, D.L.S., 1904.*

Township 32.—A trail running due west from Olds station on the Calgary & Edmonton railway to the mill in this township affords an easy method of reaching it. This is a good winter road, but in what shape it would be in the summer I cannot say. The soil is generally black loam of varying depths over a clay subsoil. The flats on the north side of Red Deer river have a very light deposit of alluvial soil over gravel subsoil. On account of the frequent summer frosts this country is not adapted for grain growing. Of course, that drawback may disappear with the advancement of settlement and the consequent clearing of the land. North of the Red Deer the land is mostly prairie with a fringe of spruce and poplar near the water. South and east of the river the land is heavily timbered with spruce, poplar and balm of Gilead. There is no hay except around the few sloughs and amongst the brush in the scrub land. Red Deer river and Fallentimber river are the two principal streams. There are also numerous small streams or brooks, but at time of survey most of them were frozen to the bottom. There is no water power. The weather was very cold in February, but in March the snow had disappeard. Frost was in the ground though until after the middle of June. For fuel there is timber only. Outcroppings of coal were noticed in 32-6, but none in this township. There are a few exposures of bed rock along Red Deer river, but none of them had been developed. No minerals were noticed. Chickens and partridges and a few deer and bear were seen.—*H. B. Proudfoot, D.L.S., 1904.*

Township 33.—A trail running due west from Olds on the Calgary and Edmonton railway strikes Red Deer river about one mile south of the south boundary. There is also a branch of that trail running northwesterly to Niddrie's ranch on section 36. The soil is generally a small alluvial deposit of black loam over a poor clay subsoil. The land in the northwesterly portion is of better quality. On account of the prevalence of summer frosts this country is at present unsuited for grain growing. Along the south boundary there is considerable prairie on the flats of Red Deer river. The northwesterly part is well timbered with jackpine, spruce and poplar, where not burned, and there is some good spruce along the Red Deer. The remainder of the township is covered with a small growth of poplar, spruce, jackpine and balm of Gilead. There are no hay marshes of any extent. By the cleaning of the scrub on the uplands good hay can be cut. There are numerous spring creeks, no lakes and but few sloughs. Red Deer river and Bearberry creek flow through the township. All the water is fresh. There is no water power. It was exceedingly cold at the time of survey—25° and 30° was a common occurrence. I am informed that there is frost every month in this locality. Timber is the only available fuel. Stone quarries may be opened up in some of the cut banks of the Red Deer near the northerly end of the township, but at present none are being developed. No minerals were observed. Blacktail deer, bears and chickens are found. McDougal's ranch is located in the south, Niddrie's and Fletcher's ranches in the northeast, all have a large number of cattle and good buildings.—*H. B. Proudfoot, D.L.S., 1904.*

Township 34.—An old trail from Red Deer station on the Calgary and Edmonton railway passes close to the north boundary of this township. The soil is generally a black loam of varying depths over a clay subsoil. On account of the shortness of the season and the frequency of summer frosts, the country is only adapted for ranching or cattle raising. The greater portion of the area is covered with a small growth (large in some places) of poplar, balm of Gilead and spruce. Wherever the land is at all open there is a thick growth of scrub. Very little real prairie exists. There is good pasture all over for cattle and horses—even in the timber but there are no hay marshes of any extent. The water is very good—the numerous spring creeks and the sloughs are all sweet; very little alkali is met with. Power might be developed on the Red Deer by the construction of dams but it would be liable to flood a large area in township 33, range 5. The survey was made in winter and some pretty cold weather was experienced. The mounders who were working in this township in June had some trouble with frost still in the ground in places. I have been informed that summer frosts are very prevalent. Poor quality of stone is exposed in the cut banks of the Red Deer, but it has never been worked. No minerals were noticed. Tracks of moose and red deer were observed ; partridges and prairie chickens were numerous and tracks of bear were seen in June.—*H. B. Proudfoot, D.L.S., 1904.*

Township 36.—In order to reach the above township I found the nearest accessible point to be Markerville, P.O., on Medicine river, from there proceeding west to Rocky Mountain House. Olds trail, by a road which is good in winter, but I understand is impassable in summer, thence following the above trail about five miles to near the forks of Raven river, then by following an old trail across the north branch of Raven river and north of Raven river through the township above referred to. The route adopted in summer crosses Medicine river at Markerville, P.O., then south along the right bank of Medicine river to Red Deer river then following this river to Rocky Mountain House trail. The soil generally in this township is a sandy loam with a clay subsoil being on the whole class No. 1 and as it is not heavily timbered would be easy to break and put into cultivation. Although it is of the lightest variety of soil, still this is better adapted for the short seasons and early frosts which prevail at present. The whole of this locality is well adapted to mixed farming as it is well watered by springs and Raven river. All the water is exceptionally pure and free from alkali. There is very little marketable timber in this township; what little there is, is chiefly in the valley of Raven river in the southern portion of the township, being principally spruce, tamarac and jackpine varying from four to thirty inches in diameter, but as it is only found in bluffs it is hardly worthy of special mention. The greater portion of the country is rolling and covered with small poplar and scrub, with patches of small jackpine. There are no hay sloughs of any value but a considerable quantity might be found in the valley of Raven river. The climate is similar to that found in other parts of central Alberta. There is no available water power, building stone, outcropping of coal or any minerals of economic value. The only game to be found in this township is the jumping deer.—*A. E. Farncomb, D.L.S., 1904.*

Township 37.—In reaching the above township I was forced to use the trail already opened through the timber from Evart's post office to township 38, range 5, and from there to the several camps in this township. The best way to reach the southern portion in the summer or perhaps any part of the township would be from Markerville post office on Medicine river west to the trail from Rocky Mountain House to Olds, which passes diagonally across the southern portion of this township. The soil on the whole is fair, being a sandy loam and in most cases a clay subsoil, being suitable for dairying and mixed farming. This township is well watered by lakes and ponds and also by the north branch of Raven river, which flows through its southern portion. The hay meadows are not good at present, but with drainage very valuable meadows could be obtained. In the valley of the north branch of Raven river, however, a considerable supply of hay could be cut under present conditions. The water throughout the township is pure and free from alkali, especially the north branch of Raven river, which rises in a large spring near the western boundary of the township and is free from ice for at least two miles in the severest winter. Owing to its small drainage area this stream could not flood to any extent. There is no available water power, no outcrop of coal, building stone or minerals of an economic value. The climate is similar to that in other portions of central Alberta. The only timber of any value is found in sections 2, 3, 27 and 33 varying from 6 to 30 inches in diameter, the remainder of the township being covered with small poplar and scrub. There is no prairie in the township. There did not appear to be game of any description.—*A. E. Farncomb, D.L.S., 1904.*

Township 38.—I found it impossible to reach the above township by any well travelled trail, but that by following a winter road which had been cut through the timber from Evarts P.O. on Medicine river to section 2, township 38, range 4, and by continuing this road west, I was enabled to get a very good winter road to my first camp and from the first to the other camps by following the sloughs and cutting new roads. This road, which I have opened, will be impassable in summer, and in fact considerable difficulty will be experienced in opening up the road allowances for the settlers in the future throughout the whole township, unless by means of a systematic drainage scheme. I found the soil on the higher lands, that is the portion which was not covered by sloughs to be a light covering of sandy loam with a clay subsoil and well adapted for dairy and mixed farming. The surface of the ground is on the whole gently rolling and not abrupt, about seventy-five per cent being covered with small poplar and scrub and the balance sloughs and patches of marketable spruce and tamarac varying from six to thirty inches in diameter. There is no prairie in this township. About fifteen per cent of the township is covered by sloughs and ponds, and if drained would make very valuable hay meadows, but at present there is very little hay of any value. There is only one creek of any importance in this township, being a branch of Horseguard creek, and is fed by the innumerable sloughs in this township and adjoining ones; but in dry seasons I am of the opinion that it would dry up. There is no available water power, outcropping of coal or any mineral of economic value, nor does there appear to be any building stone in the vicinity. Game of any kind is very scarce. A few jumping deer are to be found in the northwestern portion of the township.—*A. E. Farncomb, D.L.S., 1904.*

Township 41.—This township is reached by way of the Rocky Mountain House trail from Lacombe. The trail is for the most part in fairly good condition, and passes about six miles south of the township. The soil is mostly clay and should, when cleared of timber, be suitable for grazing purposes. There is very little open prairie and the surface is more or less hilly throughout. The timber is mostly poplar which is mixed with spruce, in the northwest part of the township. There was formerly a heavy growth of pine and spruce in the south part of the township, all of which was destroyed by fire many years ago, and the resultant brulé has been overgrown to a considerable extent with poplar and scrub. There is very little hay. There are numerous springs, and small creeks of fresh water, the largest stream being a branch of Medicine river, which crosses the northeast corner of the township. It is there about 20 links in average width with moderate current and low banks. Depth about 18 inches. There are no water powers. So far as it was possible to obtain information as to climatic conditions it would appear that the winters are much milder than in places further east and the rain and snow fall not usually heavy. Summer frosts prevail to a considerable extent. There is an ample supply of wood suitable for fuel. No indications of coal were observed. There is no stone suitable for building purposes and no minerals were noticed. Bears, deer, prairie chicken and partridge are found here.—*Geo. Edwards, D.L.S., 1904.*

Township 51.—Bounded on the east side for the most part by Low-water lake, this township was reached by the squatters, who settled in it last summer, through a road which they opened themselves for a distance of eight miles, that is from the end of the trail leading from Edmonton to the banks of Saskatchewan river after passing through Mewassin. This new road enters the township near the point where the southeast corner of section 4 will be established. We came into the township by an old pack trail which crosses it in a southwesterly direction from the east boundary of section 36; leading to the Rocky mountains from the Indian reserve adjoining the east shore of Wabamun lake in range 4. The soil with a few exceptions is a coat of black loam three to six inches deep with a clay subsoil, but there are a number of spruce swamps which reduce considerably the farming area of the sections. The ground is hilly in the northeastern sections with the middle part of the township heavy rolling, while the southwestern sections are comparatively easy rolling. The north part is thickly wooded with poplar and some spruce. The bush gets lighter in the middle part, and in the southern part the country is more open, that is, it will be easily cleared. There are few hay sloughs of any extent. The water was good where found. There are no water powers in this township. The climate is the same as in the vicinity of Edmonton, but the snow is slightly deeper in winter. I have seen no coal, but for a few years plenty of fuel will be found in the woods of the country. I have been told that coal exists along the banks of the Saskatchewan south of this locality, and on the north shore of Wabamun lake in this range, that is in township 53, range 4. I have met no stone quarries nor minerals of any kind. We crossed tracks of bear, deer and moose and we saw plenty of duck, chicken and some partridge.—*Geo. P. Roy, D.L.S., 1904.*

Township 52.—The surface of this township is rolling and in some places broken and hilly, especially along the creeks. It is thickly wooded with every kind of timber; in the first three miles on the north side there is green and dry poplar, cottonwood, willow, brush, some jackpine of fair size and scattered spruce along the ridges of the creeks; while the south part, especially in the southwest corner,I found spruce and tamarac in muskeg. The latter are of good size for ties and frame bridges for railway work. The north half, adjoining Wabamun lake and the east half of the township is very good land for agricultural purposes. The soil is either clay loam or sandy loam, and will produce all kinds of cereal and root crops. The only apparent objection for settlers is the labour involved in clearing the forest country. Regarding climate, I may state my own experience. Very cold weather was recorded in the beginning of February, the coldest day registered was the 14th of that month (—57°). All the month of February was cold, but not to prevent the work on the line, and, living in the canvas tents was not uncomfortable, except on the above mentioned date. In the month of March we had 3 feet of snow, which delayed the work, but in April the fine weather commenced which lasted till the end of the season. The few settlers and Indians on the reserve said that they have no frost in the summer ; this is due to the warmth of the waters of Wabamun, which tempers the atmosphere for a distance of a couple of miles around its shore. This township is well watered by small lakes and several creeks of good and clear water which run all the season, even in a dry summer, because they have their source in a spruce muskeg, and also in Wabamun lake, which is situated on the north part. This lake is a large sheet of water 12 miles long and 2 miles broad, and empties through Wabamun creek into the Saskatchewan. It abounds in fish of different kinds such as whitefish, pike and carp. To give an idea of the value of the fishing a merchant told me that during the winter he exported 3,000,000 pounds, besides the exportations made by some other merchants of Edmonton. The half-breeds ofSt. Ann spend the greatest part of the winter fishing in that lake. I found, in traversing the lake, on the N.W. ¼ of section 35, coal which was very useful for fuel during the cold days in the winter. In conclusion I may state that this township is a safe farming land, settlers will not be disappointed.—*C. E. Bourgault, D.L.S. 1904.*

Township 53.—This country is reached by a branch of the road going from Mewassin to Lake St. Ann, which branch forks on section 7, township 53, range 3 and going across range 4 it dwindles to a pack trail, ending near the east boundary of this township. This is the shortest road to get into that section by land. The northwest corner of the township strikes in Isle Lake while the southeast angle falls in Lake Wabamun, which runs towards the west, close to the eastern limit of range 6, covering part of sections 6 and 7. In fact the most western waters of this lake come to within 10 chains of the corner post of section 1, township 53, range 6. The land parts of sections 4 and 5, and part of 6 are separated from the northern sections by the lake, which there measures as much as two miles and a half across. Whitefish are plentiful in the lake, and the fishing is part of the revenue of the surrounding country. Many sections have been classed as No. 3 in the field notes, but these remarks apply more to the broken nature fo the surface than to the soul, which is mostly a good coat of black loam over a clay subsoil well adapted to farming. The surface is hilly, espeally in the proximity of the lake ; this section is in fac tthe roughest that I have traveled through this summer, and no Indian trail goes across it. It is a timbered country. Good poplar with some spruce 10 to 14 inches diameter are seen on every section. Large spruce 10 to 30 inches in diameter are found on sections 31 and 32 as well as on sections 14, 15, 20, 23, 24, 25, 26 and 27. Along the east and north boundaries, although there are some scattered spruce and jackpine, small poplar and windfalls predominate, showing the passage of fire at a date not far back. It is remarkable that there is birch nearly all through the township. Hay does not appear to be plentifml and hay sloughs seeu to be scarce. Water is good wherever found. There are no streams capable of producing water powes. The climate is the same as in the vicinity of Edmonton. Wood as fuel is abundant, but good coal is found on section 10, close to the shore. The seam has already been worked. Although stones are met in some places, no quarries were found in the township, nor any minerals. Game outside of duck and chicken is scarce. Although bear and many other kinds of fur bearing animals are seen once in a while, this is not to my judgment a rich country for game.—*Geo. P. Roy, D.L.S., 1904.*

Township 54.—Island lake is the principal topographical feature of this township. It extends four and a half miles in a northerly direction, from the southwest corner, to its outlet, Sturgeon river, on the east boundary of section 10. Running northeast as already said, it measured about nine miles in length by a mile and a quarter in breadth, covering part of this township and part of township 53, range 6.

I have been told that its depth averages thirty feet. Whitefish are found in it. The trail from Edmonton to Jasper crosses this township in a southwesterly direction from the east boundary of section 24, to the west boundary of section 6. It is narrow and crooked with many soft spots, but wagons can travel over it as far as Gray's store, in township 53, range 6, beyond which place it is nothing but a pack trail, although vehicles can go a few miles further. On section 14 a pack trail branches from it running about due west to Pembina river where it comes back again to the main trail. It is used only in very dry seasons, on account of the many muskegs through which it goes, and although it would shorten the distance by more than eight miles, travellers to Jasper prefer the road around by Gray's which is in a far better condition. Like all the rest of this section of country, the soil is a coat of black loam six to ten inches deep over a clay subsoil, capable of producing good crops when cleared. The surface is heavy rolling covered with green poplar in the south part, and small poplar, windfalls and scrub towards the north. There are large patches of prairie covered with small scrub especially towards the northeast corner, in fact a good fire would pretty nearly make an open prairie of this part of the country. There is some good poplar and some spruce, enough for building purposes for settlers, but if used for fuel the woods would not last long after the country is settled. However, coal will be easily procured in this section of the country, either from Pembina river or from the township north of this one; if not found here itself. There are no hay sloughs of any consequence in the township. Water is good in the lake and wherever found elsewhere. There are no water powers. The climate is the same as in Edmonton with a little more snow in winter. I have seen no stone quarries nor minerals, and game is not plentiful.—*Geo. P. Roy, D.L.S., 1904.*

Township 56 (north outline).—In this range the base line passes over a gently rolling country comprising clumps of poplar of an average of six inches diameter alternating with small open patches mostly covered with willow scrub. Soil is rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 60 (north outline).—In this range the country is rolling and in the depressions are to be found muskegs and tamarac swamps. It is thickly wooded with poplar and spruce suitable for lumbering. Throughout the range the soil is of poor quality and rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 72 (north outline)—Lesser Slave river crosses the 19th base line four times in this range, viz., twice in section 35, once in section 34 and once in section 33. A belt of variable width up to one mile along this river is good land, and should be suitable for grazing purposes though it is generally very scrubby. All of section 31 and a part of section 32 is scrubby prairie with an excellent soil. Elsewhere the land is mostly swamp.—*Edgar Bray, D.L.S., 1904.*

Range 6.

Township 27.—This township may be reached from township 28, range 6, with wagons by following the valley of Dogpound creek to a point on the north boundary of section 35, township 27, range 6. But the route is bad because of the dense brush and soft ground. There is no southerly route from this point into the township. It may also be reached from township 26, range 5, which is the location of the Mount Royal ranch, through the open country, along the correction line to Ghost river, thence northerly along the pack trail leading from Morley to the north boundary of section 31. This trail in the vicinity of the lake in section 30, is very bad, because of the softness of the ground. The soil in the hills is rocky and stony, the bed rock coming to the surface at the summits and being near the surface along the slopes. In the valleys the ground for the most part requires to be drained. Along the southerly limit of section 1 to Mount Royal ranch, people have grown oats. On the northerly part of sections 3 and 4, Mr. A. McDonald has grown oats, potatoes, turnips and carrots for a number of years. The roots are of good quality. He has also cultivated a piece of grain, along the northerly limit of sections 17 and 18 for a number of years and has grown here good roots. The township is fitted for grazing purposes and on part of it there is some good timber, spruce and pine to fifteen inches in diameter and fir to four feet. The chief part of the timber of commercial value is on the north half of sections 9, 10 and 11, and the south half of 14, 15 and 16, and on sections 12 and 13. The balance of the township is chiefly covered with scrub and second growth timber and grass. The surface is rough. Ranges of parallel hills run southwesterly from the northerly limit of the township, nearly to the southerly limit. These ranges are cut transversely at many places by ravines. Ghost river runs in a very deep ravine. There is little hay in the township. Mr. A. McDonald has cut hay on the northerly part of sections 17 and 18, near the northeast corner of section 18. The chief streams are Dogpound creek in the northerly part of the township and Ghost river in the southerly part. Ghost river is in December about seventy links wide and about two and one-half feet deep with a strong current. At the stage of high water it overflows its banks to a width of about three and one-half chains. The water is clear, cold and wholesome. Dogpound creek has its source in section 22. It is but a small stream from five to six feet wide and from eight inches to one foot deep at low water stage, where it leaves the township; but the flow seems to be permanent. There are no water powers. The climate is about the same as at Calgary. There is abundance of wood for fuel. No stone quarries were seen. No minerals were seen. The chief game are deer, partridge and prairie chicken.—*John Aylen, D.L.S., 1904.*

Township 28.—This township is reached with wagons from township 28, range 5, by following the valley of Dogpound creek to the point where it crosses the north boundary of section 1, township 28, range 6, thence northwesterly along a road cut out by myself to Little Red Deer river, which it reached about one-half mile west of the east boundary of section 28, township 28, range 6, thence up the valley of Little Red Deer river along a road cut out by myself to a point near the quarter section post on the north boundary of section 19, township 28, range 6, where the pack trail, leading northerly from Morley, crosses Little Red Deer river, thence southerly along this pack trail over a very bad road, that would seem to be passable for wagons only when the ground is frozen, as it was when I passed over this trail to Ghost river and Mount Royal ranch, which is on section 3, township 26, range 5. This township is very rough; ranges of hills, nearly parallel, in lines about one-half mile apart run southwesterly through it. These ranges are cut transversely by deep gorges, in which flow the streams. The hills reach to a height of 1,200 feet. At the summits and along the sides, the bed rock is at or near the surface. In the valleys the soil is good, but needs to be drained. The township is suitable for grazing purposes. The surface is covered with scrub, second growth jackpine and poplar, and where the trees do not grow too thickly there is good grass. Sections 4 and 5 are chiefly covered with windfalls. The township has been burnt and the large timber destroyed. Except on sections 25 and 36, there is no timber worth mentioning. On 25 and 26. there is considerable jackpine up to ten inches in diameter. On sections 30 and 29, on the low land, along Little Red Deer river, hay suitable for cattle has been cut. The Little Red Deer and Dogpound creek have a permanent flow of good water. The water of the other streams is of good quality. There are no water powers. The climate is about the same as at Calgary. There is an abundance of wood for fuel. No coal or lignite was seen. The rock is shaly. No stone suitable for building was seen. No minerals were observed. Partridge and prairie chicken are the chief game, and splendid trout are plentiful.—*John Aylen, D.L.S., 1904.*

Township 29.—This township may be reached by a pack trail leading from Ghost river, northerly along the west side of township 28, or by a better road, cut out and made by myself, along the easterly side of township 28 from Dogpound creek to Little Red Deer river, thence up Little Red Deer river by a road made by myself to the point phere the aforesaid pack trail crosses this river, which is in section 29, township 28, thence northeasterly to the centre of township 29, by a road made by myself. This route is passable for wagons throughout the season. The pack trail is only passable for wagons when the muskegs are frozen. The surface is rough and hilly—the ranges of hills having a general northwesterly trend and being cut transversely by streams. The soil in the valleys is good, but most of the valleys are swampy and would need to be drained to fit them for agriculture. That on the hills is stony and on most of the hills the ledge rock comes to the surface. The township is only fitted for grazing purposes. For the most part the township is covered with second growth jackpine and poplar and a small quantity of spruce. Where the valleys are too wet for the growth of such timber, they are covered with scrub and grass. Little of the timber exceeds ten inches in diameter. Forest fires have destroyed the old timber and most of the young timber is from four to eight inches in diameter. It seems to take a jackpine tree in this vicinity from twenty-five to thirty years to attain a diameter of six inches. These trees, in places, are so tall and of such small diameter, as to be easily blown down and, in places, they make almost impenetrable windfalls. These windfalls are chiefly in sections 10, 11, 14, 15, 22, 23, 26, 27, 19, 20, 29 and 30. In these sections there is much timber suitable for fencing. The timber is suitable for any purpose to which such timber can be applied in its round condition; it is hardly large enough to saw. There are places in the westerly part of the township along Grease creek where some hay could be cut; but generally, where there is grass suitable to make hay, there is too much brush. There is plenty of good water. Grease creek is a fine stream of clean, wholesome water of permanent flow, and it has several good sized tributaries. There are no floods to cause damage. There are no water powers. The climate is about the same as at Calgary. There is an abundance of wood for fuel. Most of the outcroppings of rocks on the hills show sandstone and along the streams at many points, such stone suitable for building was seen. No minerals were observed. The game consists of partridge, prairie chicken and deer. We caught an abundance of fine trout in Grease creek.—*John Aylen, D.L.S., 1904.*

Township 30.—This township is situated about due west 26 miles from Carstairs, a station on the Calgary and Edmonton railway, but is easier of access by way of Didsbury, another station on the same line of railway, thence through township 31, range 5, through which township it would be required to have a wagon road constructed. At the present time it can be reached only on foot or by means of pack-horses. My way of ingress and egress was by means of the south boundaries of sections 1 and 2, which, however, involved the necessity of crossing several very high hills. From near the southeast corner of this township a very fair lumber road exists, leading to the sawmill on Little Red Deer river in township 31, range 4. The soil is partly of a sandy nature and partly a stiff gravelly clay; black loam was met with in a few instances. It is not very well adapted for the raising of crops, owing to climatic conditions, but may ultimately become a good grazing country. It is a bush township, except some of the flats in the vicinity of Fallentimber river, which, where not open, are covered with willow and willow scrub. The southerly and westerly parts are very hilly, the valleys between the hills are generally of a swampy nature. The timber consists of jackpine, poplar and spruce, the former predominating, but not of any great commercial value. No hay meadows of any extent were met with. Fallentimber river runs easterly through the northerly tier of sections, the current varying from three to four and a half miles an hour, the water varies in depth from six inches to four feet on the outside, the average depth probably being a foot and a-half, and it averages about one chain in width. Marshes, partly of the nature of quaking bogs, extend south southeasterly from near the river through part of sections 29, 28, 21, 16 and 15, narrowing down to a valley about 5 chains wide through sections 10 and 3, a small creek is formed, or rises, in this marsh, somewhere on section 16, emptying through the above mentioned valley, southerly, into Little Red Deer river. The water, generally is but very slightly alkaline, and, it appears permanent. There are no available water powers. As regards climatic conditions, I may state that my camps were generally pitched in low places, and here summer frosts were of very frequent occurrence, but it is quite possible, that on the higher lying lands, injurious summer frosts may not prevail. Any quantity of timber is available for fuel, much of it lying down, but no coal of any description was met with. Sandstone rock is exposed on the tops of all the high hills, but is not available for quarrying and is of no commercial value. No minerals were observed. An Indian packtrail traverses this township in a northerly direction from Morley to the 'Stony Indian' hunting grounds, north of Red Deer river. It is well beaten, but passes occasionally through muskegs that are very soft. Signs of game, such as 'white tail' deer, were frequently seen, also partridge and grouse, and Fallentimber river furnished us with many a meal of speckled trout and greyling. Much fallen timber was encountered in various parts of this township, more especially in the southwest quarter. Were any fire to get in, a pretty clean sweep would be made, which however, for any incoming settler, or rancher, would be rather beneficial than otherwise. Most of the township, now covered with jackpine, is of no value, whereas, if it were removed, by fire, or any other means, the township would, in my opinion, become valuable for grazing purposes.—*C. F. Miles, D.L.S., 1904.*

Township 31 (north boundary).—The country traversed by this line is very hilly and with the exceptions noted all heavily timbered with spruce, jackpine and poplar. Red Deer river is crossed on section 31. A considerable amount of horse power could be developed without a very large outlay near the boundary. A seam of coal about two feet in width outcrops on the south side of Red Deer river. No other minerals were met with.—*H. B. Proudfoot, D.L.S., 1904.*

Township 32.—A trail which I have not travelled over passes along the south side of Red Deer river, striking the railway at Morley. There is another trail to township 32, range 5, which leaves the Calgary and Edmonton railway at Olds. The northeast part of the township, north of the Red Deer is a gravelly plain mostly prairie with scrub and very poor soil. The northwesterly part is hilly with small poplar; the southwesterly part, hilly with spruce and poplar. The southeasterly and central southerly portions have large spruce. There is good pasture on the plain north of Red Deer river also amongst the timber in the northwesterly portion. There is no hay south of the river. Red Deer river is the only stream of any size, but there are also a few small brooks and springs. Power could be developed in the Red Deer in the southwesterly part of the township without a great expense, and small liability of flooding. There was some cold weather in March, but the days were generally bright and warm. Snow was disappearing very fast. Stone quarries could be developed in the southwest and central portions along the Red Deer, but considerable stripping would have to be done. Several outcrops of coal were noticed in the southwest portion about 2 feet in thickness. No other minerals were found. Chickens, partridges and a few deer were seen. McDougall's winter cattle sheds—now abandoned—were situated on section 21.—*H. B. Proudfoot, D.L.S., 1904.*

Township 33.—From the town of Olds, Alberta, the eighth base line was followed to its intersection with Red Deer river in range 5. A ford was made opposite McDougall's ranch. The south side of the valley of Bearberry creek was then followed westward to the eastern boundary of township 33, range 6, west of the fifth meridian. A trail was then located leading across section 12, then crossing Bearberry creek to the north side, then leading across sections 11, 15, 21, 20 and 19. The route across the township is obstructed by numerous small swamps and creeks, which it was found necessary to corduroy in places, and much brush had to be cleared. The southeastern portion of the township is generally black loam, but it seems to rest upon cold subsoil. Numerous small swamps, however, occupy a large area of land. The northwest portion of the township is rolling ridges with swamps between. The soil is sandy clay. The whole township is adapted to the growth of cereals. The valley of Bearberry creek, averaging two miles wide, is covered with scrub willow and scrub birch. Patches of spruce, six to twelve inches, lie along the creek. Numerous swamps occur. North of the valley of the creek the township is covered with a dense growth of small poplar and scattered jackpine. South of the valley of the creek the township is timbered with jackpine and spruce, six inches to twelve inches. The open country is represented by swamps and muskegs and steep hill sides. The only timber of commercial value is located on section 6, west half section 5, southwest quarter section 8 and south half section 7. Small swamps abound in all directions which afford a coarse variety of hay. No permanent supply of water is present except Bearberry creek, which has few feeders in this township. Bearberry creek offers no facilities for constructing water power. The climate is similar to that prevailing in other parts of northern Alberta, summer frosts being usual. Much windfall affords much good dry fuel in all directions. No rock in place or outcrops were observed. Minerals appear to be entirely absent. Grouse, prairie chicken and partridge are plentiful, tracks of deer and bear were frequently noticed.—*A. W. Ponton, D.L.S., 1904.*

Township 35.—This township is accessible from the northeast by a trail on the north side of Raven river, which trail can be made a very good road in ordinary seasons, and Raven river, a small stream about thirty feet wide, could be bridged. The soil is mainly clay with a few places where black loam is found on clay subsoil. It is broken across sections 25, 26, 27 and 28 by a ravine about two hundred feet deep, through which a small stream flows from its head in section 19 and which stream is gradually enlarged by tributary streams flowing from the north and south until it becomes about twenty feet wide and nine inches deep, with a current of about three miles per hour, on section 25. From this stream the land rises towards the south for two miles, where the country becomes hilly, with small sloughs and ponds between them, and then descends towards the southwest. Along the north boundary the land descends generally to Raven river in the next township (35, R. 6). Altogether the township is broken too much by hills, ravines and creeks to be a good farming country, although where grass grows it shows a very luxuriant growth. Along the creeks are a few spruce large enough for small sawlogs, but too few for commercial use. Also there are a few small bunches of jackpine from seven to ten inches in diameter, but short and with limbs to the ground. The remainder of the timber is poplar, willow and poplar brush, very thick generally and of no value, except for fuel. The few hay meadows are small and not at present of value, being generally full of scrub and willows. Water is invariably good; no alkali was found in this township. Streams are all small and would not be available for water power. Summer frosts occur, I am told. I did not find any coal or lignite, nor stone quarries or minerals, nor was there any game seen, of any kind, although I am told that the Stony Indians range through this country, finding deer and moose in the fall and bear in the spring. Speckled trout are plentiful in the larger streams. When the land is cleared it should be good ranching country, as the soil is capable of growing good vegetation, and the water the best that can be had anywhere.—*Henry W. Selby, D.L.S., 1904.*

Township 36.—The best route to the township is from Innisfail via Markerville and Raven river. The road was in bad condition in the spring, but in good order later on in the season. The country is covered with small timber namely poplar, spruce, jackpine and willows. There are a few openings in the timber. There is a scarcity of hay, which is marsh hay of rather poor quality. The country is well watered and the water is fresh and good. This is one of the characteristics of the country. The south branch of Raven river traverses the township in an east and west direction near the two mile cross line. It is a stream about thirty links in width. It is a very crooked stream with a gentle current and it is from one to three feet in depth. Clearwater river cuts across the northwest part of the township. It is a large river with a valley one hundred and fifty to two hundred and fifty feet in depth. It has a very swift current of about six miles an hour. In this township the valley bed of the river is from three to ten chains in width and this is practically full of water in the freshet stage, but partly bare in the lower stage of water. At an average stage of water it is from three to eight feet in depth. In addition there are many small creeks all affording good water. There are no defined falls in the Clearwater, but the general fall of the river is considerable, especially in the rapids and water power in plenty could be developed by building dams. The climate is pleasant ,but a good many severe frosts were observed. Several settlers came in after the survey and seemed to be of the opinion that grain would do well. Fuel in plenty is to be had everywhere, being composed of poplar, spruce and jackpine. No coal veins or stone quarries or minerals were observed. Colours of gold can be found in Clearwater river. Game is fairly abundant such as bear, moose, deer, geese, grouse, rabbits and duck, and fine trout can be caught in abundance.—*Thos. Drummond, D.T.S., 1904.*

Township 37.—The township can be reached by road from Olds or Innisfail, which was in bad order in the spring, but as the season advanced, it was in good order. The soil as a whole is more or less sandy especially to the west of the Clearwater, but there are many good sections to the east of the Clearwater suitable for farming or ranching. The country is covered with scrub poplar and jackpine to the west of the Clearwater, but there are open places to the east of the river. Hay meadows are scarce and the hay is not of a good quality. Good fresh water and numerous and permanent spring creeks are in abundance. Clearwater river is a large stream. In the summer it is from three to eight chains in width with a very rapid current probably six miles an hour. It is from three to eight feet in depth and it is impossible to cross it till late in the season. In this townhip the gravel bed of the stream is wide as is shown on the traverse plan. This bed practically runs full in the high stage, but it drops in the fall when it is comparatively a small stream. Numerous beautiful spring creeks are found practically all over the township. Water power could be generated from Clearwater river as the current is rapid and the fall considerable, but there are no falls. Summer frosts were numerous but apparently more or less local and near the large muskegs. Fuel is plentiful in the shape of spruce, jackpine and poplar, but no coal was observed. No stone quarries or minerals were observed. Moose, small deer, bear, grouse, geese, &c., are fairly numerous and beautiful trout are abundant.—*Thos. Drummond, D.T.S., 1904.*

Township 38.—The best route is by way of Innisfail and Raven river. The road was not very good in the spring, but was excellent later on. The top soil is underlaid by clay, and where dry it is fairly good, but a large part of the township is muskeg, which in many places is unsafe, even to walk upon, and for this reason it is not suitable for agricultural or other purposes except a strip along Clearwater river in the southwestern part of the township. The surface is covered with timber, poplar and jackpine on the dry land and spruce and tamarac on the low lands. It is scrubby and small as a whole. There are practically no hay meadows in the township. The water is fresh and sweet, indeed there is no alkaline water to be found, and the supply is sufficient and permanent. The Clearwater passes through sections 5, 6 and 7, and onward through township 38, range 7. It is a large and important stream about 3·50 chains in width and about five feet in depth at a medium stage of water. There are two lakes of considerable size, lake No. 1 in sections 11, 14, 13 and 12 and lake No. 2, in sections 11 and 2. Both contain fresh water. Water can be obtained almost everywhere by digging. Water power could be obtained from the Clearwater by building dams, and some of the valley flats might be flooded to a depth of about a foot for a day or two in the freshet stage. The climate is pleasant, but a good many summer frosts were observed probably due to the proximity of the muskegs. Abundant fuel is to be found everywhere in the shape of poplar, jackpine, spruce and tamarac but no coal veins were observed. Sandstone was exposed along the banks of the Clearwater. No minerals of economic value were observed. Bear, deer, moose, rabbits, grouse, geese, duck, were seen and their tracks were numerous; and fine trout are abundant in the river.—*Thos. Drummond, D.T.S., 1904.*

Township 39.—This township is accessible by way of the Mountain House trail leading from Lacombe and traversing the northern part of the township from east to west. The portion of the trail leading through this township is for the most part in good condition. The soil is clay or clay loam in most places and the surface level or rolling with very small hills. There is not much open prairie. There is a heavy growth of small timber consisting of spruce, jackpine, poplar and balm of Gilead, little of which is large enough for lumber. There is not much hay. There are very few creeks, and none of any considerable size. About one-fourth of the surface is covered with muskegs, sloughs or swamps. Summer frosts are prevalent. The average rainfall appears to be small. Winters are not severe and snow does not fall to any considerable depth. There is an abundance of wood suitable for fuel. No indications of coal were noticed. No minerals were observed. Game consists of bear, deer, partridge and occasionally a few ducks and prairie chickens are seen.—*Geo. Edwards, D.L.S., 1904.*

Township 40.—The trail leading from Lacombe known as the Rocky Mountain House trail touches the south boundary of this township. In dry seasons it is good, but in wet seasons some of the sloughs it traverses are next to impassable. The soil is mostly clay loam affording good grass in the few open spaces. Surface is rolling or level with few hills, but a considerable portion of swamp land. The timber consists of spruce, poplar and balm of Gilead with some jackpine. There is very little large timber. Hay is not abundant. The creeks afford a fairly good supply of fresh water. Lobstick creek crosses the northeast corner of the township and is there about 30 links wide and one to two feet in depth. Horsepound creek crosses the township from northwest to southeast. It is about 20 links wide and 18 inches deep with moderate current and low banks. There are no water powers. Winters seem to be mild here with light snowfall. Summer frosts prevail, and would prevent growth of anything but hardy cereals. There is an ample supply of wood for fuel, but no indications of coal were observed. There is no stone of any kind observable. No minerals were found. Black bears and cinnamon bears are numerous here. Deer are also seen occasionally. Partridge are plentiful and prairie chicken are seen.—*Geo. Edwards, D.L.S., 1904.*

Township 41.—This township is reached by way of the Rocky Mountain House trail from Lacombe. The trail is in fair condition and passes about six miles south of the township. A branch trail, made by the Red Deer Lumber Company, reaches the south boundary of the township. The soil is chiefly clay, suitable for grazing purposes. There is very little open prairie. The timber consists of poplar, balm of Gilead and spruce, mostly of small size. There is not much hay. There are several creeks, the largest, Lobstick creek, rising in the northeast corner and traversing the township in a southeasterly direction. When it leaves the southern boundary it has a width of thirty links and depth of one to two feet, with moderate current and low banks. The water in all the creeks is fresh. There are no water powers. Climate is not severe in winter. Snowfall is light. Summer frosts were observed in July and August, sufficiently severe to form thin ice on pools in low lying swamps. There is plenty of wood suitable for fuel. but no indications of coal. There is no stone suitable for building. No minerals were found. Bears were frequently seen, the cinnamon bear most often. Deer were seen occasionally. Partridge and prairie chicken were numerous.—*Geo. Edwards, D.L.S., 1904.*

Township 48, Range 6, W. 5—(North outline).—The base line in range 6 crosses an undulating country thickly covered with poplar and spruce varying in size from 10 to 14 inches diameter and suitable for lumbering operations. On the northeast quarter of section 35 Buck creek flows northeasterly into the Saskatchewan. Its rate of current is two miles per hour and the depth of water is six inches. The soil, owing to the great proportion of sand it contains is rated, third class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 51.—This township is reached by a wagon road coming in from the southeast, which was opened by intending settlers in the season of 1904. It is a new trail not in very good order, I was told. Not having travelled on it I cannot give a fair report of its condition. We reached it partly by an old Indian pack trail from the Indian reserve on township 52, range 4, and partly by travelling through the bush. The soil is generally a fair coat of black loam over a clay bottom, suitable for all kinds of grains, but there are quite a number of swamps, which will reduce considerably the productive area of the sections. The surface is generally heavy rolling country covered in the southern portion mostly by a growth of small poplars very easy to clear. The timber grows larger towards the north, but in no part of the township will there be any considerable difficulty to prepare the land for cultivation. The timber is mostly poplar except in swamps where there is a certain quantity of spruce six inches to twelve inches in diameter which may be sufficient to supply the first wants of the settlers for building purposes. There are not many hay sloughs that I have remarked. The water where found was good drinkable water, especially in the creeks, but I believe it will be scarce in dry seasons. There are no water powers. The climate is the same as in the neighbourhood of Edmonton. Poplar and spruce is the only kind of fuel available in the township. I have remarked no coal but I believe it will be easily procured from the banks of the Saskatchewan. There are no stone quarries nor minerals. Game is not plentiful. Prairie chicken and partridge I have met, but not a great many. We have crossed tracks of moose and deer and we have seen a few bears while at work. Fur bearing animals seem to be scarce.—*Geo. P. Roy, D.L.S., 1904.*

Township 52.—There is no trail in this township. I was obliged to cut a pack trail in bush to carry my outfit on horseback. It was a very hard job to move the camp in thick bush just in the time when the mosquitoes and flies are worst. The soil in the north portion, which is nearly all sandy loam with clay subsoil is more suitable for farming purposes than the south portion which is more swampy. The surface is rolling, some places broken and hilly, and covered with thick bush, poplar, spruce, tamarac, jackpine, cottonwood, birch, willow and scrub. The poplar predominates in the north portion, while the spruce and tamarac are in greater quantity in the south portion. There is enough hay in the marshes and along the ridges of the creeks to supply the settlers who may come into this township. I met good water, and in great quantity nearly everywhere, but especially in the creeks, which are full of fish. The greatest objection settlers would have against coming into this township would be the absence of roads, and the work involved in clearing a forest country. This country is very poor in game.—*C. E. Bourgault, D.L.S., 1904.*

Township 52.—The main feature of this township is the chain of large swamps which cut it off from the township south of it, and from which direction, outside of sections 4. 5 and 6 the only way to get north is along the eastern boundary of section 1. The western boundary is also situated in a large swamp, which extends nearly four mi'es from the southwest corner of section 6 to the northwest corner of section

19. The building of roads from the west and especially from the south will consequently be a heavy undertaking. A pack trail partly opened by me leads from the northwest corner to Gray's store on section 28, township 53, range 6, situated along the wagon road coming from the half-breed settlement of Lake St. Ann. At least half of the south third of the township is covered by muskegs. The remainder is a succession of ridges turning into hills towards the north, the soil of which is a good coat of black loam over a clay subsoil. It will be a good farming country when the bush is cleared from it. There are a few patches covered with only a light brush, but the country is mostly a bush country lightly timbered towards the south, and the timber grows larger and denser going north until the base line is reached. Poplar is the main kind of wood, but good spruce and some jackpine are also found on nearly every section. There are very few hay sloughs that I have remarked. Water is good wherever found. There are no water powers. The climate is the same as in the vicinity of Edmonton. Wood as fuel or for building purposes is readily available all through the township. Coal exists in the neighbouring township. There are no stone quarries nor minerals that I have remarked, and game seems to be scarce.—*Geo. P. Roy, D.L.S., 1904.*

Township 53.—From Wabamun lake there is a trail crossing this township in the middle part on the north side of Isle lake, but the best way to come into this country is by Lake St. Ann settlement. The south part is rather rolling, while the north part is quite level, especially near Isle lake. The soil is generally a good black loam with clay subsoil, but adjoining Isle lake it is swampy. This township is thickly wooded with poplar from four to fourteen inches in diameter and about fifty feet high, with spruce near the lake and on the ridges of the creeks, and also with pine, tamarac, willow bush and scrub. I would not encourage any settlers to take a homestead here with the intention of opening a forest country, but it is a good place for stock raising, especially near Round lake, where there is plenty of hay, several hundred tons, and a good place to winter cattle.—*C. E. Bourgault, D.L.S., 1904.*

Township 53.—Isle lake is the principal feature of this township, from the northeast corner of which it extends for five miles, its western limits being at a distance of a quarter of a mile from the southwestern corner of section 28. The place is reached by the road leading from Lake St. Ann to Jasper House. Wagons are often used as far as Gray's store on the southwestern quarter of section 28. Beyond, although vehicles can go a few miles, it is considered only as a pack trail. Wagons travelled on this trail to any extent only since last summer and it is not in a very good condition, but teams with loads of two thousand pounds can get through easy enough in dry seasons. The soil is generally a coat of black loam from six to eight inches deep over a clay subsoil, well suited for farming purposes. The surface is heavy rolling, hilly in some parts, and thickly wooded on the south side of Isle lake. On sections 28, 29, 30, 31, 32 and 33 there are large patches of prairie, the remainder of these sections being covered with light brush only, which can easily be cleared. The northern part of the township is certainly the most advantageous for immediate settlement. As already said, south of the lake the country is thickly wooded. Poplar predominates but spruce is met nearly on every section and along the lake there is quite an amount of it, and it is good sized timber. The west end of Isle lake is a large hay slough capable of producing an immense quantity of hay, as well as the borders of Round lake, where Mr. Gray cuts nearly all the hay he requires for his twenty horses and his cattle. The water is good in Isle lake, Round lake, and wherever found elsewhere. There are no streams able to produce water power of any consequence. The climate is the same as in Edmonton. There is plenty of wood for fuel and building purposes for years to come if used with judgment, and there is coal on township 53, range 5, joining on this one to the east; no doubt it exists also on this township. I have remarked no stone quarries nor minerals of any kind and game outside of prairie chicken and duck in the fall is not plentiful.—*Geo. P. Roy, D.L.S., 1904.*

Township 54.—This township is reached by wagon road, which goes through Lake St. Ann settlement, coming from Edmonton and going as far as Gray's store situated on section 28, township 53, range 6. The last six miles of it were used for vehicles for the first time last summer, and it is yet crooked and narrow, with a few soft spots. From Gray's to Jasper House it may be considered only as a pack trail, although wagons may go a few miles further. There is a branch of this trail running nearly west coming into the township on section 24 and catching the river Pembina on section 30, but on account of the swampy nature of the ground travellers prefer going around by Gray's, from where turning northwest they come to the Pembina near where the west outline intersects the river on section 19. The Pembina flows through the northwest corner of the township and Isle lake cuts out part of the southwest corner of section 1. The numerous swamps which are met all through reduce considerably the farming area, but on solid ground the soil is a good coat of black loam over a clay subsoil, promising good crops when the ground is cleared. The country is heavy rolling with a few patches of prairie, especially on sections 5, 6 and 7. There are quite a number of windfalls in the township where a fierce fire must have passed not many years back, judging by the amount of dry burnt wood met all over. As a consequence, the clearing would be easy and a few fires would in a short time make an open country where the bush now stands. The timber is mostly poplar on the solid ground, with spruce in the swamps but neither kind of wood, except in some places, seems to be of much consequence, although settlers will find all they require for building purposes, and for fuel on the start. A few tons of hay can be cut in a slough on section 6, and around the lakes on sections 4 and 15. Water is good in Isle lake, in the river and wherever found elsewhere. The Pembina is a river averaging three to five chains wide, three feet deep, with a current of about four miles an hour. It might be possible by building a dam near the north boundary of section 19 to produce one hundred horse power. Climate, as in all the surrounding region, is the same as in Edmonton. As already said, there is plenty of wood for fuel for a few years until the country is entirely settled, and coal is found on Pembina river three miles west of the southwest corner of this township. I have remarked no stone quarries nor any minerals of any kind, and game is not plentiful.—*Geo. P. Roy, D.L.S., 1904.*

Township 56 (north outline).—In this range the base line passes over a gently rolling country comprising clumps of poplar of an average of six inches diameter alternating with small open patches mostly covered with willow scrub. Soil is rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 60 (north outline).—In this range the country is rolling and in the depressions are to be found muskegs and tamarac swamps. It is thickly wooded with poplar and spruce suitable for lumbering. Throughout the range the soil is of poor quality and rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—About one-half of section 36 is scrubby prairie with bluffs of small poplar, and is excellent land. The remaining half of section 36 and half of section 35 is swamp of spruce and tamarac, after which for a section and a half I found dense scrub of willow with scattered poplar and a sandy soil of very poor quality. The remaining half of this range has a soil of fair quality and is timbered with poplar, birch and spruce, of fair size, with a few swamps of little importance.—*Edgar Bray, D.L.S., 1904.*

Range 7.

Township 27.—This township is easy of access by wagon from the south, either from Morley or Cochrane, both stations on the Canadian Pacific railway. From the former place by wagon road it is about 10 miles partly pretty stiff up-hill to the south boundary and from the latter place it is about 20 miles by wagon road to the east boundary of this township. A fairly good road runs through sections 1, 2, 3, 4 and 5, thence northerly into section 21, this is about the extreme limit to which a wagon could be brought. The southerly tier of sections comprising the bench adjacent to the valley of Ghost river contains some fairly good lands generally consisting of a black sandy loam, with a clay or gravelly subsoil. Hitherto only green crops have been grown here as far as I can learn, and it appears to me rather doubtful if any crops would mature. All but the southerly tier of sections are very hilly; the hills in several instances rising to a height of up to 500 and 600 feet by barometrical reading. The level bench lands north of the river attain also a considerable altitude above the bed or flats of Ghost river. Along the banks of the north branch the flats are more contracted, running in fact in a very much narrower bed, although the volume of water does not appear to be less than in the main stream. Much of the level land is also scrubby, although most of the hills facing the valley are nearly bare of timber and brush. There is some good timber scattered through this township, but nowhere in sufficient quantity to justify any part being designated as a timber berth. The southwest quarter contains probably more timber than any other part of the township. On the high promontories facing the valley of Ghost river, groves of Douglas fir are frequently seen, probably up to 30 inches in diameter, few of these, however, appear to have any commercial value, many having the appearance of being unsound. It might be desirable to reserve the timber for the needs of future settlers, or for the conservation of the water supply. A good hay meadow, averaging probably 10 chains in width, extends through parts of sections 17 and 8; probably a couple of hundred tons might be secured here. Good water is plentiful from rivers and spring creeks. The main branch of Ghost river traversing three southerly sections, and the north branch of the Ghost river running diagonally in a southeasterly direction through this township. The water in these streams at the time of survey was low, but flows with considerable velocity. The north branch including the dry bed, averages about 2 chains in width, but the stream itself was only about 1 chain. The main branch bears signs of being of much larger volume at times, as the bed in most places is from 5 to 10 chains in width; but the water at present only running in channels, sometimes 2 or 3, each less than a chain in width and with a current of 4 or 5 miles an hour. The immediate valley of the river bears no sign of periodical flooding—there is no water power available, the bed of the river being too wide to dam economically. With regard to summer frosts it is altogether likely that they prevail in this township, the same as in the township to the north, but perhaps not to the same extent. In parts of the township to the south crops mature, I am informed. Both wheat and oats are grown here, but only for green feed. Wood for fuel abounds and can be procured all over this township. No signs of either coal or lignite were observed. Stone is plentiful both on tops of the hills, and in the dry bed of the river, but no quarries exist. Neither were minerals of any economic value observed. Owing to the close proximity of this township to the Stony Indian reserve game does not abound as in the northern townships; some few partridges and chickens and an occasional sign of deer were observed. Speckled trout appeared plentiful in the north branch of Ghost river, but in the main branch none were observed. I was, however, informed that higher up this stream fish were much more plentiful. In conclusion I may state that in my opinion this township is not at all adapted for general or even mixed farming, but only for grazing and cattle raising.—*C. F. Miles, D.L.S., 1904.*

Township 28.—This township is somewhat difficult of access. From the north it can only be approached, in summer by pack horses, or in winter. when the marshes are frozen, by sleighs. From the south it can be approached within two miles of the south boundary by wagon from Ghost river valley. As for getting into the township by wagon that is quite out of the question. The nearest station to reach this township would be Morley on the main line of the Canadian Pacific railway. The soil is mostly of a sandy nature, with a clay and stony subsoil on the side hills, the bottoms generally being marshy and the hills stony and rocky. Owing to its elevation in altitude and general broken nature, I doubt if any crops could ever be grown here. The surface is exceedingly hilly, sometimes traversed by high ridges, ranging from three to five hundred feet above the adjacent bottom lands and frequently broken by high hills rising and falling in every direction, without forming any regular ridges. It is all densely wooded with the exception of some parts, principally southern exposures of hills, that have at one time been burned over and are now covered with brush and scrub and second growth jackpine and poplar. It is broken by Little Red Deer river cutting its way easterly through the northerly two tiers of sections and one of its tributaries through sections 21, 22, 23 and 24. Adjacent to these streams occasional small flats are met with, sometimes open, but of small areas. Travelling up the valleys of these streams one would be compelled to cross them perhaps half a dozen times in a mile. Jackpine and spruce timber of very fair dimensions are pretty well scattered through this township, more particularly in the western half, attaining in some instances 24 to 28 inches in diameter. It would be difficult to get at and almost impossible to get out with teams. Of hay lands in a natural state there are hardly any, the low lands generally being of a marshy nature. This township is well supplied with water, spring creeks being quite numerous. The Little Red Deer already alluded to above has an average width of about eighteen or twenty feet, has a stony and sometimes rocky bed, and an average depth of about nine inches. The small stream tributary to the above has an average width of about six feet and depth of six inches. Neither of these streams appears liable to overflow, or, if they should break their bounds, could do any damage. The banks of the Little Red Deer in some places approach one another quite closely, and there would be difficulty about constructing a dam or dams, which, however, would be of no material benefit for any purpose. The north branch of Ghost river traverses diagonally through section 6; the bed is of an average width of about two chains, but the stream itself, at time of survey, would not average one chain in width with a depth of about twelve inches—not enough water to float logs down it—except during freshets, which however is not an annual occurrence, so I am informed. The climatic conditions are such, I believe, as to prevent the ripening of any crops, summer frosts being the rule rather than the exception. For fuel jackpine, poplar and spruce is available in any quantity. No traces of coal or lignite were observed. Neither are there any stone quarries. Sandstone crops out in the tops of nearly all the hills and ridges. No minerals of any economic value were observed. Signs of bear, deer, rabbits and partridge were frequently seen. As already stated, this township is exceedingly rough; its only product of any value at the present time, would be its timber, and if the snow lies here in the winter, as it does not in some townships farther south, roads might be constructed along the marshy bottoms for conveying the same out into the open, but the haul to the nearest railway is a long one. A great deal of fallen timber is scattered all over this township, making it almost impossible to get through with pack horses. All the old Indian pack and hunting trails are blocked by this timber and therefore abandoned. Signs of cattle and horses were observed, but it is not apparent what would take them into this township, the limited areas of pasture being very few.—*C. F. Miles, D.L.S., 1904.*

Township 30.—This township is situated due west about 32 miles from Carstairs, a station on the Calgary and Edmonton railway, but is probably more easy of access by way of Didsbury, another station on the same line and by way of the sawmill in township 31, range 4, on Little Red Deer river. From here wagon roads lead to the northeast corner of township 31, range 5 and to the southeast corner of township 30, range 6. From the latter point only pack horses could be got through owing to the high hills, extensive marshes and dense woods and windfall to be traversed to reach the township in question, whereas from the former point although densely wooded, the country is more level and less swampy. A wagon road was at one time(about 8 years ago I am informed) cut through this township from Morley to Red Deer river, but owing to wet seasons, it is not now available. If, however, a series of dry seasons should return I have no doubt this road may be utilized again. There would be no difficulty in reaching this township in early winter after the muskegs are frozen. The soil with few exceptions consists generally of a stony and gravelly clay, and is rated nearly altogether as 3 or 4 class. Some crops might possibly be produced here if climatic conditions are favourable. With regard to the surface of this township the sections north of Fallentimber river up to sections 28 and 33 are fairly level or undulating and along both sides of the river there are some very fair flats; where open, well adapted for pasture lands, stony in places and narrowing to smaller dimensions up stream. The southerly and westerly parts are either high, rolling or hilly. From the south high ridges extend northwesterly into this township within a short distance of Fallentimber river; these ridges are divided by marshes running in the same direction up to the river. These marshes in dry seasons may furnish good hay, but at time of survey were frequently of a boggy nature. The northeast quarter of this township is very hilly. There is much brulé and windfall all through the township generally replaced by a new growth of Banksian (jack) pine. This township is wooded with jackpine, poplar and spruce in quantities in the order named, jackpine predominating. It is of no commercial value owing to the difficulty in approaching it or getting it out. There are a few groves of fairly good spruce in the flats along Fallentimber river which at times of high water might be brought down the river to its outlet into Red Deer river. Here there was a sawmill, I am informed, from which, however, the machinery was removed recently. There is also a grove of good dry standing timber on section 36; north of the creek both jackpine and spruce are fire-killed. The water in Fallentimber river is slightly alkaline, but not sufficiently so to affect the fish, which are plentiful. The smaller streams, which are numerous generally, contain good water and are fed by springs—the supply I would consider both sufficient and permanent. Fallentimber river averages about 1 chain in width and varies from 1 to 4 feet in depth with a current of about 4 miles an hour. The land does not appear liable to be flooded to any extent, and there are no available falls to be utilized for power. As regards climatic conditions, I may state from my experience in August that frosts are of very frequent occurrence; my camps, however, being generally pitched in flat or low places, it is quite possible that the higher lands may be comparatively free from summer frosts. Fuel is easily obtained, both dry and green timber being in abundance all over the township. No signs of coal or lignite float or otherwise were observed. Sandstone is exposed along and near the tops of nearly all hills and ridges, but no quarries exist, nor were any minerals of economic value noticed. By way of game some partridge and grouse were seen along the creek flats or in the windfall. Speckled trout and greyling also abound in the river. Both signs of deer and bear were frequently observed. —*C. F. Miles, D.L.S., 1904.*

Township 33.—The nearest railway point is the town of Olds, Alberta. From Olds the eighth base line road was followed to its intersection with Red Deer river, near where a ford can be made. The south side of the valley of Bearberry creek is then followed to the west boundary of section 12, township 33, range 6, west of the 5th meridian. A crossing is then made to the north side of the creek and a trail crosses sections 11, 15, 21, 20 and 19 to the west boundary of the township. The trail then enters section 24, township 33,range 7, and crosses sections 24, 23, 22, 27, 28 and 33. This route crossing township 33, ranges 6, and 7 is obstructed by numerous small swamps and creeks which required to be corduroyed in many places, and it was found necessary to cut out much bush. The soil is generally yellow clay; forest fires in the past have consumed the top soil over a large portion of the township. The soil is well adapted for the growth of cereals. The surface is divided between extensive valleys and high rolling hills. Large timber, poplar, spruce and jackpine is found in separate patches, from one-half to one mile square ; the township is generally grown up with second growth poplar, willow and scrub birch. The open country is represented by numerous small swamps and muskegs. Large spruce, suitable for commercial purposes is found on sections1, south half 12, south half 3, south half 4, south half 5; and all of 6, 7, 18, 19 and 30. Small swamps abound in all directions which afford a coarse variety of hay. Water is well distributed, Bearberry creek branching in many directions. The water is clear and sweet. The fall of Bearberry creek is not sufficiently great at any point to afford power in sufficient quantity for commercial purposes. The climate is similar to that generally prevailing in other parts of Alberta, but summer frosts prevail owing to the high altitude. Traces of perpetual frost were found in spots at eighteen inches. Much windfall offers an abundant supply of good dry firewood and is well distributed. No stone suitable for building was observed. No trace of minerals was found. Grouse, prairie chicken and partridge are plentiful ; and tracks of bear and deer were noticed.—*A. W. Ponton, D.L.S., 1904.*

Township 34.—From the town of Olds, Alberta, the eighth base line road was followed to its intersection with Red Deer river, where a ford was made opposite MacDougall's ranch. The south side of the valley of Bearberry creek was then followed to the western boundary of section 12, township 33, range 6. A crossing was then made to the north side of the river or creek and a trail was then located leading across sections 11, 15, 21, 20 and 19 to the west boundary of the same township; the trail then enters township 33, range 7 and crosses sections 24, 23, 22, 27, 28 and 33 to the north boundary of the same township. The trail then enters township 34, range 7, and crosses section 4—through which James river flows from west to east—and continues to a point between sections 9 and 10, to where my central camp was located. From this camp pack horses were employed to move about as circumstances required. The route across townships 33, ranges 6 and 7 is extremely rough, and is obstructed by numerous small swamp and creeks, and it was found necessary to clear much bush. The valley of James river was afterwards used as a route for transporting supplies and moving camp, but the river must be forded many times before reaching its junction with Red Deer river, and this is only possible at low water. With the exception of the valley of James river the soil of the township is barren, being composed of a light sandy clay with stony or gravel subsoil. In the valley of James river patches of sandy loam occur. Generally this township is unsuited to the growth of cereals. The south portion is much broken by the valley of James river. The central and northeastern portions are flat and the northwest portion is cut up by the valley of Raven river. The valley of James river is covered with patches of spruce, poplar and willow, with occasional small prairies and swamps. The central and northeast portions are wooded with jackpine, poplar and ground cedar. The northwest portion is wooded with jackpine and poplar. Along the banks of James river frequent small patches of spruce, from six to eighteen inches occur. No other timber of commercial value is found in the township. Practically no hay exists. The valley of James river is well watered by small creeks issuing from springs on the hillsides bordering the valley. James river is a stream of considerable size. Raven river affords good water in the northwest corner. The balance of the township is devoid of any permanent water supply. The fall of James river, being rapid, appears to afford numerous locations for constructing water powers with from six to ten feet ahead. No falls exist, however. The climate is similar to that prevailing in other parts of northern Alberta, and summer frosts are usual. Much windfall affords good dry fuel in all directions. No rock in place or outcrops were observed. Signs of coal were observed on the south bank of James river on sections 3, 4 and 5. The exposures occurred close to the water level, and being much weathered and air slacked its nature and quality could not be determined.

It appeared of the lignite variety. Grouse, prairie chicken and partridge are numerous. James river furnishes trout of large size, eight pound fish being quite common and no difficulty was found in catching fifty pounds in a couple of hours. Tracks of deer and bear were frequently noticed.—*A. W. Ponton, D.L.S., 1904.*

Township 36.—The route via Innisfail, Markerville and Raven river is the most direct. It was rather bad in the spring, but good later on. The soil is somewhat light as a whole, and it has a clay subsoil. It should grow the various grains and vegetables. The surface is covered with timber, as a rule small, that on the high land being poplar and jackpine and in the low land spruce and tamarac. There are practically no wild hay meadows. The township is traversed by Clearwater river, Raven river and by numerous small streams, and there are several lakes, all of which furnish permanent water in abundance, fresh and good. Some of the valley land along the Clearwater may be flooded to a depth of about one foot in the freshet stage for a few days. The Clearwater is the principal stream and it is a large river with a gravel bed three to ten chains in width and in this width it changes about considerably. It has a swift current of about eight miles per hour and a rapid fall. At a medium stage of water it has a depth of about five feet. In high freshet stage the bed practically runs full, but for a good part of the season a fair portion of it is bare and exposed in the shape of sand bars. The south branch of Raven river is a crooked stream of about fifty links in width. It has a current of about two miles an hour and an average depth of about two feet. Water power can be developed by building dams, as the fall is rapid, but there are no definite falls. The climate is pleasant, but several summer frosts were observed. Fuel is plentiful in the shape of poplar, jackpine, spruce and tamarac, and is found everywhere. Sandstone is exposed along the river in places, but no veins of coal were observed. Bear, deer, moose, duck, geese, grouse and rabbits are apparently plentiful, and beautiful trout of large size are abundant. No minerals of economic value were observed except a few fine colours of gold in Clearwater river.—*Thos. Drummond, D.T.S., 1904.*

Township 36.—This township being cut by Clearwater river from west to east, about one and a-half miles north of the south boundary, is naturally divided into two distinct parts. The south part being most easily reached from the east between the Raven and Clearwater rivers and the north part by a trail crossing Clearwater river near the north boundary of township 36, range 6. The soil on that part of the township subdivided as far as could be seen was clay loam on a clay subsoil. The surface of the country south of the Clearwater is quite rolling, thickly timbered with small poplar and jackpine with some spruce along the Raven river. North of Clearwater river the surface as far as subdivided was nearly level except on the east boundary of sections 22 and 23, where it was more rolling, and the timber mainly small scrub poplar, black birch and willow, with a small belt of spruce along the north bank of the river. The spruce timber is from 6 inches to 16 inches in diameter, but is not in sufficient quantity to be of merchantable value. There are no hay meadows as far as our survey went. The water of Clearwater and Raven rivers is fresh and the best met with and both are permanent streams. Clearwater river averages between its banks fifteen chains, but except at flood time, flows in several channels amongst sand bars and gravel beds thickly strewn with driftwood, and in many places piled up several feet high. The depth of water varies from three to nine feet with a rapid current generally. Raven river is about 40 links wide and from 2 to 4 feet in depth, with a current about 2 miles per hour, and very tortuous in its course. There does not seem to be much flooding of the adjacent lands by either of the above rivers, as the land falls quite rapidly on each side of them. The climate, from the experience of the past winter, is fairly mild, though summer frosts may be looked for sometime. The only fuel seen is wood and to be had in sufficient quantity for settlers' purposes. No coal or lignite was discovered. On sections 11 and 12 the bank of the Clearwater, on south side, is composed mainly of a soft sandstone, apparently too soft for quarries. No mineral or game was seen, but deer and bears are said to be plentiful at certain seasons.—*Henry W. Selby, D.L.S., 1904.*

Township 37.—The best route is via Innisfail and Raven river to township 37, range 6, beyond which there is no road. After the month of June the road was in good condition. The soil is a black loam with a subsoil either of sand or clay. When cleared of timber it would probably be suitable for growing the various grains and vegetables. Over a considerable portion of the township the surface is rough and hilly. The whole township is covered with timber—poplar and jackpine on the high land and spruce and tamarac on the low land. The timber is scrubby and small as a whole. There are a good many muskegs. There are practically no hay meadows. Good water is plentiful and the supply is permanent. There are several lakes, numerous creeks, and the township is traversed by Prairie creek, which is 1·00 to 1·50 chains in width and at an average stage about two and one-half feet in depth and a gentle current of about three miles an hour. There are no falls in the creek, but water power could be developed by building dams. As far as can be judged the land is not likely to be flooded by the streams. The climate is pleasant, but summer frosts occurred. Timber fuel is plentiful everywhere. Float coal was observed in the bed of the stream, but no coal veins were discovered. Sandstone is exposed along the banks of Prairie creek, and as far as could be judged of good quality. No other economic minerals were discovered. Moose, deer, bear and rabbits are apparently numerous as indicated by the tracks and grouse also are numerous. Fine trout can be caught almost everywhere in Prairie creek.—*Thos. Drummond, D.T.S., 1904.*

Township 38.—The best route is via Innisfail and Raven river to township 38, range 6; beyond this there is no road and Clearwater river has to be crossed, which river is impassable till about the middle of August or beginning of September. The road is in good order after July 1. The surface is covered with timber, which as a rule is scrubby except in the northwest corner of the township, where there is a little timber of larger size. The timber is poplar, jackpine, spruce and tamarac. There are no hay meadows, but there are a few open patches of grass along Prairie creek which afford a little feed for horses. The water is fresh and wholesome, permanent and plentiful. There are several lakes, numerous small creeks, and the township is traversed by Clearwater river and Prairie creek, both of which are important streams. Clearwater river is about 3·25—4·50 chains in width. It has a current of about four miles an hour and a depth of about five feet in an average stage of water. Water power could be developed by dams,, but the fall is not so great here as higher up the stream. Prairie creek is about one chain in width, a current of about three miles an hour and a depth of about two feet. It consists of a succession of deep pools with rapids and shallow water between and in the rapids water power could easily be developed by building dams, but there are no definite falls. The climate is pleasant, but there are summer frosts. Timber for fuel is plentiful everywhere, but no coal veins were observed. Float coal was observed in Prairie creek. Sandstone is exposed along the banks of both Clearwater river and Prairie creek. Fine colours of gold can be found on Prairie creek, but it is of no commercial value. Bear, moose, deer, rabbits, grouse, geese are apparently plentiful and beautiful trout of large size are abundant in the Clearwater and in Prairie creek.—*Thos. Drummond, D.T.S., 1904.*

Township 39.—Rocky Mountain House at one time a post of the Hudson's Bay Company, is situated on section 17 of this township. A trail from that point leads to Lacombe and another to Innisfail, the latter is said to be a very good trail. The soil is mostly a sandy loam which produces a fine quality of grass in the open spaces. The largest bits of open prairie are on sections 3, 16 and 17, but most of the land is covered with small timber consisting of spruce, jackpine, poplar and balm of Gilead, only a small portion of it being large enough for lumbering purposes. There is not an abundance of hay except on the three sections of open prairie already noted. There are several small creeks and two rivers in this township all affording very good fresh water. Clearwater river enters the township in section three and enters the Saskatchewan at the northeast corner of section 16. Its average width is about 2½ chains, depth from ten inches to 3 feet or more; rate of current 2:56 miles per hour. Saskatchewan river enters the township at the northwest corner of section 7 and leaves it on the north at section 33. Its width varies from four to ten or twelve chains. Depth at summer level from two to five feet. It is subject to freshets, when snow is melting on the mountains, that raise the level ten or fifteen feet. The rate of current here is 2·75 miles per hour. The right bank is for the most part in this township a precipitous cliff from 100 to 140 feet high. The left bank is low. The considerable volume of water and frequent rapids suggests the possibility of developing water power to a large extent. Summer frosts prevail here. Winters are not severe and snow usually not deep. There is ample wood for fuel. There is coal on section 16, the seam being a foot or more thick. This coal burns well with slight residue. On section 21 I observed a coal seam extending about half a mile along the left bank of the river. The seam was about eight inches thick. The sandstone cliff on the east bank of the Saskatchewan would doubtless afford good material for building purposes. I noticed indications of some one having been prospecting for gold in the gravel banks of the river, but so far as could be ascertained the search was fruitless. I understand that 'colours' are obtainable, but so fine that working for it will not pay. I found no minerals. Deer and bears are found here, also partridge and a few ducks and prairie chicken. Beavers were formerly numerous here, but very few remain. Trout, grayling and suckers can be caught in Clearwater river and are said to be quite abundant at certain seasons. Fish do not seem to be abundant in the Saskatchewan. This township affords some suitable ranching areas. Two settlers have taken up land with a view of cattle raising, and two more arrived when my survey was in progress.—*Geo. Edwards, D.L.S., 1904.*

Township 40.—The Mountain House trail touches the south boundary of the township. The soil is generally sand or sandy loam, suitable for grazing purposes or the cultivation of hardy cereals. There are few open spaces, most of the surface being covered with timber consisting of spruce, balm of Gilead, jackpine and poplar. The timber is mostly small. There is not much hay. Saskatchewan river passes through the township from south to north. Width of river varies from five to fifteen chains. Depth of water two to eight feet. The shallow places are of course the most rapid, average current being nearly three miles per hour. The banks are low and liable to be overflowed to some extent during freshet periods when the river rises ten or fifteen feet above summer level. The considerable volume of water and numerous small rapids would seem to make possible the development of water power to a large extent. There are only a few small creeks and the water is fresh. Winter climate is not severe. Summer frosts prevail. There is ample wood for fuel. No coal was noticed other than pieces of 'float' in the gravel along the banks. There is no stone suitable for building purposes. No minerals were observed. Deer seem to be plentiful. Bears are to be seen, and beavers are not entirely extinct, though the few that remain will soon disappear. Partridge are plentiful and a few ducks and prairie chickens were noticed. A few small fish were seen in the river, but they were not plentiful.—*Geo. Edwards, D.L.S., 1904.*

Township 48, range 7 (north outline).—In entering range 7, the country becomes very rough, hilly, broken and heavily timbered, and so remains until the heights on the other side of the Saskatchewan have been attained; from there the line passes over an undulating surface devastated by fire and covered with fire-killed timber and windfalls. On the northwest quarter of section 35 and the northeast quarter of section 34, the various channels and gravel bars of the Saskatchewan are intersected. On the northwest quarter of section 33, a pack trail is intersected leading from Brazeau river to the wagon road following the Saskatchewan. The quality of soil in this range is similar to the preceding one and therefore rated third class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 53 (west half).—The best route to reach this township is by the trail to Lake St. Ann and from thence to Isle lake. From the latter place I found it best to transport my baggage and provisions by pack horses. The trail is good and much used by hunters from the Rocky mountains. Pembina river enters the township in section 5, is very winding, flows in a general northeasterly direction, and leaves the township in section 34. The bed of the river is rocky, the water good and clear. On the banks are very fine spruce. Fish are scarce, but traces of bear, deer, wolves and foxes were seen. One of my men says he saw a black fox. The township is wooded with young elm and very fine spruce of tremendous size, especially near the river, where there are also rich coal deposits. The soil is sandy and not fit for cultivation except in sections 30 and 31. What makes this township valuable are the fine deposits of coal on the banks of the river and the fine quality of the spruce. These spruce will before long be sought after by lumbermen. Timber can easily be floated down Lobstick and Pembina rivers.—*C. E. Bourgault, D.L.S., 1904.*

Township 53.—The north branch of the road from Lake St. Ann to Jasper House passes through the north part of this township. Wagons can travel as far as the eastern boundary, but beyond it is only a pack trail. For the last six miles, we may say the last ten miles coming to Grays from the east, it has been used for wagons this summer for the first time, and some work would be required to get it in good condition. The soil is mostly a good coat of black loam over a clay subsoil well adapted for farming. The surface is rolling wherever it is not affected by the Pembina and Lobstick rivers, which form the principal topographical feature of the township. The valley of the Pembina is two hundred to two hundred and fifty feet deep and measures one-quarter to half a mile wide, and the banks are very steep in some places. The valley of the Lobstick is about one hundred to one hundred and fifty feet deep, but it generally slopes gradually on one side, although it is very often quite abrupt. There are, especially on the north third of the township, large spaces covered with small poplar easy to clear, with small open spaces covered only with scrub; but the country may be described as a heavy timbered country, interspersed here and there towards the south, with areas covered with small poplars, the big timber getting lighter the further we go north, although almost every section contains a good quantity of poplar averaging six to sixteen inches in diameter. Good spruce is also found along the river and the muskegs, especially on sections 2, 3, 10 and 11, also on sections 26 and 27. There are many spruce swamps which considerably reduce the farming area. Hay is found in a few sloughs, especially along the centre line on the east boundaries of 9 and 16, and also in the vicinity of Round lake. Water is good wherever found, but it was scarce in some parts this summer. The Pembina, which, as already said, is the main topographical feature of the township with the Lobstick, measures from two and one-half to three chains in width, with an average depth of from two to four feet at low water. The current averages four to seven miles an hour with many rapids. With the exception of the ends of points the river will not overflow its banks. There are no regular falls, but water powers could be developed by the building of dams. The bed is strewn with small boulders. Lobstick river is one to two chains wide, two feet deep and all that has been said of the Pembina applies also to it. The climate is the same as in Edmonton. There is plenty of wood for fuel, and coal is found along the Pembina, especially near the crossing of the north boundary of the township. There are no stone quarries, and I have remarked no minerals of any kind. Game does not appear to be plentiful.—*Geo. P. Roy, D.L.S., 1904.*

Township 54.—Pembina river is the principal feature of the township, into which it comes by crossing the south boundary of section 3, near the northwest corner of section 34, township 53, range 7, leaving it by crossing the east boundary of section 24 near the quarter section post. It averages three to five chains in width with a depth of two to four feet at low water, and a current of about five miles an hour. There are a number of rapids, but no regular falls. The valley is from one-half to three-quarters of a mile wide from top to top, and two hundred to two hundred and fifty feet deep. North of section 11 the banks recede and where the river leaves the township the ground on each side slopes gradually towards the river to a bank of ten to fifteen feet high. The general direction of the river is northeasterly. If dammed especially in the part running through section 3, where the banks are high and close a considerable water power could be developed, but the valley would be flooded for a long way back. The bank of the river is stony in most places. This township can be reached by the trail from Lake St. Ann to Jasper House. Wagons can come as far as Gray's store, on section 28, township 53, range 6, and even as far as the east boundary of the township, but from there it is only a pack trail. Two miles beyond Gray's it forks into two branches, one coming into the township near the eastern boundary of section 24, where the Pembina leaves it, the other continuing nearly due west, strikes the river about a quarter of a mile south of the south boundary of section 3, continuing in the same direction for a few miles more. The two branches re-unite again before reaching Jasper house. There is also another pack trail coming into the township near where Pembina river leaves it. It is a branch of the wagon trail from which it forks on section 14, township 54, range 5, but it is in bad condition on account of swamps, and is not much travelled. The soil is a good coat of black loam over a clay subsoil, and well adapted to farming. The valley of the Pembina breaks the surface of the country. All the part situated east of it is rough and hilly, except on section 24, where the ground is gently sloping towards the river. This side of the river is also thickly wooded for two miles from the south boundary, after which the bush gets lighter as you get near the river. The western part of the township is much better, except for the two miles along the meridian east of sections 4 and 9 where the country is broken by the valley of the river and by another deep valley crossing the east boundary of section 9. Along this meridian also the bush is heavy, and east of section 9 and 16, and also on the north boundary of section 10 we had to cut some of the largest trees (among them spruce) which we met this summer. Towards the west the country is rolling and the bush is much ligter. There are large spaces where land could be easily cleared in a short time. There is good fuel all over the township, but not many hay sloughs are found. The water is good. There are no water powers and nothing to produce them outside of Pembina river. The climate is the same as in Edmonton, but in the valley of the river it is much warmer than on the table land. When camped there in July the heat at night kept us from sleep more than once. Wood is the fuel most readily available, and it can be procured in any part of the township. A seam of coal about five feet deep runs for half a mile along the left bank of the Pembina, where it crosses the south boundary of section 3, and the men saw evidence of good coal along the north boundary of section 11. I have remarked no stone quarries nor minerals of any kind, ad we saw very little game while we were there.—*Geo. P. Roy, D.L.S., 1904.*

Township 54 (west half).—This township is all wooded with small poplar, some scattered spruce and birch, willow and scrub. The surface may be classified as rolling, in some places very level. Several creeks of good water running into Pembina river, cross the township. It may happen that these creeks will be dry the greater part of the season, when all the timber has been cut. Settlers coming into this country will not be disappointed, as there is good water, a great quantity of timber suitable for log houses, and at the same time very good land composed of black loam and clay subsoil.

There are no hay marshes, but along the creek may be found enough hay to feed cattle during the winter. There is a pack trail very well opened from Lake St. Ann settlement to the Rocky mountains, crossing sections 20 and 19. There is no prairie. Settlers will be obliged to cut timber to erect their houses, so you may imagine the great work to clear a farm. Notwithstanding this, I will not be surprised to see settlers coming into this country. There is no coal in this part of the township, but four miles away on Pembina river there is coal enough for the wants of a big town like Montreal.—*C. E. Bourgault, D.L.S., 1904.*

Township 56 (north outline).—The east half of this range is covered with thick poplar bush of 5 inches diameter, the surface is broken. The remainder comprises an undulating area with small open patches and occasional small muskegs. On the northwest quarter of section 36 Pembina river flows in a northeasterly direction with a rate of current of 4 miles per hour and a depth of water of 4 feet. On the northwest quarter of section 34 the line intersects a good pack trail leading from Lake St. Ann to the junction of the Macleod and Athabaska rivers. The soil is similar to that of the preceding ranges and rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 60 (north outline).—In this range the country is rolling and in the depressions are to be found muskegs and tamarac swamps. It is thickly wooded with poplar and spruce suitable for lumbering. On the northwest quarter of section 32, is intersected the east shore line of Athabaska river. Throughout the range the soil is of poor quality and rated third class.—*L. E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—Generally this range has a fair soil, a rolling to rough surface and is wooded with poplar, birch and spruce of fair size.—*Edgar Bray, D.L.S., 1904.*

Range 8.

Township 48 (north outline).—Across range 8 the line passes over an undulating surface over-run by fire and covered with fire killed standing timber and windfalls. Sections 31, 32, 33 and part of 34 comprises a level mossy muskeg. With the exception of sections 35 and 36 where the soil can be rated third class the remainder of the range is practically worthless.—*Louis E. Fontaine, D.L.S., 1904.*

Township 52 (north outline).—In the east half of range 8 the line passes over an undulating surface thickly covered with poplar and spruce of an average of 10 inches diameter. The remainder of the range is low and swampy with intervening small ridges of jackpine of small dimensions. The soil is rated third class throughout.—*Louis E. Fontaine, D.L.S., 1904.*

Township 56 (north outline).—Across range 8 the line runs over an undulating brulé country partly covered with a second growth of poplar and willow scrub. Paddle river meanders on the northeast quarter of section 35, in a northeasterly direction and empties into the Pembina. It has an average depth of two feet and a current of two miles per hour . In this range the soil is of better quality and rated first class and second class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—Assineau river crosses the base line in section 33 in a deep valley, whereof the west slope is generally gradual, while that to the east is very rough. Elsewhere the range is composed of rolling land with mostly a good soil, and is thickly wooded with poplar, birch and spruce.—*Edgar Bray, D.L.S., 1904.*

Range 9.

Township 52 (north outline).—Across range 9 the surface is undulating and swampy. Most of it has been over-run by fire and only a few scattered small bluffs of green jackpine are to be found. The soil is of a poor quality and rated third class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—The land in sections 36, 35, 34 and 33 is generally rolling, has a good soil and is wooded with poplar, birch and spruce of fair size and quality. Section 32 is swampy and mostly covered with scrub. Section 31 is also scrubby, but is good land. Swan river, a stream of about 120 feet in width, variable depth and slow current crosses the line close to the western boundary of the range. Along the river we found beautiful prairies, mostly of small size, but rich soil and adapted for any kind cf farming.—*Edgar Bray, D.L.S., 1904.*

Range 10.

Township 52 (north outline).—In this range the country assumes a rolling aspect. It is heavily timbered with poplar, spruce and jackpine varying from 10 to 18 inches in diameter. The soil is third class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—Section 36 is mostly prairie (with some scrub) with a remarkably rich soil. Section 35 and part of 34 lies in a swamp of spruce and tamarac. Section 31 is about one-half swamp of the same description. Elsewhere the land is gently rolling with fair soil and is covered with woods of poplar, with some birch and spruce.—*Edgar Bray, D.L.S., 1904.*

Range 11.

Township 52 (north outline).—In this range the country assumes a rolling aspect. It is heavily timbered with poplar, spruce and jackpine varying from 10 to 18 inches in diameter. On the northwest quarter of section 35 the line intersects a pack trail leading from Lake St. Ann to Jasper House pass. The soil is third class.—*Louis E. Fontaine, D.L.S. ,1904.*

Township 72 (north outline).—Mostly good rolling land with thick woods of poplar, birch and spruce.—*Edgar Bray, D.L.S., 1904.*

Range 12.

Township 52 (north outline).—In this range the line runs over an undulating surface, alternating between small ridges of green jackpine of six inches diameter and small muskegs and tamarac swamps. In this range there is a large quantity of waste land and what is left that is of any account is rated third class.—*Louis E. Fontaine, D.L.S., 1904.*

Township 72 (north outline).—Section 31 is in a spruce and tamarac swamp. Elsewhere the land is rolling, with woods of poplar, birch and spruce, and good soil.—*Edgar Bray, D.L.S., 1904.*

Range 13.

Township 72 (north outline).—Driftpile river, a stream of about 80 feet in width and variable depth and current, crosses the line near the western boundary of section 36, and here some unimportant openings were found. Generally, however, the land is of fair quality and is covered with woods of poplar, birch and spruce. The surface is mostly rolling, with a gradual rise from Driftpjile river to the middle of section 32, where a considerable altitude is attained. This point is also the beginning of a descent to the west, which continues for nearly a mile.—*Edgar Bray, D.L.S., 1904.*

Range 14.

Township 72 (north outline).—Sections 36 and 35 are mostly rolling land, with good soil and heavy timber of poplar, spruce and birch. The remaining sections (with a few unimportant exceptions) are part of an extensive and wet swamp of spruce and tamarac and are of no present value.—*Edgar Bray, D.L.S., 1904.*

Range 15.

Township 72.—East Prairie river, a reported tributary of South Heart river, which empties into the west extremity of Lesser Slave lake, flows northerly through section 32 of this township. This stream is about fifty-five yards wide, with banks twelve feet high, with a stone or gravel bottom and an average current of three miles an hour. The hills on each side of the river are thirty-five feet high. This river is reported to join South Heart river at about six miles above its estuary. Along each bank of the river, there is a strip of poplar, six inches in diameter, with a heavy undergrowth of alders and willows. Excepting the east half of section 35, which has a rolling surface, covered with poplar and spruce averaging eight inches in diameter, the country adjoining the line is a continuous spruce and tamarac muskeg. The soil on the east side of the river is a fine grayish silt, four inches deep, overlying a sand and stone subsoil, whilst on the opposite side of the river, it is black loam eight inches deep with a sandy subsoil. There are some hay meadows north of the line in sections 5 and 6, township 73. A pack trail from Sucker creek, Indian reserve, runs near the northeast corner of section 35.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 16.

Township 72.—Sections 35 and 36 are part of a large muskeg. The other sections which have a general slope to the north are thickly wooded with poplar, birch, spruce, balm of Gilead from six to twelve inches in diameter, and a thick underbrush of willows. The soil is a black or sandy loam four to eight inches deep over a sand or clay subsoil. A pack trail from Prairie river settlement to Snipe lake crosses the line near the middle of section 33. The divide between East Prairie river and West Prairie river occurs in section 31. Creeks running north cross the north boundary of this township in sections 31, 32, and 36.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 17.

Township 72.—The surface of this township is undulating and timbered with poplar, birch, spruce, balm of Gilead, of eight inches in diameter. There are some extensive spruce muskegs, notably in sections 31, 32, 34, and 35 with intervening narrow strips of high land, well wooded. West Prairie river, coming from the southwest crosses the north boundary of this township near the corner of section 32. It is forty yards wide with banks fifteen feet high. It flows in a narrow valley bounded on the east by steep hills forty feet high, whilst those on the west side of the river are seventy-five feet high. There is a prairie flat along this river, where the line intersects it. This river is said to be another tributary of South Heart river, which it joins about fifteen miles above its mouth. The soil is a black or sandy loam six inches deep with a sand and stones or clay and stones subsoil.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 18.

Township 72.—This township includes the northeastern slope of Hunters mountain, which is timbered with very large spruce averaging twenty-four inches in diameter. Spruce of thirty inches and thirty-six inches in diameter are not uncommon. The trees are sound, straight and clear of limbs to a height of forty feet or more. The other trees noticed are balsam firs (sapin), poplar, twelve to fifteen inches in diameter, birch, balm of Gilead and large cottonwoods. The underbrush in this forest is very dense, and in places the ground is covered with bad windfalls. The soil is generally a sandy loam, six inches deep, covering a subscil of heavy clay. Nat-sho-e or Iroquois creek, which flows northwards into Iroquois lake and ultimately into Little Smoky river, crosses the line in section 36 as does also the winter trail from Prairie river settlement to Sturgeon lake. There are a few small patches of prairie land along this creek. The divide between West Prairie river and Snipe creek is in section 31.—*Arthur Saint Cyr, D.L S., 1904.*

Range 19.

Township 72.—A thick forest of spruce of two feet in diameter, balsam firs (sapin), birch, balm of Gilead, and large cottonwood, covers this township, whose surface is rolling and sloping towards the northwest. Section 35 is covered with impassable windfalls. Good sized creeks flow through every section along the line and go to feed Stony creek, which winds along the west edge of Hunters mountain and crosses the line at the northeast corner of section 34. The ground is stony in places on the surface and the soil is light, being a sandy loam from six to ten inches deep with a heavy clay and stone subsoil.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 20.

Township 72.—Little Smoky river, which is the principal tributary of Big Smoky river, enters this township near the northeast corner of section 35. It is 140 yards wide, has a stony bottom, a swift current and banks fifteen feet high. Its valley proper is less than two miles wide and is bounded by hills 130 feet high. In sections 35 and 36, the country is rolling and covered with young poplar whilst in the other sections it is either level or undulating and thickly wooded with birch, poplar and spruce bluffs, alternating with patches of willows and alders. Along the river soil for one mile and a half west of it, is a heavy clay changing to a sandy loam four to eight inches deep over a clay subsoil in sections 31 and 32. Snipe creek, which is the outlet of Snipe lake, a body of water five and a half miles long and lying in ranges 18 and 19, township 71, crosses the north boundary of section 36. It winds along the foot of high hills and joins Little Smoky river about half a mile north of the line. The wagon road from Lesser Slave lake to Sturgeon lake crosses the middle of section 35. *Arthur Saint Cyr, D.L.S., 1904.*

Range 21.

Township 72.—The surface of this township is nearly level and covered with spruce, birch and poplar woods. The timber range from six to eight inches in diameter. There is a spruce muskeg in section 35 and a larger one, which starts north of section 34, extends westerly through sections 33, 32 and part of 31. Creeks flowing south cross the north boundary of section 35. The old pack trial from Lesser Slave lake to Sturgeon lake intersects section 31. It follows along a stream flowing north towards Little Smoky river. The soil is very good in the vicinity of this trail and creek, being a black loam ten inches deep with a clay subsoil. Through the other sections, the soil is a black or a sandy loam three to ten inches deep overlying a clay subsoil.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 22.

Part Township 28.—The survey of the above township lay along the Canadian Pacific railway in the neighbourhood of Moberly, B.C. It consisted in extending the original survey. The part lying between the Canadian Pacific railway and the Columbia river is low and nearly level. Most of it is occupied by a swamp meadow, which is boggy in places. When the water in the Columbia is high this swamp is covered with water; in consequence it is practically useless. It might be reclaimed by placing a dyke along the river but it is a question if the land warrants such an outlay. If a large open ditch was placed through the middle of the meadow, a considerable part of it could be made use of. On the opposite side of the railway the country is hilly with occasional benches. The timber has been almost completely burnt off. *Jos. E. Ross, D.L.S., 1904.*

Township 72.—This township is covered with impassable windfalls and its surface, which is rolling or undulating, is stony in places. Two muskegs extend across section 35. Spruce timber is found only in small patches in the brulé, which is overgrown with small poplar and thick willow scrub. Creeks of good water, flowing northeasterly towards Little Smoky river, run through sections 36, 33, 32 and 31. Along one stream and its branches, running through section 36, is a strip of prairie land half a mile wide. The soil is a black loam fifteen inches deep with a clay subsoil. In places this prairie is dotted with willow clumps. This creek receives from the west a tributary, the outlet of a lake half a mile long and lying one quarter of a mile north of section 35. In sections 31, 32, 33, 34 and 35 the soil is a heavy clay.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 23.

Township 68.—This township is tolerably level, and the land is stony in places. It is covered with young poplar, balm of Gilead and thick willow scrub. There is a large muskeg in section 32 and another one in section 34. A well travelled pack trail from Sturgeon lake to Little Smoky river enters this township near its northeast corner. The soil is a sandy loam two to six inches deep or a black loam in places fifteen inches deep with a heavy clay or sandy subsoil. Spruce timber of small dimensions is found in the muskegs. Small creeks, tributaries to Little Smoky river, cross this line in sections 35 and 36. The height of land (2,300 feet above sea level), between the basins of the Simmonette and Little Smoky river, occurs near the northeast corner of section 31.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 72.—The north boundary of this township runs over a mountain timbered with spruce from ten to twenty-four inches in diameter, some attaining a diameter of thirty-six inches, jackpine, poplar, balsam fir and birch. The highest point, 2,700 feet above the sea, reached, is at the northeast corner of section 33. The land is well irrigated by several creeks of good water flowing in deep ravines. The largest one of these streams is called Wabatonish (white earth), by the Cree Indians, and is a tributary of Little Smoky river. There are some bad windfalls overgrown with small poplar in section 36, and north of sections 34 and 35. Two pack trails leading to Sturgeon lake join in section 19, after crossing the north boundaries of sections 31 and 32. The soil is clay.—*Arthur Saint Cyr, D.L.S., 1904.*

Range 24.

Township 68.—Level country covered with willow scrub, small spruce, birch, poplar and balm of Gilead. A large spruce muskeg extends across section 31, and the west half of 32. Another large muskeg takes up the east half of section 34, and the west half of 35. In these muskegs the timber is scraggy and small. Two pack trails from Sturgeon lake run through section 35 in close proximity to each other, and another one through the middle of section 36. The soil is generally a black or sandy loam four to eight inches over a clay or sand and stone subsoil. In places the soil is gravel.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 72.—Undulating country wooded with poplar and spruce from 6 to 12 inches in diameter. The height of land between the basin of the Big Smoky river and those of Sturgeon lake and Little Smoky river crosses the north boundary of section 36. Amongst the many streams which flow through this township, the most important is Puskwaskow river, the outlet of the Puskwaskow (Marecageux) lake, lying in section 32. It is a tributary to Big Smoky river. There are hay meadows in sections 32, 34 and 35, and a large spruce muskeg covers the west half of section 32 and nearly the whole of 31. The soil is a sandy loam 3 to 4 inches deep with a subsoil of clay.—*A. Saint Cyr, D.L.S., 1904.*

Range 25.

Township 72.—The forest extends westerly through this township as far as the middle of section 32 where the brulé and windfalls begin. The surface of this township is nearly level and is well drained by several large creeks, feeders to Puskwaskow river. The soil is a black loam 3 to 10 inches in depth overlying a subsoil of clay, or clay and stones. The timber is mostly spruce, poplar, cottonwood and birch 6 to 15 inches in diameter.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 68.—The western half of this township is rolling and lightly covered with willow scrub and bluffs of small poplar and birch whilst the eastern half is level. The land is stony on the surface and there are many hay meadows. A pack trail from Sturgeon lake to Simmonette river crosses the north boundary of this township at the northeast corner of section 35. Creeks, giving an ample supply of good water and flowing southerly towards Simmonette river, intersect this line in every section. The soil is a sandy loam four to twelve inches deep, with a subsoil of clay or clay and stones. At about half a mile north of the line, there is a range of low hills with a large meadow extending along their south base. This would be a good ranching country.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 77 (outlines).—The country along the base line is swampy for the first three miles and of a rolling sandy nature for the next two. The last mile of the base line and the first five miles of the eastern boundary are the usual poplar and spruce country . The last mile of the east boundary and the whole north boundary is through a net work of open marshes interspersed with some belts of very good land rather heavily timbered.—*C. C. Fairchild, D.L.S., 1902.*

Township 78 (part).—The south two-thirds of this township is very marshy for a great part and Coot lake is little more than a great marsh. The township is heavily timbered in the north part, while the south part is heavy in places and light in others. The country adjoining the east and south sides of Coot lake is full of marshes of varying size and practically grades No. 4 as for settlement. The pack trail from Lesser Slave lake to Spirit river crosses this township running north of Coot lake. The soil is excellent when not marshy and in some of the dry marshes hay was seen six feet in height.—*C. C. Fairchild, D.L.S., 1902.*

Township 79 (south and east outlines).—The country is generally heavily timbered, soil good and generally dry.—*C. C. Fairchild, D.L.S., 1902.*

Township 80.—As only the boundaries and the northern one-third of this township was surveyed, the report is confined to that part of the township. North of Peace river the country is generally rolling prairie with enough timber on some sections to provide for the requirements of the prairie parts. On the margin of the river and extending back in places for a mile or more is a block of as fine farming land as can be found in the Northwest Territories. These lands are partially prairie and the soil excellent. The surface is generally level and a fringe of good timber skirts the river. On the south side of the river, with the exception of the prairie running down to the river shown on plan, is found heavy timber covering both side, hill and valley. The valley when cleared will make excellent farming land, and timber enough can be had for all requirements. A considerable sprinkling of spruce is found throughout the other timber, but not in quanities to recommend its being reserved. On the islands, or rather what are islands in high water, large spruce grows in such quantities that I would recommend its reservation. The 21st base line in its fifth mile along the north side of range 25 reaches the summit of the banks of Peace river which I estimated at nine hundred above the river. On this plateau the land is excellent, and not so heavily timbered as the south flat of the river. Numerous small hay marshes abound on this level plateau, but I am informed by the Indians and others that these are practically all dry except in a wet season such as 1901. In fact great difficulty is met in finding water by hunters here except in the river, Egg lake and two or three creeks found between. This township, like the one to the west, is very difficult to approach, except by boat or saddle horse and this objection applies to the whole of the country between the 20th and 21st base lines.—*C. C. Fairchild, D.L.S., 1901.*

Range 26.

Township 68.—Simmonette river flows northwards through this township and crosses its north boundary in section 33; on both sides of the river are steep hills, 175 feet high. At some distance from the river, the ground is undulating, whilst in its immediate vicinity, its surface is rough and furrowed by deep ravines. Belts of large timber, spruce which has been spared by fire, were noticed in the flats along the river. On the high lands one hundred and seventy-feet above the river, some green timber is also found in bluffs separated by large tracts of fire-killed timber. Sections 35 and 36 are pretty open, with patches of willow and scrub poplar here and there. The soil is very good, being a black or sandy loam eight to ten inches deep over a clay subsoil. Near the river the subsoil is generally sand or stone and gravel. The eastern half of this township is sufficiently open, and there is enough wild hay growing to render it fit for ranching. There are a few small swamps and muskegs in the township.—*Arthur Saint Cyr, D.L.S., 1904.*

Frac. township 72.—Running diagonally from the northwest to the southeast across this township is a wide depression following the foot of Mt. des Salines on section 34. With the exception of patches of green timber in sections 21, 27 and 34, nearly all the timber is fire-killed and is either standing or strewn thickly over the ground. The divide between the Simmonette and Puskwaskow rivers is in section 35. There is a lake in sections 16 and 17, a large marsh in sections 20, and some hay meadows in section 31. Creeks flowing north across the north boundary of section 36, whilst those crossing sections 33, 34 and 35 flow southerly towards the Simmonette. The soil, in the east half of this township, is a sandy loam 5 to 10 inches deep over a subsoil of clay; in the other half, the loam is only 4 inches deep with a clayey or sandy subsoil. The land is stony on the surface in the vicinity of Mt. des Saines.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 77.—This township may be divided generally into two parts for agricultural purposes, viz.:—(1) North of Birch hills, (2) South of Birch hills. That part lying north of Birch hills slopes gradually to the north from the crest of the hill and contains some excellent farming land when not too heavily timbered. The northwest corner is the best part of the township. The eastern portion of the north half is more heavily timbered chiefly with poplar and interspersed with small marshes. This may be said to be the case with the eastern part of the south half as well, except that the timber is larger with a greater proportion of spruce, and marshes are more frequent and larger. The southwestern portion consists for a great part of a series of connected swamps and marshes, the only valuable feature being a considerable extent of large poplar, spruce, tamarac and jackpine timber. Birch hills extend only about one mile east of the sixth meridian; the east and south sides of the range are very steep and broken, while the north slope, as before mentioned, is, for the greater part, a steady decline.—*C. C. Fairchild, D.L.S., 1902.*

Township 78.—The surface of this township is generally slightly undulating and covered with a growth of poplar and spruce of varying size. A considerable portion of the surface is covered with a thick undergrowth of willows and a large marsh in the centre of the township detracts considerably from its value. The soil is excellent when dry, but it is rated as No. 2 only on account of the timber growth. The creeks shewn on the lines all run dry in the summer. The trail from Lesser Slave lake to Spirit river settlement passes through the southern part of the township. *C. C. Fairchild, D.L.S., 1902.*

Township 79.—This township has more prairie and is better drained than any of the others examined by me on the south side of Peace river. Fox creek, a never failing stream of good water, runs from east to west across the township, and a branch runs from the southwest angle of the township in a northeasterly direction to join the main stream. This branch, however, dries up in the summer. A greater part of the land lying on either bank of these creeks is prairie broken with bluffs of small poplar and willow. The soil is excellent, generally well drained, and, but for the timber, which increases in size as you get farther from the creek, would be No. 1 for agricultural or grazing purposes. Some small marshes are found in the north end of the township and strange to relate, though the north limit runs at the west side within one mile of Peace river the drainage is all towards Fox creek. The ravine through which the creek runs is only about twenty-five feet deep at the east boundary, and increases to one hundred or more at the west boundary, where both banks are more or less heavily timbered.—*C. C. Fairchild, D.L.S., 1902.*

Township 80.—On July 26 I started the survey of this township. The greatest difficulty in the survey was the crossing of the various marshes, many of which had three feet of water in them at the end of July, which were practically dry by the middle of September. The township lies almost wholly in the valley of Peace river, i.e., between the tops of the high banks. The soil is first class clay loam and black loam, but a great portion of the surface is so broken that it would be practically useless for grain farming, but would do for grazing. There is plenty of timber for wood and building on the township, although a portion north of the river has little besides small poplar scrub. The growth during the summer of 1901 was almost tropical. The pea vine and grass reaching a height of six feet in places. Saskatoon and raspberry bushes are plentiful in many places, and the yield for the season was very prolific. Horses run wild over the district north of the river and have not the slightest difficulty in wintering without feed. The township is approachable, however, only by boat or saddle horse. The deep gullies found by the tributary creeks making road building almost an impossibility. The creeks shown on plan and in notes required to be bridged to cross my pack trains, while in September no water was running in any of them. The greater part of the township north of Peace river has been burnt over in past years, while the south bank is as yet untouched. Peace river was so flooded that I found it impossible to swim my horses, and I was forced to transfer them in a boat, but by the time the traverse of the river was made it had fallen to normal low water. Some excellent flat lands mostly on the south side of the river would make splendid farms. These lands hemmed in by surrounding hills like the settlement at the south of Smoky river, are among the finest I have ever seen.—*C. C. Fairchild, D.L.S., 1901.*

Range 27.

Township 68.—This is a fractional township adjoining the sixth initial meridian, which intersects its north boundary at 28·89 chains west of the northeast corner of section 35. Moose river, a tributary of Simmonette river, flows northerly through this township, crossing its north boundary near the middle of section 36. Over this part of the country are deep ravines leading to the river and all the land is covered with bad windfalls. The soil is a sandy loam six inches deep over a sandy subsoil near the river, or a clay subsoil on the high lands.—*Arthur Saint Cyr, D.L.S., 1904.*

TOWNSHIPS WEST OF THE SIXTH MERIDIAN.

Range 1.

Township 65.—In the north half of this township, which has a rolling surface, the fire has destroyed all the timber in what was once a magnificent forest. The other half is very hilly, but the ridges are covered with dense woods of jackpine three inches to fifteen inches in diameter, poplar, balsam fir (sapin) and spruce in the intervening muskegs. The general slope of the land is towards the west, where the valley of Moose river can easily be identified by its steep hills and cut banks. A well travelled pack trail, reported to be a branch of Lake St. Ann trail, runs through section 1. Amongst the many streams which flow through this township, one, called Cache creek, is thirty links wide. It flows westerly, crossing the line at right angles near the northeast corner of section 1. The soil is light, being sand and gravel or a fine grayish silt over a hard clay subsoil. The south half of section 12 is swampy.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 66.—The surface of this township is undulating and the land is irrigated by several creeks, tributaries to a good sized stream which flows in a northeasterly direction and crosses the line at a sharp angle near the middle of section 13. This stream empties into 'Lac des Petits Poissons,' which is reported to be one mile and a-half long and to lie two miles east of section 36. This lake empties Simmonette river, distant about five miles from it. There are some patches of green timber still left in this township. These are surrounded by large areas of fire-killed trees which are either standing or lying in an inextricable maze over the ground. From the middle of section 13, the ground rises gradually till an altitude of 3,175 feet is reached in section 1. This may be taken as the average altitude of the country above the level of the sea. The Rocky mountains are now in full view to the southwest with their snow-cappel peaks glittering in the sun. A pack trail from Lac des Petits Poissons crosses the middle of section 36. Soil is a clay loam with a clay or clay and stones subsoil.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 67.—Rolling country sloping towards Moose river, which flows northwards across the middle of this township. From section 36 the ground along the line rises gradually towards the south till in section 12 the highest point (2,800 feet above sea level) is obtained. In sections 1, 25, 36 and in the north half of section 24, nearly all the timber has been fire-killed, but the remaining sections along the line are well timbered with spruce, twelve inches to thirty inches in diameter, jackpine ten inches to twenty inches straight and free of limbs for over forty feet, balsam fir (sapin) twelve inches to twenty-four inches. Several creeks, giving an ample supply of good water, cross the line in their course towards Moose river. The soil is a black or sandy loam three inches to twelve inches deep overlying a subsoil of sand, or sand and clay, or clay and stones. Through this township there are considerable areas of thick windfalls. A pack trail from Sturgeon lake crosses the line in section 25.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 68.—Moose river flows from the west, crosses the eastern boundary in the southeast part of section 24, thence flowing north, crossing and recrossing the boundary in section 25. The river is about fifty yards wide, the valley is about half a mile wide between the crest of the hills which are from one hundred and fifty to one hundred and seventy-five feet in height. The hills are much broken by ravines. The timber is fire-killed, much of it lying on the ground. Soil, black sandy loam, six inches to eighteen inches deep, subsoil clay. South of the river to the southern boundary of the township, is a dense forest of spruce, twelve inches to twenty-four inches in diameter, poplar ten inches, birch eight inches, with heavy undergrowth of alders and willows. The country is level. The aneroid shows 2,000 feet to be the general elevation of the country above sea level.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 69.—For the last time Simmonnette river crosses the sixth meridian near the northeast corner of section 12. Less than half a mile west of that point, it receives a tributary, called the Moose river. This very tortuous stream crosses the line twice in section 36, and four times in section 25; it is about sixty-five yards wide, has a swift current, a stony or gravelly bottom and banks fifteen feet high. The hills on each side of the river are one hundred and seventy-five feet high, and in places end in steep cut banks reaching to the water's edge. The surface of the north half of this township is level and swampy. It is old brulé overgrown with young poplar and willows. There is a belt of spruce, tamarac, poplar and birch in section 24. Through the south half of this township run deep ravines leading to Simmonette and Moose rivers. A few strips of good spruce ten inches to twenty inches in diameter were noticed along both streams. A pack trail runs through section 13. The soil is loam, two inches to eight inches deep with a clay or sand and clay subsoil.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 70.—Simmonette river crosses the east boundary of this township three times in sections 36 and 25. Between the river and the foot of the steep hills which bound its valley are some flats where narrow belts of good timber (spruce twelve to thirty inches in diameter) and large cottonwood were noticed. South of the Simmonette, the surface of this township is generally level and covered with small poplar and willows in belts and clumps, with spruce and tamarac swamps and hay meadows intervening between the belts of small poplar. As usual, the land is thickly covered with impassable windfalls piled several feet high. The soil is a loam four inches to ten inches deep with a sandy subsoil in the sections adjoining the river, and a clay or sand and clay subsoil in the others. A pack trail crosses this line not far from the northeast corner of the township. In section 25, there is a large hay flat at about half a mile west of the sixth meridian and close to the right bank of the river. The sections adjoining the river are much broken by deep ravines.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 71.—Simmonette river, a large tributary of Big Smoky river, crosses the east boundary of this township, three-quarters of a mile south of the northeast corner of section 1. At the crossing on the line Simmonette river is one hundred yards wide, with a swift current. Its banks are about ten feet high and its valley, three-quarters of a mile wide, is enclosed between rough hills one hundred and seventy feet high. Extensive mud slides occur on both sides of the valley. After crossing the line, the river is reported to flow nearly due west to the Big Smoky and during the winter becomes part of the winter trail from Sturgeon lake to Grande Prairie. In this township also nearly all the best timber has been destroyed by fire, and though many dry trees are left standing, many more are lying over the ground in bad windfalls. A belt of good timber spruce twelve inches to twenty inches in diameter is, however, found between an old channel of the Simmonette and the river proper in section 1. Section 13 is very hilly. A large muskeg extends across section 24 and numerous creeks irrigate this part of the country. The soil is a loam four inches to eight inches deep overlying a clay subsoil though in some places the subsoil is a grayish fine silt of the kind noticed in township 75, south of Big Smoky river. Large lumps of drift coal were found along the banks of the river and indications of coal were noticed at many places in the mud slides. The country is hilly in the vicinity of the river. *Arthur Saint Cyr, D.L.S., 1904.*

Township 72.—Rolling country sloping towards the west and southwest and covered with bad windfalls, overgrown with thick poplar—many fire-killed trees still standing, the remains of what was a few years ago a fine forest. There were still some patches or bluffs of green timber surrounded by willow swamps or muskegs. An Indian trail runs through section 13. The soil in sections 1, 12, 13, 25 and 36 is a loam four inches to twelve inches deep with clay subsoil. In section 24 it is hard clay. Drift lignite in considerable quantity was found in the bed of a small stream flowing through the middle of section 13. *Arthur Saint Cyr., D.L.S., 1904.*

Township 73.—The surface of this township is undulating. All the timber in this part of the country was destroyed by fire about eight years ago, with the result that the land is at present thickly strewn with bad windfalls and brulé overgrown with small poplar and thick willow scrub. From the middle of section 36, the sixth meridian follows the western slope of a range of hills extending southwards. The soil is very good, being a loam six inches to twelve inches deep with a clay, or sand and clay, subsoil. Another range of high hills is seen eight or ten miles to the east.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 74.—Puskwaskow (Grassy) creek, a tributary of Big Smoky river, enters this township at the northeast corner of section 24. It is about half a chain wide and furnishes a good supply of water. It flows out of Puskwaskow (Grassy) lake one mile and three-quarters long and one-half mile wide. Large quantities of good hay (red top) could be procured from the vicinity of this lake. This township is wooded with spruce, jackpine, poplar from six inches to fifteen inches in diameter and birch with dense underbrush of willow scrub and alders. In section 1 the land is flat and swampy, whilst section 25 is much broken by ravines. The soil is a black loam three inches to six inches deep with a clay subsoil. The regular pack trail from Sturgeon lake to Birch hills and Ghost river crosses the east boundary of the township in section 13.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 75.—The east boundary of this township runs through an undulating and wooded country irrigated by numerous small creeks. The timber is chiefly poplar from ten inches to fifteen inches in diameter, spruce six inches to ten inches and birch mixed with a heavy underbrush of alders and willow scrub. A pack trail crosses this line in section 13; and small creeks in sections 13, 24 and 36. In sections 13, 24, 25 and 36, the soil is fine grayish silt from four inches to fifteen inches deep with hard clay for a subsoil. In sections 1 and 12, the soil improves, being a loam six inches deep overlying hard clay.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 76.—Big Smoky river, an important tributary of Peace river, flows through this township from west to east, crossing the east boundary at a quarter of a mile north of the northeast corner of section 12. It is at that point a quarter of a mile wide, has a current of four miles an hour and banks twenty feet high. Its bed is stony and gravelly. The hills facing the river from the north side are five hundred feet high, whilst those on the south side are less than two hundred and fifty. The width of its trough-like valley, measured between the crests of the hills on both sides, is almost three-quarters of a mile. North of the river the country is rolling and heavily timbered with spruce 10 to 15 inches, poplar of the same dimensions and birch. It is also much broken by ravines in section 25, through which runs a creek of good water. The country south of the river is also timbered, but more level. Creeks of good water cross the east boundary of this township in sections 1, 12, 24 and 25. A tamarac and spruce swamp, with trees about 6 inches in diameter, fifty chains wide, extends across the line and lies partly in sections 36 and 25. The soil in the sections north of Big Smoky river is generally a black or sandy loam 4 inches to 15 inches deep with a clay subsoil, which in those south of the river changes to a fine grayish silt 4 inches to 15 inches deep overlying hard clay.—*Arthur Saint Cyr, D.L.S., 1904.*

Township 85 (east outline).—This line is entirely on the southerly slope of a range of hills separating the watershed of the Whitemud river from that of Burnt creek. The south three miles have been burnt over, leaving scarcely any timber except small poplar and willow; there are several small watercourses rising in the hills to the northwest which have gradually worn out deep ravines and coulées towards the southwest down to the watershed; the northern three miles lies in more broken country with a thick growth of spruce and poplar and some birch. The soil is not deep, ranging from 3 to 12 inches of loam on clay subsoil. The height of land is about half way in the south half of section 1, township 86, range 1; from this point a view can be had along the meridian over the Whitemud river valley to a point about 1½ miles south of the northern corner of township 88, range 1.—*Henry W. Selby, D.L.S., 1904.*

Township 86 (east outline).—Descends gradually to the creek entering Whitemud river a short distance east of the northeast corner of township 86, and while it does descend it rises and falls over rolling ground between watercourses trending northeasterly from the height of land. The timber is mainly small poplar and scattered spruce of good size, while the soil improves from the height of land to the river.—*Henry W. Selby, D.L.S., 1904.*

Township 87 (east outline).—Whitemud river is crossed in section 12 along which there are small areas of prairie to the west, increasing in size to the east; the timber is chiefly small poplar with a few small spruce belts on dry muskeg and here and there burnt slash areas between the gently rolling ridges gradually ascending to the north. Soil continues loam with a clay subsoil except in the depressions where the muskeg is from 10 to 18 inches deep on clay.—*Henry W. Selby, D.L.S., 1904.*

Township 88 (north outline).—The land along the north boundary of sections 36 and 35 of this range is rolling, the drainage is to the northeast. A range of hills from 200 to 300 feet high extends in a southeasterly and northwesterly direction crossing the base line in section 34, beyond this the drainage is to the south. In sections 36 and 35, township 88, and sections 1 and 2, township 89, is a belt of heavy green timber, principally spruce and poplar; sections 34 and 33 township 88, and sections 3 and 4, township 89, are covered with a burnt slash. The soil in sections 36 and 35, township 88 and sections 1 and 2, township 89, consists of loam on a clay subsoil. In sections 34 and 33, township 88, and sections 3 and 4, township 89, the loam has been practically all burned, leaving only clay.—*Henry W. Selby, D.L.S., 1904.*

Township 88 (east outline).—The east boundary of this township gradually rises to the north until in section 25 the height of land is reached and a descent of 200 feet brings us to the northeast corner of section 36. The timber on sections 1 and 2 is mixed spruce and tamarac, and a few poplars of little value, the balance of the line runs through a thick burnt spruce slash, which on section 36 is thick slash and windfall almost impassable.—*Henry W. Selby, D.L.S., 1904.*

Range 2.

Township 83 (north outline).—This line, as far as it has been run, lies entirely in muskeg, which in summer is very wet, but which was frozen at the time of the survey, the timber is very small scattered spruce and tamarac. To the north of the line in sections 6, 5 and 4, township 84, range 2, it is a burnt slash. In sections 31 and 32, township 83, range 2, is a small lake.—*Henry W. Selby, D.L.S., 1904.*

Range 3.

Township 83 (north outline).—The land adjoining this line is also gently rolling, muskegs are also numerous; the timber is small poplar, spruce and willow. Muddy creek crosses the north boundary of section 33.—*Henry W. Selby, D.L.S., 1904.*

Township 83 (east outline).—The character of the country adjoining this land is similar to that of township 84; muskegs continue to be very numerous. The timber in sections 31, 30 and 19, township 83, range 2, and in sections 36, 25 and 24, township 83, range 3, is similar to that in township 84, that is to say, small spruce, tamarac and poplar, but in section 18, township 83, range 2, and in section 13, township 83, range 3, a belt of heavy spruce, poplar and tamarac is found extending in an east and west direction; this extends south into section 7, township 33, range 2 and section 12, township 83, range 3; the soil is principally clay.—*Henry W. Selby, D.L.S., 1904.*

Township 84 (east outline).—The land adjoining the east boundary of this township may be described as gently rolling, the timber is mostly small, though a small quantity of spruce, poplar and tamarac from 12 to 20 inches in diameter is to be found in section 30, township 84, range 2, and section 25, township 84, range 3. A number of muskegs covered with small spruce, tamarac and willows are to be found. Muddy creek crosses the east boundary of section 24, flowing in a southeasterly direction, a few prairie spots covered with a luxuriant growth of grass are to be found along the creek; the soil is mostly loam on a clay subsoil.—*Henry W. Selby, D.L.S., 1904.*

Range 6.

Township 80 (north outline).—The east boundary of this township falls in the easterly limit of a belt of large timber consisting of poplar and balm of Gilead thickly interspersed with small poplar and willow, which continues westerly to the top of the bank of Peace river valley in section 36, the timber extends southerly forming a fringe to the valley and northerly about 3 miles. The bank of Peace river on the 21st base line, is 810 feet above the water of the river, and is indented with ravines, landslides and washouts, which are continually changing their position, this sliding or change of position is due to the presence of alkaline clay in layers, upon which the upper layers keep moving upon receiving pressure from any direction. The first two miles west of the river is through large spruce, poplar and birch, and growth of willow; this extends for several miles both north and south of the line. The soil is chiefly leaf mould on clay. Section 33 appears to be a basin, dry this year, except for one or two sloughs, which may be considered as on the height of land and draining in a northeasterly direction. In section 32 ravines are found which empty into

Bear creek at a depth of 700 feet below the surface of the country; very heavy poplar and spruce is found here on both sides of the line and extending westerly to the west slope of the ravine in section 31. Fire has evidently destroyed the timber on the west slope, and only thick scrub, poplar and willow is found.—*Henry W. Selby, D.L.S., 1904.*

Range 7.

Township 80 (north outline).—This range is mainly scrub, poplar and willow growing up in burnt slash and fallen timber. Bear Creek coulée is met with in sections 34 and 35 and is from 600 to 700 feet deep. Very little water was flowing in this coulée this season. The soil is chiefly loam on clay and gumbo. This coulée runs easterly from near the northwest angle of township 80, range 7, and nearly parallel to the base line to section 35 and thence northerly about 1½ miles and thence northeasterly into Peace river, township 81, ranges 6 and 7 being very much cut up by it and its many ravines or arms.—*Henry W. Selby, D.L.S., 1904.*

Range 8.

Township 21.—I made a survey of parts of sections 17, 18 and 20, township 21, range 8, west of the sixth meridian, sufficient to cover the land required for mill purposes on the shore of Shuswap lake. The site is a very suitable one for a mill, being convenient to the Canadian Pacific railway and the waters of Shuswap lake, and lying in a crescent shaped bay is sheltered from the wind. It is a level strip about a mile in length and a few chains in depth from the water's edge. There are a small shingle mill, several dwelling houses and offices at present on the land. There are several small streams but none suitable for water power. The land in sections surveyed is thickly wooded with small timber. The land rises to about five hundred feet in twenty chains from the water. There is a little bench of land that might be used for gardening. In general,the land along Shuswap lake is steep and rocky and not suitable for agricultural purposes. In order to determine the position of sections surveyed, a traverse had to be made from the quarter post on north boundary, section 27, township 21, range 8, west of the sixth meridian.—*Jos. E. Ross, D.L.S., 1904.*

Township 80 (north outline).—The timber and soil is similar to that in range 7, with the addition of heavier fallen timber partly burnt. Bear creek coulée is crossed in section 35, 34 and east half of 33 and is about 600 feet deep ; the valley is all full of landslides and the timber is lying down in all directions piled ten feet in places. The line crosses an alkaline and iron bog in section 34 which may have some value. Another ravine crossed the line near the centre of section 31, which falls into Bear creek coulee. Vegetation is very good.—*Henry W. Selby, D.L.S., 1904.*

Range 9.

Township 80 (north outline).—The timber and soil is similar to that in range 8 with a rank growth of vegetation. The line crosses a ravine, an arm of Bear Creek coulée in section 35 and it crosses Bear Creek coulée in section 33 where there are a few good sized cottenwood trees and spruce, here we also found some good water which had been very scarce all along the line.—*Henry W. Selby,D.L.S., 1904.*

Range 10.

Township 80 (north outline).—The timber is mainly spruce, poplar and cottonwood in quite large belts amongst which the fire has burnt deep bays, leaving the timber lying in all directions and now growing up with poplar, willow and rank grass ;

the soil is similar to that in ranges 8 and 9, and in ordinary years would have a good deal of water lying on it on account of the gumbo and hard pan not letting it through. The watershed or height of land crosses the line west of the northwest corner of range 10 and extends northeast and southwest, a ravine falls northerly across the line in section 35 and there is a sharp descent to the west in section 31. On section 32 there is a large belt of good sized birch timber not met with elsewhere.—*Henry W. Selby, D.L.S., 1904.*

Range 11.

Township 80 (north outline).—Timber continues as in range 10 to be large and healthy looking, through sections 36, 35 and 34 in bluffs with dense willow flats between, in which the scrub is so tangled and matted together that it has to be pulled out of the way when being cut. Descent of drainage is to the northwest several small watercourses rising in ravines to the southeast and flowing through a large area of burnt and fallen timber ; soil same as last range and vegetation very rank. Very little can be said of the country away from the line as the willows are so thick that travelling is almost out of the question off the line.—*Henry W. Selby, D.L.S., 1904.*

Range 12.

Township 80 (north outline).—This range seems to improve in soil while the timber is smaller and the large trees are very much scattered except in sections 34, 33, 32 and 31 where deep gullies occur in which the timber is of larger and better quality.—*Henry W. Selby, D.L.S., 1904.*

Range 13.

Township 80 (north outline).—Bear creek is crossed in section 36, 810 feet below the general level of the land, and is at present a very small stream, but the banks show that at times there is a deep and wide body of water flowing therein, also along the cut banks there are narrow seams of soft coal outcropping. The timber is of very little commercial value, there being only a few spruce of any size. Section 35 is on the bank of Bear creek and partly cut by it and very much so by ravines and landslides, and the timber is of no value except for firewood. Section 34 is gently undulating with a good growth of poplar and spruce and the soil showing some improvement with a rank vegetation. Section 33 is cut by a coulée 400 feet deep and several smaller ravines which are quite heavily wooded, but little of which is of value. Section 32 is gently undulating with similar soil and timber to the last. —*Henry W. Selby, D.L.S., 1904.*

Township 81 (east outline).—This township is very much broken by Bear creek and its branches and many ravines and coulées. The timber is generally small poplar with small bunches of spruce of fair size,the soil is clay loam on clay. A pack trail follows the bed of Bear creek at low water from Peace river to St. John's trail, but is very rough for the northern six miles with stones and boulders. The meridian crosses Bear creek in sections 12 and 36 where the banks are from 700 to 800 feet high.—*Henry W. Selby, D.L.S., 1904.*

Township 82 (east outline).—East boundary rises slightly to the north on section 12 where it gradually descends to Peace river in section 25, passing through small belts of poplar and spruce and prairie spots to the northeast corner of section 36. This extends up the north bank of the river to the general level of the country.—*Henry W. Selby, D.L.S., 1904.*

Range 18.

Townships 17 and 18 (lots 780 and 781).—These lots lie in the valley of Guichon creek. They were taken up from the province and had been surveyed. The survey was made in a very superficial way. The posts, lying down often, were the only marks of the original survey.—*Jos. E. Ross, D.L.S., 1904.*

Range 19.

Part of township 17.—The parts of this township surveyed lie in the Meadow creek valley. Along the creek there is considerable good wild hay meadow. On the hills there is some good grazing land. The valley being from 4,000 to 4,500 feet above sea-level, general farming cannot be carried on. Stock raising is the only branch that could be prosecuted with any success. The lower part of the valley is timbered with black pine ; the hills with bull pine and fir. The best part of the valley has been taken up in lots from the province.—*Jos. E. Ross, D.L.S., 1904.*

Range 20.

Part of township 17.—The parts of this township surveyed lie in the Meadow creek valley. Along the creek there is considerable good wild hay meadow. On the hills there is some good grazing land. The valley being from 4,000 to 4,500 feet above sea-level general farming cannot be carried on. Stock raising is the only branch that could be prosecuted with any success. The lower part of the valley is timbered with black pine ; the hills with bull pine and fir. The best part of the valley has been taken up in lots from the province. *Jos. E. Ross, D.L.S., 1904.*

Part township 17.—The part surveyed is mostly range land, partly open and partly heavily timbered with fir and pine. In the open there is good bunch grass ; in the timber the grass is long, but sour. The country is generaly hilly.—*Jos. E. Ross, D.L.S., 1904.*

Range 21.

Township 18.—Lot 1,021 lies in the Guichon creek valley. It adjoins lot 780.—*Jos. E. Ross, D.L.S., 1904.*

Parts Tps. 13 & 14.—Rgs. 22 & 23.—W. 6.

Parts Tp. 15.—R. 23.—W. 6.

The valley of Nicola river, which flows into Thompson river near Spence Bridge, trends in a southeasterly direction. It varies in width from a few chains to half a mile and has in general high mountains on either side. The lower part of the valley is open but is fairly well wooded towards the boundary. The timber is small to medium size, mostly pine and fir. Nicola river is about three chains in width and keeps continually winding from one side of the valley to the other. During low water it can be forded in places but during the early part of the summer, it attains considerable proportions with a depth of four or five feet and a very strong current. Most of the valley has been taken up in Indian reserves and provincial lots. The remaining arable land lies in small flats along the river. The soil is a sandy gravelly loam. As the land lies in the middle of the 'Dry Belt' it would be necessary to irrigate to obtain crops of any kind. Considerable water power might be obtained from several steams flowing into the Nicola. Spiaos creek, which flows into the Nicola at the boundary of the belt is the largest. The land along this creek has been staked out in coal claims. There is also considerable merchantable timber. At present there is only a wagon road up the Nicola valley, but a railway is expected soon.—*Jos. E. Ross, D.L.S., 1904.*

Part Tp. 18, R. 23, W. 6th M.
" 17, R. 23 "
" 17, R. 21 "
" 17, R. 22 '

Nearly all the land surveyed in these townships lies in what is known as Highland valley. The part east of the Divide is sometimes called High valley. The valley varies in width from a few chains to half a mile. There is some fairly good wild hay meadow but the best land is occupied by Indian reserves. The altitude is about four thousand feet above sea level. In consequence of this general farming could not be carried on. Stock raising is the only branch that could be undertaken with any fair degree of success. Several settlers have been living in the valley for some years but they did not care to make the usual settler's statutory declaration. It is supposed that there are several good mining claims in the valley. The provincial government have just completed a very good wagon road into the valley from Ashcroft. The timber in the valley is black pine about six inches in diameter. The hills are timbered with bull pine and fir, from ten to twenty inches in diameter.—*Jos. E. Ross, D.L.S., 1904*

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DEPARTMENT OF THE INTERIOR

REPORT

OF THE

CHIEF ASTRONOMER

BEING PART IX. OF THE ANNUAL DEPARTMENTAL REPORT

FOR THE

YEAR ENDING JUNE 30

1905

PRINTED BY ORDER OF PARLIAMENT

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REPORT OF THE CHIEF ASTRONOMER.

THE OBSERVATORY,
OTTAWA, December 30, 1905.

W. W. CORY, Esq.,
Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report upon the operations of the Astronomical Branch of the Department during the past year. The correspondence of the branch from July 1, 1904, to June 30, 1905, was as follows:—

Letters received (exclusive of circulars, &c.)	1,138
Letters sent " "	1,871
Accounts dealt with	498

The correspondence, as now classified, is all contained on 285 files, representing subjects of correspondence. A card index, alphabetically arranged according to subject, forms a ready reference to the files. An incoming letter book and an outgoing letter book are kept for the record of the correspondence. The accounts are kept in an accounts record, from which they are posted into a card system ledger, classified under 45 titles, representing the principal items of expense connected with the administration of the branch.

The expenditure on the astronomical work and the boundary surveys, including salaries of all temporary employees, between July 1, 1904, and July 1, 1905, was $92,999.73.

THE DOMINION OBSERVATORY.

In my last annual report, I spoke of the expected completion at an early date of the Dominion Observatory. The building was ready for occupation and partly furnished by Easter, when the branch, comprising the staff of the chief astronomer and the boundary surveys, moved into the new building, vacating the rooms at 26 Wellington street which it had occupied for a few days less than nine years.

The new building is found very suitable for its purpose, affording space, which in the former quarters was very deficient, for the systematic carrying on of the work, including the correspondence, computing, draughting and photographing. The location of all the instruments in the same building is also most advantageous for the prosecution and supervision of the observations, as contrasted with the former condition of things. Accommodation for the library, which was much needed, is also provided. The shelving for the books has lately been put in, and the cataloguing is being proceeded with. Good progress has been made since our occupation of the building towards the completion of the furnishing and the installation of the instruments. The permanent accommodation for the meridian instruments is, however, not yet quite ready. The contract for the erection of the 'transit house' to receive these instruments was let early in the season. This house forms an annex to the western end of the present building, and is now nearly completed. It is proposed to place in it a meridian circle, which is now being constructed at the works of Messrs. Troughton & Simms. Accommodation is also provided in this building, by two piers, for the portable transit instruments used in longitude determinations, or other instruments as may be requisite. Pending the completion of this building, temporary shelters for the field transits have been provided to the east of the main building.

Descriptions of the various instruments now in use will be found in the reports and statements annexed.

It may be stated here that the observatory is open to the public every day during office hours, to view the building and the instruments. In addition every Saturday evening visitors are allowed, under the supervision of one of the staff, to view the celestial bodies through the fifteen-inch equatorial telescope. These privileges are taken advantage of by many people. The number of people registering their names in the 'visitors' book,' from May 31 to October 31, was 2,666.

ORGANIZATION OF STAFF.

With the removal to the new building, a proper organization as a branch of the Department became necessary, involving the permanent appointment of a sufficient staff to carry on systematically the work of the observatory and the boundary surveys. Provision having been made by parliament, the existing permanent staff, comprising only myself and Dr. Klotz, was added to by the appointment on July 1 of twelve officers. The names of the staff as thus constituted, with their respective duties, will be found in an appendix hereto.

ELECTRIC CLOCKS.

An appropriation of $5,000 was made by parliament in the session of 1904 for the installation of electric clocks in the government buildings. As mentioned in my last annual report, the primary clocks of the experimental system had been housed in the basement of the Supreme Court building on Bank street, with a connection with the Cliff street transit-house. All this apparatus has been moved to the new building, including the instruments which were at Cliff street. An arrangement has been made with the Bell Telephone Company for the use of wires connecting the observatory with the principal government buildings. Master clocks and dials have been installed, and the whole system is now being worked from the primary clock at the observatory.

There are now being operated in the parliament building, 42 dials; in the west block, 60; in the east block, 36; in the Langevin block, 48; at 26 Wellington street, 2; and in the observatory, 26, besides a tower clock; or in all 214. There is also a circuit for dropping the time ball on parliament hill. This has lately been put in operation. The dials are driven by master clocks, which are in turn synchronized by the primary clock at the observatory, which itself is regulated by observation.

With regard to the synchronization of the master clocks, it has been found advisable to make a modification. In the experimental system, the pendulums of the controlled clocks had their oscillations checked by a damping cylinder. This gave a very perfect control, but had the fault that in case of interruption of the controlling current for a short time the damper would bring the pendulum to rest and stop the clock with the dials depending upon it. This method of synchronization has been replaced by another in which the damping is omitted. In case of interruption of the synchronizing current, the controlled clocks are no longer subject to stoppage; they continue to work as independent clocks irrespective of the interruption. This control, though theoretically less perfect than the other, is sufficient for the purposes of time service by dials moving every minute. A full description of the instruments used in the time service, by Mr. R. M. Stewart, who has charge of them, is appended.

LATITUDES AND LONGITUDES.

The determination of latitudes and longitudes of points in Canada has been continued. On this work have been employed Dr. Klotz, Mr. F. A. McDiarmid and Mr. R. M. Stewart.

Dr. Klotz early in the season engaged in a determination of the difference of longitude between Vancouver and Seattle, in conjunction with the United States Coast and Geodetic Survey, represented by Mr. Smith, who observed at Seattle, while Dr. Klotz observed at Vancouver.

The purpose of this determination of longitude was as follows:—

In 1896, the difference of longitude between Montreal and Ottawa was determined in the usual way by Prof. McLeod of McGill University and myself. The longitude of Montreal had been determined by connection with Greenwich and with certain points in the United States. By combination of these observations a presumably accurate longitude had been obtained by the late Mr. Schott in his computation of the 'United States longitude net.' From this longitude that of Ottawa was obtained by addition of the difference observed in 1896.

From this again the longitude of Vancouver was obtained by a difference of longitude observed in 1900, by Dr. Klotz and myself.

From Vancouver the longitude was extended to Australia and New Zealand by a series of steps by Dr. Klotz and Mr. Werry, in 1903.

Such a series depends for the accuracy of any longitude upon the accuracy of all steps behind it. The errors are very small individually, but their accumulation is to be guarded against. For this reason it is not advisable to depend for longitude upon a mere chain, but cross connections are needed by which a longitude may be determined from as many independent points of known longitude as possible. The aim is to form triangles or 'nets' in strict analogy with the methods of trigonometrical surveys.

By connection with the United States longitude net is known the longitude of Seattle, which thus affords a convenient point from which to get a second determination of the Vancouver longitude. This it is important to determine with accuracy as the basal point not only, as explained above, for the transpacific longitudes, but also for longitudes in Yukon Territory, and possibly the international boundary at the 141st meridian of west longitude.

In this work Dr. Klotz used the 'Repsold' or registering micrometer attachment to the transit instrument, a recent device, a description of which will be found in his report appended hereto.

This apparatus is believed to increase the accuracy of observation, and especially to eliminate the 'personal equation' of the observers, thus saving half the time and cost of a longitude determination.

The movable thread in this micrometer is moved by hand, the observer endeavouring to keep the star bisected throughout its passage across the field of view. By an electric device automatic record is made on the chronograph of the times at which the thread passes certain points in the micrometer frame. The objection will at once occur to one who has had experience in transit observations that on a partially cloudy night, the star may be observed during part of its passage across the field of view, and yet a complete transit (20 records) be recorded.

It is said, however, that it is easy to distinguish these false records from the true, owing to the greater irregularity of the intervals between successive records. Nevertheless it is conceivable that an observer might become so expert in his use of the instrument that no irregularity of intervals should appear although the star was actually invisible at the recorded instants. In the micrometers moved by clock work which have been proposed as improvements upon the hand-moved Repsold, the danger from this cause would be still greater. There seems to be imposed upon the observer with this micrometer the duty, on partially clouded nights, of keeping a record of the visibility of stars while crossing the field of view, from which his observations may be properly weighted.

For the purpose of further strengthening the Canadian longitude chain, a determination was made later in the season of the difference of longitude between Harvard College observatory and Ottawa. Dr. Klotz observed at Harvard, and Mr. R. M.

Stewart here. Mr. Stewart not having a registering micrometer on his transit instrument, the personal equation between the observers was observed afterwards at Ottawa.

In the interval between the Seattle and the Harvard observations, Dr. Klotz observed at Father Point and Tadousac for latitude and longitude, Mr. Stewart assisting in the longitudes by taking the corresponding observations here. These observations were made at the request of the Hydrographic Branch of the Department of Marine and Fisheries.

From Tadousac, time signals were sent on August 1 to Sir Wm. Macgregor, at Chateau bay. These he had asked for for the purpose of determining longitudes on that coast, and especially in connection with the expedition sent from Lick Observatory to observe the total eclipse of August 30, at Sandwich bay. After the eclipse, signals were again sent him on September 1, directly from Ottawa.

Mr. F. A. McDiarmid has observed the latitudes and longitudes of twelve stations in Ontario and Quebec. This I believe to be a record performance, though the honours must be shared by Mr. Stewart who occupied the home station while the exchanges for longitude were being made, besides attending to his work in connection with the time service.

The stations observed by Mr. McDiarmid were, Sharbot Lake, Ste. Anne de Bellevue, Trenton, Madoc, Lindsay, Kingston, Whitby, Sutton, St. Catharines, North Bay, Temagami and Renfrew. These stations were observed for cartographical purposes at the request of the geographer of this department and of the intelligence division of the Militia Department. Besides this the difference of longitude between the transit house on Cliff street and the observatory was observed by Mr. McDiarmid and Mr. Stewart. The Cliff street house has been the reference point of all longitudes observed up to the present year. As the reference point will now be the observatory, this longitude connection was a necessity to correlate future longitudes with the past.

It seemed advisable further that an independent connection between the two points should be made by survey. As the two stations are not intervisible, the survey had to be carried out by a triangulation extending to the hills north of the Ottawa river, so as to secure points from which both stations could be seen. The angles of the triangulation have been observed by Mr. H. Bigger.

TRIGONOMETRICAL SURVEY OF CANADA.

Early in the summer a request was received from the Department of Militia and Defence that this branch should undertake the execution of a triangulation for topographical purposes of this part of Canada.

As the base line measurement and the expansion therefrom necessary for the observatory connection would serve for the initiation of the larger scheme, I was authorized to proceed with the latter tentatively, as a part of the work of determination of geographical positions hitherto done by us exclusively by astronomical methods, and pending specific provision by parliament for such a survey. A reconnaissance covering 3,000 square miles in the neighbourhood of Ottawa has been made by Mr. C. A. Bigger and Mr. J. D. McLennan and the selection and preparation of the observing stations has been begun.

TOTAL ECLIPSE OF THE SUN.

On November 19, 1904, the secretary of the Royal Astronomical Society of Canada communicated to the Right Honourable the Prime Minister, the following resolution of the council of that society:—

'In view of the fact that on August 29, 1905, there will be a total eclipse of the sun, first visible on the shores of James bay, and that it is in the interests of physical and astronomical science that the phenomenon be observed as fully as possible and reported upon; and the further fact that already the government of the United States and the governing bodies of Lick Observatory and the Carnegie Institution have determined to send parties of observers to different parts of Canada.

'Be it requested of the government of Canada that steps be taken to organize an expedition, under its control, to proceed to the neighbourhood of James bay, the coast of Labrador, or other suitable place, to observe and report upon this eclipse.

'And be it further requested that a limited number of members of the Royal Astronomical Society of Canada who are qualified observers shall be granted the privilege of accompanying the expedition, free of expense to themselves, the extension of such a privilege to a national astronomical society being entirely in accord with the custom which has obtained in all previous eclipse expeditions despatched by Great Britain and other countries to foreign parts.'

In compliance with the request of the society, the sending of an expedition to observe the eclipse was authorized by council. I was put in command, and invitations were given to six members of the society to accompany the expedition. The conditions having later been found such, with relation to transport, &c., as to warrant an increase of the party, invitations were issued to Mr. Maunder, of the Royal Observatory at Greenwich, with Mrs. Maunder, and to others interested in astronomical science, to accompany the expedition. The observatory party proper consisted, besides myself, of Messrs. Plaskett, Macara, Gauthier and Near. Mr. Menzies, of the Magnetic Observatory, Toronto, accompanied the expedition as magnetic observer. Mr. Plaskett was given charge of the designing of the apparatus and the preparations for the observations which it was desired to undertake on behalf of the observatory, leaving the other gentlemen bringing instruments to arrange for their own observations. To Mr. Macara was assigned the duty of looking after transport and commissariat for the whole party.

The central path of totality passed over the southern end of James bay, across the northern peninsula to Lake Melville, thence easterly to Sandwich bay, on the Labrador coast, and to the Atlantic ocean. There were thus four localities which would be accessible by water, from which to make a choice. Long land travel in these wild regions would obviously be impracticable with a large expedition.

Taking into account all considerations, especially probable weather conditions, so far as known, a point on Lake Melville, at the mouth of Northwest river, was finally chosen for the location of the Canadian expedition.

The ss. *King Edward,* of Quebec, was chartered for the expedition. Leaving Quebec on August 4, Northwest river was reached on the 11th. Prof. Louis B. Stewart, of Toronto, had preceded the expedition, travelling via St. John's, Newfoundland, and by the Labrador steamer, for the purpose of selecting the best place for the instruments and for the camp. Arriving at Northwest river a few days before the expedition, he was fortunate in finding an excellent place near the Hudson's Bay Company's post.

Here the expedition landed, and after much labour the installation of the instruments was completed some days before the eclipse, which gave time for the necessary practising and accurate adjustment.

The ss. *King Edward* returned to Northwest river, according to arrangement, on August 28, bringing several gentlemen who had been invited to join in the observations.

On the 29th a strong easterly wind prevailed, bringing cloudy skies. This weather continued during the night and the next morning dense clouds obscured the sun throughout the time of the eclipse. Totality, which occurred a few minutes before eight o'clock, was marked only by the dense darkness, and the careful preparations for photographing were rendered nugatory.

It had been hoped that good photographs of the corona would be obtained on this side of the Atlantic, which by comparison with those taken in Spain and Africa would afford information as to the variations of form, during the elapsed time, of the little-understood corona.

Unfortunately the expedition sent out by the Lick Observatory, which was stationed at Sandwich bay, some 100 miles eastward from us, was equally unsuccessful.

Immediately after the eclipse the work of packing up and loading on the steamer was begun. This was completed on the morning of September 1, and the *King Edward* started on her return voyage. Quebec was reached on September 7.

The equipment of the various observers and the objects aimed at was as follows:—

The instruments and proposed observations of the observatory party are fully described by Mr. Plaskett in his report.

Mr. Maunder, representing the Royal Observatory at Greenwich, was equipped as follows:—

1. From the Royal Observatory, Greenwich.

(*a*) 'Dallmeyer Coronagraph,' aperture, 4 inches; focal length, 5 feet; used with negative enlarger so as to give image of sun 2·4 inches in diameter. Mounted on equatorial stand of a 6-inch telescope by Simms. Programme, 6 exposures — 5 seconds, 10 seconds, 20 seconds, 20 seconds, 10 seconds, 5 seconds. To correspond as nearly as possible with the 'Thompson coronagraph' being used at Sfax in Tunis, in this eclipse; and to continue the series of coronal photographs taken in former years; this Dallmeyer coronagraph having been used in Mauritius in 1901.

(*b*) 'Abney' lens. A rapid rectilinear lens, 4 inches aperture, 34 inches focal length, photographs taken in primary focus. Mounted on equatorial stand of telescope of 4 inches aperture, lent to Greenwich observatory by Mrs. Maunder. Programme as for 'Dallmeyer' corónagraph. Corresponding to similar lens being used at Sfax, and to lenses used in eclipses of 1900 and 1901. Intended to secure the outer extensions of the corona, whilst the Dallmeyer coronagraph was intended for the details of the inner corona.

2. Mrs. Maunder's apparatus.

(*a*) Cooke photo-visual telescope, aperture, 3½ inches; focal length, 4 feet. Lent to Mrs. Maunder by Messrs. T. Cooke & Sons, of York. Mounted on 'Matthew' equatorial stand, belonging to 4-inch telescope, lent by Royal Astronomical Society to Mrs. Maunder for this eclipse. Programme 10 exposures in primary focus, varying from half second to 4 seconds. To correspond with series obtained in Mauritius with similar instrument in 1901.

(*b*) Dallmeyer stigmatic lens, 1½ inches aperture, 9 inches focal length, mounted on miniature equatorial lent by Royal Observatory, Greenwich, to Mrs. Maunder for this eclipse. Programme 4 exposures in primary focus, 15 seconds, 30 seconds, 30 seconds, 15 seconds. To obtain the long streamers. Same lens that secured the long streamers in 1898, and was used also in 1900 and 1901.

(*c*) Goerz anastigmat lens, 2 inches aperture, 2 feet local length, fixed mounting. Lens lent by Messrs. Goerz, of Berlin, who also lent a similar lens to Prof. H. H. Turner to use in Egypt in this eclipse, so as to give, with the photographs to be taken in Labrador, a set of stereoscopic pictures of the corona. Programme, 6 exposures, each of 0·4 seconds duration, with plates of different sensitiveness.

In the eclipse it was intended that the telescopes should be worked as follows:—

'Dallmeyer' coronagraph, Mr. Maunder.
'Abney' lens, M. Jennings.
Cooke photo-visual, Mr. Upton.
Stigmatic lens and Goerz lens, Mrs. Maunder.
Time keeper, Mr. Russell.

Mr. Menzies, as magnetic observer, was provided with the following instruments:

Magnetometer for recording photographically daily curves of horizontal force and declination.

Elliott magnetometer for determining absolute declination and horizontal force.

Dip circle for determining inclination.

Air barometer for recording small changes of pressure.

Standard barometer and thermometer for comparisons.

Richard thermograph, self-recording with pen.

Mr. Louis B. Stewart used a ten-inch theodolite for the determination of latitude. He also determined longitude by transits and azimuths of the moon with this instrument, as well as by carriage of chronometers. He made gravity observations with the Mendenhall half-seconds pendulum, and a survey of the station to show the positions of the various instruments.

Rev. I. J. Kavanagh, S.J., reports as follows upon his proposed observations for the purpose of charting the extreme coronal appendages:—

'Though our low-lying station on the Nor' West river in Labrador did not present the best conditions for the observation of the coronal streamers on account of the large atmospheric absorption, no means were neglected to secure records of their form and direction for comparison with the data elsewhere to be obtained. The fact of our station being the very first, as that at Assouam was the last, in the path of the lunar shadow, gave a special value to observations made at this point. Moreover, the increased solar activity in this maximum sun-spot period, made it very probable that there would be notable variations in the coronal appendages.

As the photographic method could not, in the given time, secure the dimmer and more delicate streamers, or pursue to their furthest extremities the more substantial rays, the shortcomings of this process were supplemented by the instantaneous method of unaided visual observation and simultaneous charting.

Fine seeing being all important in this work, the eyes of the observer were to be lightly bandaged for a quarter of an hour before totality, and during it, to be protected from the glare of the lower corona. This last was effected by the use of a light sighting-rod fastened to an altazimuth telescope provided with slow motion. A thin board, blackened on one side and white on the other and pierced by a quarter-inch hole, constituted the eye-piece. At the end of the rod, 10 feet away, was an opaque disc of a size calculated to cover the moon and four minutes of arc beyond. An assistant, Mr. H. M. S. Cotter, of the Hudson's Bay Co. post, was, by means of the slow motion, to keep the shadow of the disc on the eye aperture of the board, which, on this side, was covered with white paper to facilitate the operation. This adjustment was to have commenced some time before totality, and, even if the shadow of the disc were too indistinct to be followed, it might have been carried through the few moments of totality by a regularly continued handling of the slow motion. The telescope was in adjustment, but was to be used only at the end, for the glare of the corona falling on the eye would spoil it for fine seeing.

The charting to scale was to be done on a light blue paper on which the pencil marks would be just visible in dim light. In the centre was a black disc the size of half a crown, and all around a series of concentric circles, the disc's diameter apart. These half-crown dimensions have been suggested and widely adopted in view of securing a uniform scale for such drawings. At the several stations set up in Spain by the Jesuit Fathers this observation was, in each case, confided to five people; one for each quadrant and one to supervise the whole.

In remote preparation for this observation a considerable amount of practice in special drawing was absolutely necessary. For this purpose, several diagramatic sketches were made on dark paper. A black disc, five centimeters across, represented the moon, while the corona and streamers of varied intensity, form and length were drawn in white chalk, some of them extending 30 or 40 centimeters. The diagrams were placed in a dim light about 5·5 metres away, so that disc subtended the same angle as the moon on the eclipse day. These diagrams were copied over and over.

Excellent practice was also had on the streamers of the aurora borealis; the quick changes, both in form and intensity, of these capriciously shifting rays provided the best of drill in rapid and accurate charting.'

Rev. Dr. Marsh, of Hamilton, reports as follows upon his apparatus and that of Mr. G. Parry Jenkins.

'In my own charge were the following instruments:—

'1. A five-inch Brashear reflecting telescope of 75 inches focal length on equatorial mountings, clock driven, equipped with an enlarging apparatus giving an image of the sun of two inches in diameter, with which I proposed to photograph the partial phases of the eclipse, making a special effort to secure a photograph when the shadow of the moon's limb came in contact with solar spots, thus obtaining a comparison of the relative darkness of the moon's limb with the sun spots.

'With this arrangement I also intended making two short exposures during totality to obtain if possible the inner corona; after which I had adjustment to immediately reduce the camera to its prime focus, and by making exposures of various lengths, I hoped to photograph the outer coronal streamers. If successful I intended to enlarge the latter to the same size as the photographs obtained with the enlarging apparatus and thus show the inner and outer corona on the same scale, and print them in the one photograph.

'2. With a two and an one-eighth-inch lens loaned me by Mr. Chas. Potter, of Toronto. This lens was mounted on an equatorial head loaned to me by Dr. King, and was fitted on a cement pier. This camera was provided with an enlarging apparatus making it 5 feet equiv. focus, and designed to photograph the inner corona and streamers. At my request Dr. A. S. Johnson, of Chicago, editor of the *Technical World* kindly undertook to handle this instrument.

'3. A 6-inch Gourlay compass transit which I had previous to the eclipse carefully adjusted, and with which I made observation for the magnetic variation which I computed to be 36 degrees 52 minutes, and with which instrument I also observed a fluctuation of 8 minutes during totality.

'4. I also used a registered thermometer and noted a drop of 2 degrees during totality.

'5. I also photographed the landscape during totality, giving one second exposure, and have pleasure in forwarding you a print.

'6. Three-quarters of an hour after totality I photographed a portion of the sun through a fleecy cloud with the 5-inch telescope, and beg to ask your acceptance of an enlarged print of the same.

'Mr. Jenkins had as follows:—

'1. A 3-inch Dollond refractor, mounted on an equatorial head, and equipped with a special enlarging apparatus for photographing both the inner and outer corona.

'2. A Bausch and Lomb camera, to which he fixed a Thorp's grating, and designed to take long exposure photographs of the sun together with two orders of spectra on a 5 x 8 plate. This instrument was fixed to Dr. Marsh's 5-inch equatorial, and was arranged to make two exposures of 90 and 45 seconds each.

'Mr. Jenkins successfully photographed the sun three-quarters of an hour after the eclipse, with No. 1 equipment and a photograph is being forwarded by himself.'

Dr. C. A. Chant, of Toronto, proposed to observe the polarization of the corona by visual observations with a polarimeter, and also by photography with a suitable camera.

Mr. J. R. Collins, of Toronto, proposed to take a succession of photographs of the sun from the beginning to the end of the partial phase. His telescope was of peculiar construction, a combination of refractor and reflector, designed and constructed by himself.

I had proposed for myself the observation by telescope of the times of contact, and of the general features of the eclipse.

BOUNDARY SURVEYS.

The re-survey and re-marking of the international boundary along the 49th parallel has been continued under the direction of Mr. J. J. McArthur, in co-operation with Mr. Sinclair, of the United States Coast and Geodetic Survey.

The work this year has been continued as in the past, by the two parties, Canadian and United States, working independently of one another, on different parts of the line, subject to mutual inspection and check.

Of the section of this line west of the Rocky mountains, 410 miles in length altogether, the part from the summit of the Rocky mountains to the Skagit river is now practically completed and monumented. The line in the lower valley of the Fraser river from the Cascade mountains to the sea is also nearly completed. There remains to finish this section, some 40 miles west of the Skagit river, in the Cascade range.

Mr. J. M. Macoun has continued his investigations into the natural history of the neighbourhood of the 49th parallel west of the Rocky mountains, and Dr. R. A. Daly his geological researches. By order in council, Dr. Daly was transferred in July last from the Geological Survey to the Department of the Interior, thus carrying out the intent of his original appointment as geologist to the International Boundary Surveys.

The London Tribunal of 1903, in its settlement of the Canada-Alaska boundary question, failed to determine the mountains which should define the boundary line across the space between the peaks referred to as 'P' and 'T' in their Award. An agreement has since been come to between the governments of the United States and Great Britain, whereby the boundary line shall, across that space, be laid down in accordance with a joint recommendation made by Mr. Tittmann and myself in April, 1904. There is, therefore, now full authority for the survey and marking of the whole boundary line from Cape Muzon and Mt. St. Elias.

The survey of this boundary line, commenced last year jointly with the United States, has been continued during the present season. Mr. C. A. Bigger has had general charge of the field work of the Canadian parties.

The distribution of the survey work on this line has been as follows:—

Canadian survey party working northwesterly from the head of Portland canal, Mr. Geo. White-Fraser, D.T.S., in command.

In the region about the Unuk river, a United States party, under command of Mr. Fremont Morse.

In the region about the Stikine river, a Canadian party, under Mr. A. J. Brabazon, D.L.S.

In the region about the White Pass, a United States party, under Mr. Leland.

In the region of the upper Chilkat river, a United States party, under Mr. A. J. Flemer.

In the region of the upper waters of the Salmon river, a tributary of Chilkat river, a Canadian party, under Mr. W. F. Ratz, D.L.S. Mr. Ratz, after completing his work in this region, spent the rest of the season in a reconnaissance on the Taku river. In accordance with an arrangement which had been made with the United States commissioner, two surveyors were appointed by him to accompany the parties of Mr. Fraser and Mr. Brabazon. One Canadian representative, Mr. J. D. Craig, was appointed to accompany Mr. Morse's party. The chief office of these representatives was to insure satisfactory identification of the boundary peaks determined upon by the London Tribunal. Mr. Bigger assisted Mr. Leland in the identification of certain points at White Pass.

In June an informal suggestion was received from Mr. Tittmann that a joint examination be made of the monuments marking the boundary line between the state of Vermont and the province of Quebec. Such examination with a view to renewals and necessary additions of the international monuments is the settled policy of the Canadian government, as stated in the Order in Council of May 26, 1900, and shown by their subsequent action with regard to the New York-Quebec line, and the 49th parallel. The suggestion was therefore agreed to, and Mr. G. C. Rainboth, D.L.S., was appointed to carry it out in conjunction with Mr. J. B. Baylor, assistant in the United States Coast and Geodetic Survey, who had been detailed by Mr. Tittmann for the work.

As there seemed, when the Vermont section of the line had been gone over, manifest advantage in carrying the examination farther, it was continued so as to cover the whole of the land boundary between Canada and the United States, as far as the source of the St. Croix river, with the exception of the densely forested parts along the 'Highlands,' which could not be reached without the expenditure of considerable time and money. The work was completed a short time ago, and a report has not yet been rendered.

Appended hereto will be found the following statements and reports:—

Appendix 1.—Names and duties of permanent staff of the branch.

Appendix 2.—Report by Otto J. Klotz, LL.D., upon field astronomical observations during the season, to which has been added a description of the half seconds pendulum apparatus, and of certain observations therewith made in 1902.

Appendix 3.—Report by Otto J. Klotz, LL.D., on Transpacific longitudes between Canada, and Australia and New Zealand.

Appendix 4.—Description of the observatory building and instrumental equipment, by J. S. Plaskett, B.A.

Appendix 5.—Report of the expedition to observe the total solar eclipse, by J. S. Plaskett, B.A.

Appendix 6.—Description of the apparatus used in the time service, by R. M. Stewart, B.A.

Appendix 7.—Tabular statements of the observations for longitude made by this department from 1885 to 1904.

Appendix 8.—Report on field operations in the geology of the mountains crossed by the international boundary (49th parallel), by R. A. Daly, Ph.D.

I have the honour to be, sir,
Your obedient servant,

W. F. KING,
Chief Astronomer
and International Boundary Commissioner.

APPENDIX 1.

PERMANENT STAFF OF THE ASTRONOMICAL BRANCH, DEPARTMENT OF THE INTERIOR.

W. F. King, B.A., LL.D., D.T.S., chief astronomer.

CORRESPONDENCE AND ACCOUNTS.

W. Simpson, secretary and accountant.
J. H. Labbe, correspondence clerk.

OBSERVATORY DIVISION.

Otto J. Klotz, LL.D., D.T.S., astronomer.
J S. Plaskett, B.A., astronomer.
J. Macara, chief computer.
Louis Gauthier, C.E., keeper records.
F. W. O. Werry, B.A., D.L.S., observer.
F. A. McDiarmid, B.A., observer.
R. M. Stewart, B.A., observer and superintendent of time service.
W. M. Tobey, B.A., observer.
J. D. Wallis, photographer.

BOUNDARY SURVEYS DIVISION.

J. J. McArthur, D.L.S., surveyor.
C. A. Bigger, D.L.S., surveyor.

APPENDIX 2.

OTTAWA, October 7, 1905.

W. F. KING, Esq., B.A., LL.D., D.T.S., &c.
Chief Astronomer, Department of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report on the longitude and latitude work carried out under my charge during the season of 1905; also of the pendulum observations made by me in Washington and Ottawa with the half-seconds pendulum apparatus.

I have the honour to be, sir,
Your obedient servant,

OTTO J. KLOTZ.

REPORT UPON FIELD ASTRONOMICAL OBSERVATIONS AND DESCRIPTION OF HALF-SECONDS PENDULUM APPARATUS.

In view of the future determination of the position of the 141° meridian, part of the international boundary between Alaska and Canada, it was desirable that a connection be made between Vancouver and Seattle.

Accordingly I left in May, with the astronomic outfit, for Vancouver. Before beginning work I proceeded to Seattle to confer with Mr. Edwin Smith, the officer of the United States Coast and Geodetic Survey, about our programme for observations, and also about the necessary telegraphic facilities for exchange of time signals at night. The Seattle observing station is on vacant ground near the old university building, now used as a public library.

In Vancouver, I occupied our observatory at Brockton Point, Stanley Park.

My astronomic outfit was the same as that used by me in the transpacific longitude work, with the exception of the transit micrometer, to be described later.

The transit Cooke No. 3 is by T. Cooke & Sons, and known as No. 504 of their catalogue, 1900, with slight modifications ordered by this office. It has an object glass of 3 inches clear aperture, and 36 inches focal length; axis 1¼ inches in diameter, Y's 1$\frac{1}{16}$ inches in width, and the support of the axis is on two cylindrical segments of ⅝-inch long arc each.

The telescope is provided with two 6¾-inch setting circles reading by verniers to 20 seconds of arc. One of these circles is provided with a special arm for carrying the latitude level, when using the instrument as a zenith telescope. Above the level there is a device for an attachable mirror, a strip of silvered glass set in a metal frame. In using the transit as a zenith telescope the level readings cannot be satisfactorily read for stars near the zenith, as one end of the bubble will be directly behind one of the transit standards. To avoid parallax in reading the level, the mirror, secured at an angle of 45°, and at the height of the eye, overcomes the difficulty. A dew-cap, 6 inches long, is used when observing.

A striding level is provided, one division equivalent to $\cdot 08^{\text{sec.}}$ The vial rests on cork tips and is retained in position by light cork-tipped springs, one at each end.

There is a glass covering to prevent sudden change of temperature of the vial. A single wooden knob on the level frame serves for handling the striding level.

The illumination of the field (threads) is now effected through the hollow axis by small 5-volt ground glass electric lights, placed on the lamp stands, attached to the transit standards. These lights are a great convenience and improvement on the oil lamps hitherto used, besides there is no heating of the axis. The necessary current is supplied for each light by three Columbia No. 6 dry cells. The lights were turned off when not required, as they readily burn out, if left burning continuously. For reducing the light there is a movable disc, with a circular reducing aperture, attached to the lamp stand and close to the lens in the axis.

The transit is supplied with reversing apparatus, operated by a lever, along and outside one of the standards.

The heavy cast-iron stand rests on an iron base-plate, and is supported by three large screws, one at one end and two at the other, fitting into spherical holes in the base-plate. For meridional adjustment two opposing screws at the foot of the stand, and near the supporting screws, act on a projection on the base-plate, which is immovable. The levelling is done by the single supporting screw at one end. The base-plate was not bolted to the pier, as the weight of the whole instrument and plate was sufficient to retain the latter in a permanent position with reference to the pier.

Dent sidereal chronometer, No. 48419, was used throughout the season's work. It is provided with a break-circuit wheel, making breaks at every even two seconds, omitting, however, the 58th second, in order to identify the minute.

A record of the temperature of the chronometer was kept, by means of a thermometer within the box. One dry cell, Columbia, was found sufficient for the chronometer circuit, which was always independent of any other circuit. It is undesirable to have a heavy current passing through the chronometer as it is apt to blacken or burn the points of contact. The clock circuit was only on during the time of observing, i.e., several hours a day. The clock was wound daily at 6 p.m.

A Fauth (Saegmuller) barrel or cylinder chronograph was used. The cylinder is 6⅝ inches long, and 4 inches in diameter, and revolved once in a minute, so that the linear measure between the two-second breaks is forty-two hundredths of an inch. A Waterman fountain pen attached to an arm on the armature answered the purpose of a recording style. By means of a finely divided glass scale, with divergent-convergent lines, with intervals of one-tenth of a second the record of the chronograph was read. The tenth second intervals on the scale were further subdivided by estimation to tenths thereof, so that the transits were read to hundredths of a second. The chronograph sheet covers about 1¼ hours in time, leaving a margin on each side for notes. Three dry cells were used for the chronograph circuit.

The switchboard which has been used for many years very satisfactorily, was used at every station. It contains two keys, one ordinary make-circuit telegraph key, and a break-circuit key used only for sending arbitrary time signals; a talking-relay (150 ohms); a split signal-relay; a pony clock-relay (30 ohms); a sounder, seldom used by expert operators; a switch to throw the main line circuit on or off the points of the clock-relay, when on, so that the clock beats can be sent directly over the main telegraph line to any distant station; the necessary binding posts for joining up the wires; and plugs for the various cut-outs.

The whole is mounted on a rosewood board 18 inches by 24 inches, hollowed out on the under side where the covered connecting wires between relays, switches, cut-outs and binding posts are exposed for ready examination.

For the exchange of time signals a telegraph operator would come to the observatory at a stated time, the main line would be 'cut in' on the switchboard, a few words would be exchanged between the two observers at the two stations about the condition of the sky, whereupon the desired number of signals would be alternately sent and received, and the services of the operator for the night were over.

Since the transpacific work, finished last year, the telescope has been provided, also Cooke No. 2, with the registering or transit micrometer. It will be in place here to say a word about this attachment.

The essence of longitude work is accurate time determination. If we have an accurate time determination at two places and a comparison of these times by cable or telegraph, we obtain the difference of longitude between the two places. Hitherto time determinations have been made by observing the transit of a star over a number (11 with us) of threads placed in the focal plane of the telescope. The instant of passage over each thread was recorded on a chronograph by tapping an electric break-circuit key. From this it will be seen that a phenomenon (transit) suffered interpretation by the observer, and this interpretation is dependent upon the temperament of the observer, that is, upon his 'personal equation.' With experienced observers the personal equation is a fairly constant quantity during a season under normal conditions. This is equivalent to saying that an observer will habitually record the transit of a star too soon or too late by a certain quantity, a fractional part of a second.

This quantity does not affect the apparent accuracy of a time determination, judged by the residuals or probable error, nevertheless it affects the absolute time determination. Hence the difference of longitude between two places as determined by two observers is invested with the error due to the difference of their personal equations. This error is inherent to the method of observing transits over threads. The only way to eliminate satisfactorily this error is to exchange stations and instruments, and make another differential longitude determination, under the supposition that the personal equation of the two observers remains the same for both determinations. Evidently the mean of the two determinations will then give the absolute difference of longitude, and free from personal equation.

Longitude campaigns carried out under such conditions were made at a great sacrifice of time and money. This state of affairs has long been recognized by astronomers as unsatisfactory and expensive. The question was how to get rid of the personal equation in transit observations, so that transits could be recorded, practically free from the personality of the observer.

Repsold of Hamburg solved the difficulty by the invention of the 'registering' or, as I shall hereafter designate it, the transit micrometer.

The fundamental conception of this micrometer is that two observers do not differ in the bisection of a star by the micrometer thread, that is, if one observer bisects a star with the movable thread, the other observer would agree to the bisection, an assumption that may well be made within measurable quantity of time.

This being granted it remains to contrive a mechanism that will record this constant bisection, for as the star moves, the observer has to follow it across the middle of the field of the telescope where the registering is done.

Up to 1905 practically the only longitude work that had been done with the transit micrometer was the work carried out by the Geodätische Institut, Berlin, and the most notable determination is the classic work of Professor Albrecht and Mr. Wanach, in 1903, between Potsdam and Greenwich, in which the most elaborate pains were taken to obtain an absolute result. In order to prove the elimination of personal equation by means of the transit micrometer these two observers exchanged stations, and the two independent determinations agreed within the third place of seconds, that is, within a thousandth of a second of time. So that we now have the assurance by means of this micrometer to make longitude determinations without exchange of stations. From tests made at Washington Mr. J. F. Hayford, United States Coast and Geodetic Survey, is of the opinion that the result of three determinations of longitude made by means of the micrometer is equivalent in merit to that of ten nights, with exchange of stations, by the old method.

It will be observed, therefore, that the transit micrometer is a great acquisition to longitude determinations, in fact, it forms a distinct epoch for such work.

As our two transit micrometers were made by Saegmuller, of Washington, under the supervision of the Coast and Geodetic Survey, I can not do better than give a description thereof as given (Appendix 8, Report 1904, U.S. C. & G. S.) by Mr. E. G. Fischer, Chief of the Instrument Division, with slight modifications:

Before considering the details of this micrometer, three points were determined upon as being essential to insure accurate and decisive action, durability and convenience in reading the chronograph record made by it.

First, it was decided that the mechanism of the slide carrying the wire should be of the form in which the screw is mounted in bearings at the extreme ends of the box or case holding the slide, the micrometer head being fast upon the end of the screw projecting from the box, because this insures greater stability under the side stress of the gears connecting the screw with the hand-wheel shaft than the form usually employed in theodolite and ocular micrometers, in which the screw is fastened to the slide and therefore takes part of whatever play there may be in the latter.

Second, it was decided that the electric recording device of the micrometer should be of the make-circuit form, transmitting its records to the chronograph, which is in the break-circuit of the chronometer, through a relay. This permits the use of a strong current through the contact points of the micrometer head, and therefore a minimum of pressure upon the latter by the contact spring.

Third, in order that the micrometer transmit no record except those made within an accepted space on either side of the line of collimation and forming the observations of the star transit proper, an automatic cut-out must be provided.

The micrometer box or case is 46^{mm} in length and 31^{mm} wide. Within it and near to one side is mounted the micrometer screw. Upon the latter fits, by a thread and cylindrical bearing, a rectangular frame forming the slide, which is 31^{mm} long and 23^{mm} wide. All play or lost motion, both of the slide upon the screw and the screw in its bearings, is taken up by means of a helical spring within the box, which, pressing from the inner end of the box against the slide and through it against the screw, holds the latter firmly against the point of an adjustable abutting screw, without impeding its free rotary motion. Upon the slide, at right angles to its line of motion, is mounted the single spider thread, which is used for bisecting the star during its passage across the field. Two threads, parallel to the line of motion about five time seconds apart, and mounted against the inner surface of the box, define the space within which the observations should be made. A short comb of five teeth, with distances equal to one turn of the screw between them, is also provided and indicates the four whole turns of the screw within which the observations are to be made. The diameter of the field of view through the Airy diagonal eyepiece, which has an equivalent focus of 15^{mm}, is something over 50 turns of the screw; thus giving a space of fully 23 turns of the screw on each side of the four turns in the centre of the field, so that equatorial stars are over a minute in the field before they reach the recording part.

That portion of the micrometer screw which projects through the box has the micrometer head fitted upon it, and secured in position by a clamp nut. The edge of this head graduated at the corner nearest the box to 100 parts (*a*, fig. 1, 2), also carries at its opposite corner a screw thread of three turns with a pitch of one millimeter and a diameter of 32^{mm} (*b*, figs. 1, 2). Sunk into the outer side of the head and fitted concentrically with it is a thin metallic shell, which has fitted upon it a hollow cylinder made of ebonite, 6^{mm} long and 26^{mm} diameter (*c*, fig. 1, 2). Five strips of platinum 0·4^{mm} thick, *d*, and corresponding to the 12·5, 25·0, 50·0, 75·0, 87·5 division points of the graduation, *a*, are slotted into the edge of the ebonite cylinder, *c*, and secured in such manner as to make metallic contact with the micrometer head proper, and, through it, with the screw, micrometer box, telescope and telescope pivots and the iron uprights of the transit. By releasing the clamp nut within the ebonite ring, the graduated head, *a*, with its thread can be adjusted, in a rotary sense, in relation to the thread of the screw, and also of the spider thread upon the slide. At the same time the position of the platinum contact strips, *d*, can be set to correspond to the zero of the graduation, which latter is read by the index.

A small ebonite plate, secured to the micrometer box, carries upon its outer end, mounted in a suitable metal block, the contact spring, *f*. It ends in a piece of platinum turned over so as to rest radially upon the ebonite cylinder. Its width is 5 millimetres, and its thickness that of the contact strips, *i.e.*, 0·4^{mm}. A small screw, *c*, serves to adjust the pressure of the spring upon the cylinder. Against one end of the micrometer box is fastened a small bracket, upon which is centered a small worm wheel, *g*, gearing into the screw head of the micrometer head. It has 40 teeth, and moves one tooth for each turn of the micrometer head. The rim of a cup-shaped cylinder, *h*, which is secured to the worm wheel so that it can be turned and clamped in any position relative to the zero point of the micrometer head, has cut into it a notch, *i*, with sloping ends and of a length corresponding to four teeth of the worm wheel, or four turns of the micrometer screw. From the end of a lever, *k*, mounted against the side of the micrometer box, projects a small steel pin, *r*, reaching over the rim of the cylinder. The other end of the lever carries a small ivory tip, *l*, which rests upon the end of a spring, *m*, mounted on an ebonite plate and pressing at its middle point against a platinum-tipped screw, *n*. Whenever the small steel pin of the lever rests in the notch of the cylinder, the spring is in contact with the screw and allows the flow of an electric current through the coiled wires *o*, *p*, to the contact spring, *f*. But when the micrometer has been turned two revolutions to either side of the middle or zero position, and its motion is continued, the sloped ends of the notch in the cylinder will engage the lever, and through it force the spring, *m*, away from the screw, thus breaking the current. It will be seen, therefore, that this arrangement permits of the motion of the spider thread across the entire field without transmitting records to the chronograph, except during the four revolutions symmetrically disposed about the line of collimation.

Against the inner side of the micrometer head is fastened a spur wheel, *s*, with 40 teeth of 48 dimetral (inch) pitch into which gears the wheel with 80 teeth, *t*, mounted on the hand-wheel shaft. This shaft is supported by arms from the micrometer box. The hand-wheels, *w*, have a diameter of 40^{mm}, are 135^{mm} apart, and equidistant from the middle of the telescope, allowing ample space for manipulating in either position of the eye-piece.

The adjustment for collimation is made by means of a small screw, *x*, fastened to the micrometer box, which in turn is mounted by dovetail slides upon a rectangular frame.

As indicated in the description of the ebonite head, *c*, with its five platinum contact strips, *d*, the instrument itself is used as part of the electric conductor forming the relay circuit. The relay of 30 ohms resistance converts the make records into break records in the chronometer and chronograph circuit. From the binding post the current is carried by means of a rubber-covered wire along the telescope to and into the telescope axis, within the latter to an insulated metal cylinder projecting from the transit pivot. Each of the wye bearings of the transit has fastened to it an insulated contact spring, which, being connected with an insulated binding post at the foot of the instrument, establishes the circuit whether the telescope lies in an east or west position. Another binding post, screwed directly into the iron foot of the transit, affords a ready means for making the necessary connection to begin observations. A quick motion screw, *y*, carries the eye-piece across the field.

The above description serves for the micrometers of Cooke transits, No. 3 and No. 2. As these instruments are used also as zenith telescopes for latitude observations, the eye-piece with micrometer attachment is made movable through 90°, so that the vertical micrometer thread for transit observations becomes horizontal and adapted for measuring zenith distances. The value of one revolution of the micrometer, 100 divisions, is about $47''·5$, so that, estimating a tenth of a division we obtain readings to $''·05$. The whole number of revolutions of the micrometer is readily read from the teeth in the worm wheel, above described. There is a clamp band or collar with two adjustable screws on the telescope immediately adjoining the micrometer attachment, and against one of these screws rests a steel screw bolt fixed on the micrometer attachment for the respective horizontal and vertical positions of the micrometer thread.

Last autumn when on an official visit to Washington, I had an opportunity to observe with the micrometer, and there obtained my first experience. The 'trick' to manipulate the micrometer is to follow the star by turning the two milled heads with the two hands respectively at a uniform motion, that of the star. The motion for different declinations of course varies. Polaris, for instance, moves about forty-seven times slower than a star near the equator. It is idle to think that absolute uniform motion can be given by hand, but experience shows that the irregularities fairly compensate each other. To every user of this micrometer the suggestion naturally makes itself to have a mechanism of some sort to turn the micrometer while the hand would simply correct any slight deviation as with the tangent screw and clock work of an equatorial. However, no such automatic device has yet evolved.

It may be stated here that our Cooke transits (Nos. 3 and 2) are of such weight and stability that the necessary touching of the hands to the milled heads on the telescope for turning the micrometer has not the slightest noticeable effect on the constancy of pointing of the telescope.

For the circuit of the micrometer four Columbia dry cells were used in conjunction with a 30-ohm relay of which the back points served to make the break-circuit necessary for record on the chronograph. Whenever the platinum strips, by turning the micrometer, came in contact with the stationary platinum spring, contact was made, the armature of the relay drawn to the core and hence the back points of the armature separated and the local chronograph circuit broken and a record made.

The programme of a night's work would consist in obtaining two independent time determinations by observing two sets of stars. Each set is composed of 14 stars, seven thereof being observed in the position of the instrument, clamp east, and sever in position clamp west. Of the seven stars one would be a polar, i.e., between declination 70° and 80°, the others would be time stars distributed between the zenith and equator. This gives fourteen observations to determine the three unknowns, clock error, azimuth and collimation. By a careful selection of the stars the sum of the azimuth and collimation factors may be made small, so that the errors of azimuth and collimation have little effect on the time determination.

It was so arranged that if the night was clear, the exchange of time signals would fall between the observations of the two sets and thereby, the effect of rate of the clock wholly or nearly eliminated. The reduction of the observations was made in the usual way, by least squares, that is, by forming three normal equations from the 14 condition equations and solving for the three unknowns.

The exchange of time signals was carried out in the following manner: Vancouver would send twenty arbitrary signals with intervals of about two seconds by means of the break-circuit key to Seattle, the signals being recorded on both chronographs, Vancouver giving a rattle to signify 'finished.' Seattle would then 'rattle' its beginning of signals, and send 40, closing with a rattle. Vancouver would then send another twenty signals. By this means the mean of the time of Vancouver sending would also be the mean of Seattle sending, thereby cutting out the differential rates of the clocks. This method was followed at all the other stations occupied during the season.

VANCOUVER.

At Vancouver I occupied our small permanent observatory (transit house) at Brockton Point in Stanley Park. During the past year a small office or work-room has been added to the building as well as the benefits and comfort of the waterworks system.

As on previous occasions here, the chronometer was placed in the brick-powder vault, near the observatory, being the most convenient and suitable place to insure a small daily range of temperature.

The first exchange of time signals Vancouver-Seattle was had on May 31, but no observations, due to clouds, were obtained.

The first differential longitude determination was obtained on June 8, when Mr. J. E. McGrath was observer at Seattle, having exchanged stations, Seattle-Sitka, with Mr. E. Smith. The Sitka longitude was carried on simultaneously at Seattle with the Vancouver determination.

There is one redeeming feature of the weather conditions in Vancouver and Seattle, and that is their relative proximity and situation on the sea-coast induces the same weather conditions to prevail, so that there is little or no unnecessary observing, as a mutually good night, or clear sky, is necessary for a successful longitude determination. By June 17 the requisite number of observations had been obtained.

FATHER POINT.

Having finished the Vancouver-Seattle longitude I returned to Ottawa and then proceeded to Father Point, Quebec. Here were built a brick and cement pier, as well as the 10-foot square observing hut on the property of J. McWilliams, immediately adjoining the lighthouse reserve. The centre of the pier is 125 feet 7 inches due south of the centre of the revolving light surmounting the lighthouse. The magnetic declination (July 6) was found to be 20° 55′ W. As usual the pier, 22 inches by 27 inches, was built on a cubic yard of grouting beneath the surface of the earth. The top of the pier is always made 30 inches above the floor of the hut, which is built of dressed flooring, tongue and groove, with the planed side inside. There is always a 2-foot clear opening in the roof, covered by two shutters extending longitudinally over the building.

The telegraph wire of the Great North Western was cut and led directly into the observatory, from where the necessary telegraphing for exchange of time signals was done at night. The length of line, Father Point to Ottawa, via Montreal, is 486 miles, and the signal exchange was very satisfactory, occupying only about five minutes of time. There was a repeater at Montreal. On the Ottawa-Montreal section of 120 miles, there were 120 volts, and on the remaining section 180 volts. At Father Point, where the St. Lawrence is 35 miles wide, considerable delay in getting the necessary observations was caused by fogs. A most marked, not to say extraordinary, phenomenon experienced was the very warm gusts of wind in the evening (10.30) of July 5 and again on July 7. Their duration was but a few seconds, and they appeared to come in narrow streaks from the south, where the banks of the river slope back to an altitude of several hundred feet. These warm (relatively hot) gusts would rapidly, for a short time, alternate with cool winds, or apparently cool ones, as the general temperature was low. The suddenness of the phenomenon and the high temperature was so marked, that I, facing the north outside of the observatory, quickly turned about, believing that a fire had been kindled near me. Was the phenomenon that of Chinook or Foehn?

By July 21 three mutually satisfactory nights transit observations had been obtained, as well as some latitude observations.

Several photographs were taken to connect the observatory with surrounding buildings.

TADOUSAC.

Last April Sir William Macgregor, Governor of Newfoundland, wrote to me expressing the desire to have some point (e.g. Chateau bay) in Labrador fixed in longitude, as there was no telegraphic longitude station on that coast. After discussing the matter with you, it was arranged that I should occupy Tadousac at the mouth of the

Saguenay, the accurate longitude of which was besides desired, while Sir William would occupy Chateau bay. The longitude of Chateau bay would not only serve as the initial or governing longitude for the Labrador coast, but would also assist in the determination of the position of the Canadian and United States (Lick observatory) eclipse expeditions.

Accordingly after completing the observations at Father Point I proceeded to Tadousac, via Rivière du Loup, where the necessary building material, lumber and cement, had to be obtained.

At Tadousac the Ontario and Richelieu Navigation Company kindly consented to the erection of the pier and observing hut on their premises to the rear of their hotel. The foundation of the pier was in firm sand, which is preferable to rock.

The telegraphic connection between Ottawa and Tadousac was via the Great North Western, through Montreal and Quebec, to Murray bay, where the government telegraph along the north shore of the St. Lawrence begins, and then to Tadousac, a distance of 461 miles, of which 1¼ miles are cable across the mouth of the Saguenay. There was a repeater at Montreal. On the Ottawa-Montreal section of 120 miles, there were 120 volts, and on the remaining section 180 volts.

From Tadousac to Château bay, opposite Belle Isle, is 958 miles; there are two cables on this section, the one of 12 miles between Bersimis and Pointe aux Outardes, and the other of 26 miles, between Pointe Paradis and Rivière Gadbout. The cables being so short, form directly a part of the land line system.

Mr. D. H. Keeley, general superintendent, had arranged for the use of the government line, and Mr. Edwin Pope, district superintendent, and also superintendent for the Great North Western, at Quebec, issued instructions to the operators along the line about the exchange of time signals.

On these 958 miles there are two automatic repeaters, one at Bersimis, 98 miles east of Tadousac, and another at Mutton bay, 611 miles east of Bersimis.

On August 1, Sir William Macgregor wired me his arrival with 6-inch transit and 6 box chronometers at Château bay. The government line is not in such good working conditions as one desires, the operators are more or less unskilled both in operating and in the adjustment of the telegraph instruments so that long delays occur and even complete failure, as happened on the nights of August 1 and 2.

On August 3 the first satisfactory exchange with Château bay was had, and another on the 5th. The following day Sir William left for Cartwright, in connection with the eclipse expedition. His time determinations at Château bay were confined to solar observations, as no stars were visible during his stay. After the eclipse he returned to Château bay on September 1, and had time exchanges directly with Ottawa (as I had left Tadousac), a distance of about 1,400 miles.

On August 8, I had the first time exchange, Tadousac-Ottawa, and a week later four mutually full nights of observations had been obtained, and the longitude of Tadousac determined.

A series of latitude observations by Talcott's method was also obtained.

A linear connection was made between the observing pier and the hotel.

The meridian through the centre of the pier passes one foot west of the flag-pole over the tower of the main or office entrance to the hotel, and the flag-pole is 211 feet south of the pier. It is 170 feet from the southeast corner of the hotel verandah to the pier, 109 feet along the meridian from the rear of the hotel to the pier, and 56 feet 5 inches from the northwest corner of the billiard room building to the pier.

Several photographs were taken showing the relative position of the observatory to surrounding objects, including also the lighthouse on the reef extending from the south side of the Saguenay into the St. Lawrence.

HARVARD.

As Harvard College observatory has been the zero or initial meridian of longitudes for the United States, it was deemed desirable that a direct connection should be made between Harvard and Ottawa, especially as we were making a connection on the other side of the continent, Vancouver-Seattle, between the Canadian and United States longitude work. Under your instructions, I proceeded to Cambridge, Mass., last April, and there discussed the matter with the director, Prof. E. C. Pickering, who not only offered his hearty co-operation but suggested putting up a suitable transit building and pier on the observatory grounds for our purpose. The kind offer was readily accepted, and shortly afterwards the building, a neat 10 ft. x 12 ft. painted structure, having a cement pier 22 in. by 32 in., was ready.

The building has a tinned gable roof, and a shutter (wooden frame covered with painted canvas) on each side over the two-foot clear opening.

'The centre of the large dome' is the point on the Harvard observatory grounds to which the Coast and Geodetic Survey determinations of latitude and longitude have been referred. Between this point and my pier linear connection was made by Mr. W. P. Gerrish. The pier is north of the dome 135·94 ft.=1″·34, and west thereof 124·14 ft.=1″.65 = 0·11s. So that the geographical position of the pier based on the Harvard position of the dome is: Latitude 42° 22′ 48″·94, longitude 4h. 44m. 31·16s.

In the latter part of August I repaired to Boston for the Harvard-Ottawa longitude campaign.

After mounting the transit, it was discovered that the transit micrometer attachment was considerably deranged. The recording took place about 15 revolutions from the centre of the field. Having adjusted this, it was found that the ebonite ring was loose on the micrometer wheel, due to the flattening of the pinch washer. This too was satisfactorily repaired.

The clock or chronometer (Dent 48419) was placed in the basement of the Harvard main building, where is mounted also the Harvard standard sidereal clock. The temperature here, with one exception, kept within a range of 1° F. per day. A single Columbia dry cell was used for the chronometer and a single wire (150 feet) between the chronometer and my observatory, the other end being well grounded, the circuit was very satisfactory.

For the telegraphic exchange of time signals the Western Union and Great North Western telegraph companies kindly placed their lines at our disposal, and their service was highly efficient and satisfactory. The route was Ottawa to Montreal, 120 miles, 120 volts; and Montreal to Harvard (Boston), 394 miles, 180 volts; total distance 514 miles. There was a repeater at Montreal.

Unfavourable weather, rain and clouds, retarded materially the progress of the work.

As an especially strong connection was desired between the Canadian and United States initial meridians five mutually good nights of observation were taken and the work completed on September 21.

During my sojourn I embraced the opportunity to visit Blue Hill observatory, one of the foremost meteorological observatories in the world, and of which Mr. A. H. Rotch is director, owner and supporter, although Harvard College observatory publishes its annual reports and results. It is situate 635 feet above the sea, on the highest point on the immediate Atlantic coast between Maine and Florida. Its distinguishing work is the study of the upper regions of the atmosphere by means of kites. The kites are of the Hargrave (Clayton-Hargrave) pattern, 'dry-goods boxes,' and are an anomaly to the memory of one's boyhood, when one flew kites that looked like kites, which had such nice long gracefully moving tails. Of this appendage the scientific kite is devoid. The kite is a rectangular parallelepipedon, the edges being thin bamboo rods braced by thin wire. The surface is covered with 'percaline,' a closely woven light cotton fabric. To the kite is attached a meteorograph in small compass and containing all the necessary self-recording meteorological instruments. Piano wire takes the place of the boy's string, and is wound and unwound from a large reel operated by a two-horse-power engine. These kites have been flown to an altitude of over two miles. The height is determined by observing the angle of elevation with a theodolite and the known length of wire reeled off. Heights have been determined too by direct triangulation or simultaneous observations from a fixed base line.

A new form of nephoscope was observed. It is a telescope pointing to the pole, and including within its field Polaris. In the focus of the telescope is placed a photographic film, and by an ingenious device the exposure is begun an hour after sunset and closed an hour before sunrise. If the sky is unobscured in the vicinity of the pole, Polaris will trace its path on the film, otherwise the trace or trail will be broken by intervening clouds. Automatically the film is shifted daily, and a week's record upon each film is obtained. The records are very sharp, the occurrence, duration and time of obscuration by clouds are readily obtained. Incidentally, flashes of lightning in the field of the instrument are well recorded. The complementary instrument to the above is the sunshine recorder.

Reference may be made to an apparatus installed at Blue Hill for recording minute quantities (drops of rain), quantities that could not be measured nor even detected by the ordinary rain-gauge. A mica plate covers a cylinder carrying a sheet of paper ruled with aniline ink into appropriate time divisions, the cylinder being driven by clock work. In the mica is a ⅜-inch hole. If the rain fall is confined to individual drops only, a drop falling through this hole will wet the paper and blot the ink on one or other of the time lines, and thereby record the fact that some rain fell.

While at Harvard, Mrs. Fleming discovered (August 31) a new star—Nova Aquilæ No. 2—in the constellation Aquila. A photograph of its spectrum, which the director showed me, shows the hydrogen lines $H\delta$, $H\gamma$ and $H\beta$ bright and broad, also faint traces of the bright bands 4472 and 4646. On August 18 the star had a magnitude of 6·5, which by August 26 had decreased to the 10th magnitude.

During my stay at Cambridge I familiarized myself as much as my unoccupied time permitted with the work of the observatory, and it may not be out of place to quote the words of Prof. Pickering with reference to the policy of the observatory. 'The policy of the astronomical observatory at Harvard College, since its establishment, has been the development of the physical side of astronomy. While much time and money have been spent on the determination of the positions and motions of the stars, the work has been mainly in determining their brightness, spectra, and other physical properties. In recent years, routine investigations on an extensive scale, each occupying many years, have constituted the principal part of the work. When practicable, every investigation is made to cover the entire sky, the northern stars being observed at Cambridge, and the southern at the station in Arequipa. An attempt is made to secure the most favourable condition for observation and to employ new and improved methods to compensate for the lack of instruments of the largest size.

'This work is greatly extended and facilitated by the collection of photographs mentioned above, and an endowment should be provided for utilizing it to the utmost. When any new object is discovered, we have here the only existing means of studying its past history for many years. As examples may be mentioned Nova Aurigæ, the planet Eros, and Comet a, 1904. The only evidence of the existence of these bodies before they were discovered was that contained in the Harvard photographs. The changes of all newly discovered variables, or other objects, can thus be traced back through the last fifteen years. Doubtless many objects of the greatest interest, but not yet discovered, might be found from these plates.

'The observatory now aims to cover a still wider field. Large sums of money have hitherto been given to astronomy, much of which, for lack of good advisers or of a technical knowledge of the subject by the donor, has been unwisely expended. There are, therefore, many large telescopes which are idle, observatories insufficiently endowed, and skilful astronomers whose appliances for research are entirely inadequate.

'It is the object of this observatory to supply these needs, by securing a fund the income of which could be used for aiding astronomers in all parts of the world. Such a fund, conscientiously administered, either here or elsewhere, should give far greater scientific returns than would be possible if expended at a single station. It would aid the work, not of a single astronomer, but of a selected number of the most eminent specialists in the world, and by co-operation would enable investigations, too large to be undertaken at a single observatory, to be conducted successfully. The sympathetic interest of experts, ready and able to make substantial grants, would greatly aid the work of young or isolated astronomers of ability.'

After completion of the Harvard observations and return to Ottawa, personal equation observations were made between Mr. R. M. Stewart and myself. During the season he observed at Ottawa with Cooke No. 1 transit, which is as yet not provided with the transit micrometer. A transit shed and pier were erected 20 feet 4 inches due south of the temporary one occupied by Mr. Stewart to the east of the main observatory. In the spring, before leaving for British Columbia, Mr. F. A. McDiarmid and I observed for personal equation respectively with No. 2 and No. 3 Cooke, each of them being provided with the transit micrometer. As anticipated, the differential personal equation, with the transit micrometer became practically a negligible quantity. About the same time Mr. McDiarmid and Mr. Stewart observed for personal equation, using respectively Cooke No. 2 and No. 1. The resulting value gave the personal equation of Mr. Stewart, who used the transit key while observing transits over the 11 threads of the diaphragm. It was hence really not necessary for me to observe to obtain the personal equation of Mr. Stewart, however, it was thought more satisfactory to do so, adding thereby to the weight of the differential longitude Harvard-Ottawa.

Four independent time determinations were made between us in three nights. The same clock Howard was used, the current being divided between the two relays of the observing huts. The clock is in the time room of the observatory and has a rate (losing) of less than a second a day. Each time determination consisted of 12 stars, six observed in position clamp east, and six in clamp west. One of the stars in each position of the instrument was a polar. To eliminate the error of star places the same stars were observed each night by the two observers. None of the observations have as yet been reduced.

PENDULUM APPARATUS.

In the spring of 1902, I proceeded to Washington to receive the half-seconds pendulum apparatus that had been constructed by Saegmuller under the supervision of the United States Coast and Geodetic Survey, and also to observe therewith on the Coast and Geodetic Survey pendulum pier in the basement of the survey building. This pier had been occupied some years before by Commandant Defforges with a seconds-pendulum and also by Mr. G. R. Putnam with the half-seconds pendulum before and after observing with the same apparatus at London, Paris and Berlin, standardizing international observations. As the half-seconds pendulum apparatus gives not absolute but only relative values for gravity, it was desirable that observations with our apparatus should be made at a station where the absolute value of '*g*' was known, so that future relative values when obtained, might be converted into absolute ones, becoming thereby available with foreign values for the further study of the figure of the earth, and more particularly its deviation from the one based on mathematical considerations. For this reason observations were made at Washington, and also to familiarize one's self with this form of apparatus under the supervision of an expert observer, Mr. Edwin Smith.

This apparatus is the outcome of the want felt for a portable apparatus, insuring accuracy, rapidity of observation and convenience. Hitherto the cost involved in using the reversible seconds pendulum for the determination of gravity at a station was large, and the time required was considerable, so that comparatively few stations could be occupied in a season.

In 1891, Professor T. C. Mendenhall, at the time superintendent of the United States Coast and Geodetic Survey, had constructed a half-seconds pendulum apparatus, which has been successfully used ever since. The Canadian apparatus is modelled after the above. Its characteristic features are, three invariable non-reversible pendulums; an air-tight receiver in which the atmospheric pressure is under control; a flash apparatus for noting coincidences between the oscillations of the pendulums and the second breaks of a sidereal box chronometer; and a dummy or temperature pendulum.

The accuracy arrived at in pendulum observations for the measurement of relative force of gravity is to determine the period of oscillation, and also the variable conditions that affect that period. To attain the latter the air-tight compartment adds in a high degree.

Pendulums.—Three pendulums (two thereof, a, b, shown in fig. 3), each designated by a number, 1, 2, 3, constitute a set, the advantage of this number being that, if discrepancies appear in the results the one at fault may be detected. The pendulums are made of an alloy of aluminum 10 per eent and copper 90 per cent, a composition which experiment proved to have a very high resistance to corrosion; they are highly polished, but not lacquered. Each weighs approximately 1,200 grammes, and is about 248 millimetres in length from the centre of the bob to the agate plane. The lengths of the three pendulums differ slightly, being made intentionally so. The stem and bob are designed so as to offer little resistance to the air when in motion. The bob is solid, and is 9 centimetres in diameter and 4·5 centimetres thick at the centre. Its form is lenticular. The stem of the pendulum is rectangular in section, 4 by 14 millimetres, with rounded edges, and is rigidly fastened to the head and the bob. The pendulums have an agate plane, *c*, set in the head which rests on the agate knife-edge, *d*, on which they are swung. This so-called knife-edge is formed by carefully ground planes meeting at an angle of 130°, thus insuring greater permanency than could be expected with a sharper edge. For invariability in the length of the pendulum it is preferable to have the knife-edge as support instead of on the pendulum itself. The knife-edge is set in a solid metal plate, *e*, which is secured by a screw to the shelf in the pendulum case, or receiver, *f*, fig. 4. As a check in case of injury, there are two knife-edges with the apparatus marked I. and II., each in its own plate, either of which may be set in the case. The advantage in using several distinct knife-edges as well as distinct pendulums being that by the relation between the independent results thus obtained, a continual check on the constancy of the instruments is furnished.

A small rectangular mirror, *g*, is set in each side of the pendulum head. These require very careful adjustment, so that from any of the pendulums with either face front, the image of the slit in the flash apparatus, described later, will be reflected into the same portion of the field of the observing telescope, when the latter is properly placed, and in line with the image of the fixed similar mirror on the plate carrying the knife-edge.

The pendulum is carried to and from the box in which it is kept, from and to the receiver, by a double-jointed handle, *h*, which has leather-lined hooks fitting under pivots on each side of the head. It is, therefore, never necessary for the hand to come in contact with the pendulum. When placed in the receiver the pendulum is first suspended upon two pivots carried on the end of a lever, which pivots fit into corresponding sockets in portions of the head projecting at each end over and beyond the agate plane. This lever is moved by a large milled-head screw, *i*, on the outside of the receiver so that the pendulum may be gently lowered and raised without injury to the knife-edge, which could not so safely or readily be done directly by hand. A spring, *k*, holds the lever against the end of the screw, and stops limit its action.

The temperature of the swinging pendulum is ascertained by means of a dummy, *l*, similar to the others in material and dimensions, save that it has no mirrors, and is supported within the receiver that it cannot oscillate. It has mounted on its stem a thermometer, *m*, whose bulb is buried in the stem near the bob, and packed with the alloy metal filings, the endeavour being in this way to obtain as near as possible the actual temperature of the swinging pendulum.

The Receiver.—The body of the receiver, *f*, is a heavy brass casting, with walls 7 millimeters thick, and of inside dimensions 17 centimetres square at the top, 21 by 28 cm. at bottom, and 38 cm. high. The cover makes an air-tight joint when a little tallow is applied to the contact surfaces. A portion of the main casting forms a solid shelf, but having openings in it through which the pendulum, dummy, and lever hang. This shelf carries on one side a plate on which the dummy pendulum is supported, and on the other the plate carrying the knife-edge on which the pendulum swings. This latter plate is supported on three points and firmly screwed to the shelf. To it is attached the adjustable fixed mirror, *n*, already referred to, and is so adjusted that the images of the slit, as seen in the observing telescope, *o*, reflected from this mirror, and from that on the pendulums, when hanging freely at rest, will appear in the same horizontal line, and slightly overlap each other.

There is a scale below the pendulum, and a small telescope mounted on the side (on the opposite face of fig. 4) of the receiver for reading the arc of oscillation. The receiver is supported by three large foot screws, *p*, resting on heavy circular foot plates, one of which has a spherical hole, one is flat, and the other has a V-shaped cut for the reception of the foot screws. These foot plates are cemented to the supporting pier. By proper disposition of the direction of the V, there is no binding of the foot screws due to change of temperature of the case. The case or receiver is levelled in the plane of oscillation by the pendulum itself as shown by the reading of the tip of the pendulum on the scale beneath. In the transverse plane it is levelled by a small level, *r*, mounted in a short pendulum which may be reversed on the knife-edge. On the sides of the case are two levels, *s*, *t*, transverse to each other, for assisting in levelling the case. Within the receiver there is a short arm for setting the pendulum in motion. The arm is covered with leather at the point of contact, and is worked from the outside. Adjustable screws limit the motion of this handle, so that it may be set for any desired amplitude of oscillation, and the same amplitude used for succeeding swings. A mercury manometer is hung within the receiver, and by means of a portable air pump, *u*, the air is exhausted through stop cocks on the side of the case to about 55 mm. Three windows, *j*, *v*, *w*, (*w* not shown) are provided in the case for observing respectively the mirrors, arc scale, dummy thermometer and manometer. The box to the right, fig. 4, is for the plate, *e*, with agate knife-edge, *d*.

Flash Apparatus.—The flash apparatus consists of a light metal box, *x*, mounted on a brass stand having both vertical and azimuthal movements and clamps, and carries above it an ordinary observing telescope, *o*, which may be focussed for objects within a few feet. The object of the flash apparatus is to observe coincidences between the swinging pendulum and the chronometer used for determining the period or time of oscillation of the pendulum, which in turn depends upon the time determination made by means of the chronometer, *i.e.*, the time determinations made by observing transits of stars with the chronometer serve as a scale with which to measure the period of the pendulum. This box contains an electro-magnet, whose coils are connected with the chronometer circuit, and whose armature carries an arm which moves two shutters; by an ingenious device a flash of light is emitted from the box only when the circuit is broken. The light for the flash is furnished by a small oil lamp, *y*, attached to one side of the box, the light from which is concentrated by a lens on to the slit after being reflected by a mirror in the interior of the box set at an angle of 45°. The chronometer is made to break circuit at every even second, omitting the 58th for identification of minute. It is the illumined image of the slit that falls on both the fixed mirror and the mirror on the pendulum; and these two images are observed by means of the telescope.

When the pendulum is swinging, the image as reflected from the pendulum mirror will change its position relatively to that of the fixed mirror as seen in the field of the telescope, because of the fact that the pendulum makes a double oscillation in a little more than a sidereal second, and hence will be found slightly behind its former position at the end of each break when the flash is thrown. The moving image will, therefore, appear to travel up and down across the field of the telescope by successive jumps, wholly disappearing from the field to return again with apparent retrograde motion. Coincidences are observed by noting the time when the two images are in the same horizontal line. It is evident that in the interval between two occurrences of this phenomenon the pendulum has made one less than twice as many oscillations as the chronometer has beat seconds, and that in an interval of time between the first and last of a number of coincidences, the number of oscillations of the pendulum will be twice the number of seconds (s) less the number of coincidence intervals (n), so that the time of a single oscillation is readily derived from the relation $P = \frac{s}{2s - n}$. The elegance of the coincidence method lies in the fact that a small error in noting the time of coincidence has little effect on P.

Use of Apparatus.—One of the principal advantages of this apparatus is the ease with which it may be used, and the few inexpensive preparations necessary for its installation. For the best work a well-founded brick or cement pier upon which the receiver may rest is essential. The flash apparatus may be placed upon a table near the pier. If the apparatus can be placed in a room of nearly constant temperature the results will be more uniform, but if sufficient time is allowed before swinging for the pendulum to come to the temperature of its chamber, as represented by the thermometer in the dummy, this is not essential. The correction for temperature may be so well known that results obtained at temperatures differing widely will be in close accord when this correction is applied. The room should be somewhat dark in order that the flash may be easily seen in the field of the telescope.

The routine of observing is as follows: We begin by making a suitable number of transit observations to determine the error of the chronometer, which will subsequently be used for the flash apparatus for determining the period of the pendulum. We next place one of the pendulums, face direct on the pivots, into the case, the dummy and manometer having already been placed therein. The lid, with its thin coating of a mixture of sperm oil and sheep's tallow, is then put on. Next, by means of the air pump, the air is exhausted to a pressure of about 55 mm., and the stop cocks closed. The pendulum is now gently lowered by means of the milled-head screw, already described, and the pendulum made to oscillate by means of the handle moving the arm which deflects the bob. Immediately thereafter the scale is read showing the amplitude of oscillation, also the manometer and thermometer of the dummy. It is customary to read an outside thermometer.

The telescope having been adjusted beforehand so that the image of the fixed mirror falls centrally in the field and that of the pendulum beside it, the observations for coincidence are begun. Presently one will see the image of the pendulum mirror approaching (or receding) the fixed image. The image increases in brightness, and each break will see it a little nearer the fixed image until coincidence takes place, when the time thereof is noted. This is done by picking up the beat of the chronometer, which one hears, every two seconds with our chronometers, by the click of the shutter of the flash apparatus. It is customary to count by half-seconds, *i.e.*, the flashes would come at multiples of four. If coincidence does not take place just at a flash, one estimates the position of the image of the pendulum image at the flash preceding and succeeding coincidence and records the coincidence accordingly. This coincidence, let us suppose, to be on the downward motion of the moving image, we record this then as D, with its corresponding time, after an interval of about two minutes, depending upon the latitude, the image will be seen to be approaching from the opposite direction as before until similarly coincidence takes place, and is recorded as U (up) with the time. The following two coincidences are similarly noted, which then suffice for this chronometer.

It is customary to use two chronometers and to have them suitably connected with switches for intercomparison, and for putting either on the flash apparatus, as well as on the chronograph used for the determination of time of star transits.

It is generally possible to interpolate the coincidences of the second chronometer between those of the first, by moving the switch from one to the other. In order to pick up the beat, that is, the proper second of each chronometer, as there is generally not time to wait for the electric interval indicating the full minute, it is customary to have a pocket or other box chronometer beside one, and whose relation in second beats to the two observing chronometers is known, so that by means of the former the counting for the seconds of the latter can readily be picked up. With the second chronometer then coincidences, two D's and two U's, are observed as with the first.

This finishes then the first stage of the observations for swing 1. Between 7 and 8 hours afterwards, these observations are repeated together with reading of temperature, pressure and arc.—which complete, then a determination for the period of the pendulum in position D, knife-edge I.

The stop cock, *z*, is now opened, air admitted into the chamber so that the lid or cap may be removed, however, first raising the pendulum by means of the milled-head screw off the knife-edge on the pivots. After removal of the lid, the pendulum is reversed, R, by means of the handle, let down on the pivots, the lid replaced and the air again exhausted to about 55 mm., the pendulum lowered on to the knife-edge, made to vibrate as before, readings taken of the dummy thermometer, manometer, and amplitude arc, and coincidences noted by the two chronometers. After a lapse of something over 7 hours, the observations are repeated and the second set for period of oscillation obtained, in this case for position R, knife-edge I.

We next observe with pendulum 2 and knife-edge II a set D, and other set R. This is followed by a set D, and set R, with pendulum 3, giving for the three pendulums their twelve determinations of periods, two for each pendulum for each chronometer.

The whole of the observations are then repeated in the inverse order, giving twelve swings each of somewhat less than 8 hours duration.

These then are grouped for each pendulum.

From the two chronometers we obtain a mean value of the period for each pendulum in each position, that is, for each pendulum there will be four mean values, two for position D, and two for position R. The mean of these four means gives the mean period for the respective pendulum, and the mean of the three pendulums the desired period of the pendulums.

While the pendulum observations are in progress it is essential that time observations be taken too for determining the error and rate of the chronometers used for noting coincidences, and especially is it necessary that time observations be obtained at the completion of the pendulum observations, for such constitute the end of our time measuring scale with which the periods are measured.

It may be here mentioned that with careful observations and under favourable conditions the periods determined for an individual pendulum will agree within the seventh place of decimals of a second, that is, will agree within the units of the ten millionths part of a second.

REDUCTION OF OBSERVATIONS.

From the observations we obtain the duration of each swing, counting from a U to a U, and from the corresponding D to D. From two successive U's and D's we obtain the approximate interval in seconds between two coincidences, remembering that a D or U coincidence falls respectively between two U's or D's. Dividing the number of seconds in this interval into the duration of swing, the number of coincidences is obtained. Although the quotient is not exact, it must be a whole number, and there is no question what the whole number is, as the quotient readily indicates that. Then reversing the operation, the whole number of coincidences is divided into the duration of swing, or total number of seconds to obtain the average number of seconds in one interval. The uncorrected period is then obtained from the relation

$$P = \frac{s}{2s - n} = .500 + \frac{n}{4s - 2n}.$$

In order to make the periods comparable with those obtained with the same pendulums at other times and stations, it is necessary to reduce them to certain standard conditions. These conditions, which are arbitrarily adopted are: arc infinitely small, temperature 15° C, pressure 60 mm. of mercury at 0° C, true sidereal time, and inflexible support.

Arc correction.—The correction to reduce the time of oscillation to what it would be were the pendulum swinging in an infinitely small arc is obtained by an adaptation of Borda's formula, as follows:—

$$\text{Arc correction} = -\frac{PM \operatorname{Sin}(\varphi+\varphi') \operatorname{Sin}(\varphi-\varphi')}{32 \log \operatorname{Sin}\varphi - \log \operatorname{Sin}\varphi'}$$

When P is the period of the pendulum in seconds, M is modulus of the common logarithmic system, φ and φ' are the initial and final semi-arcs respectively.

Temperature Correction.—The co-efficient necessary for this correction was determined experimentally at Washington with pendulums of the same material and construction as those of our office, by swinging pendulums at temperatures, differing about 20° C, and obtaining the periods at the different temperatures.

From these experiments the formula for correction for temperature was derived:—

Temperature Correction = + ·00000418 (15°—T°).

T being the temperature in degrees Centigrade.

Pressure Correction.—In the original formula of Mendenhall, the standard pressure was taken at 500 millimetres, but for later observations the standard has been made 60 millimetres, and the following formula from observations by G. R. Putnam in 1894, gives the

$$\text{Pressure correction} = +\ {\cdot}000000101 \left[60 - \frac{Pr}{1 + {\cdot}00367\ T^\circ} \right]$$

Where Pr is the mean of the observed pressures at beginning and end of swing, and T° the mean temperature of the pendulum during the swing. The expression $\frac{Pr}{1 + {\cdot}00367\ T}$ is simply a reduction of the air pressure to a temperature of O° Centigrade.

Rate Correction.—The periods are reduced to sidereal time by correcting for the rate of the chronometer. If the chronometer is gaining, then as a time measuring scale its seconds are too short, and the deduced period of the pendulum will be too long. Hence for a chronometer gaining, the correction is subtractive; and additive when losing. The reciprocal of the number, 86,400, seconds in a day is ·000011574, hence the

Rate correction = ·000011574 R P, where P is the period and R the daily rate on sidereal time of the chronometer.

Flexure Correction.—The effect of flexure upon the period of the pendulum was determined experimentally at Washington for this form of pendulum apparatus, by placing it successively on supports—piers, posts and wooden framework—and finding the period for each support. By means of a weight, q, 1·5 kilogrammes, the force thereof applied horizontally in the plane of oscillation, the displacement of the knife-edge in microns is obtained. From these determinations the following formula is derived:

Flexure correction = — ·00000065 D, where D is the observed displacement of the knife-edge in microns.

Applying the above four corrections the periods of the pendulums are obtained, and from them, g, for each station. In order, however, to compare them with each other and with other values of g by the relationship of the empirical formula, $g = 978{\cdot}066\ (1 + {\cdot}005243\ \operatorname{Sin}^2\varphi)$ (Putnam), where φ is the latitude, reduction to sea-level must be made. The reduction to sea-level is always positive and is of magnitude $2\frac{H}{r}g$, H being the height of the station above sea-level, and r, the mean radius of the earth. This term is independent of the matter lying between the station and sea-level. This matter increases gravity, and the correction therefor $\frac{3H}{r}\frac{\delta}{\Delta}$, in which δ is the density of the matter above sea-level and Δ the mean density of the earth, is necessarily negative.

The reduction to sea-level then takes the form, known as Bouguer's formula $dg = +\frac{2gH}{r}\left(1 - \frac{3\delta}{4\Delta}\right)$, on the supposition that the station is situate on an indefinitely extended horizontal plain.

Any deviation from the latter condition by mountain masses above the station or valleys beneath the same will decrease the gravity at the station and hence a correction, the 'topographical' correction, giving a third term to the above expression, will have a positive sign. To evaluate this term contour maps of the country surrounding the station are necessary, also the density of the matter.

OTTAWA.

The pendulum observations were made in the basement of the Supreme Court building on the east side of Bank street, and within the parliament grounds. The place was well adapted, as there is very little traffic on the streets in the neighbourhood. In this basement (same compartment) was installed the Harvard sidereal clock, which was used for years for all time observations made at the old small observatory (transit house) on the north side of Cliff street, between the properties of Mr. R. J. Devlin and Mr. G. Holbrook, and on the immediate precipice overlooking the Ottawa river. For the pendulum observations, part of the floor in this part of the basement was removed, a cement pier, 2 feet square, was built on the limestone rock in situ, which immediately underlies the floor. The pier was enclosed within a double-walled room 8 feet square, to insure a fairly uniform temperature, and to protect the pendulum apparatus from currents of air. The flash apparatus was placed on a table immediately contiguous to the outer wooden wall of the pendulum room, and the coincidence observations were made through a rectangular aperture 4 inches by 6 inches, in the wall; when not observing this aperture was closed.

The two time-pieces that were employed for noting the coincidences were the Howard sidereal clock and Dent sidereal chronometer No. 48419, both breaking every two seconds. The Howard clock was used for the time determinations, and comparisons between the clock and chronometer were made at every swing of the pendulum. The chronometer was kept in the pendulum room. The comparisons were made on a large Favarger chronograph in the basement, while the transit observations were recorded on the chronograph in the transit house.

The clock, chronometer and flash apparatus were connected by four small two-point switches on the table, and at the immediate command of the observer. For taking the readings of the thermometer, manometer and arc an electric light on a cord was turned on.

The top of the guard stone at the west side of the entrance to the parliament grounds, near the Supreme Court building, is 120·82 feet above the city datum. The city datum is 120·00 feet above mean tide level. These measurements are from the records of the city engineer. The height of the pendulum based on above data is therefore 73 metres above mean tide level. In the reduction for 'sea level' for the value of gravity at Ottawa, the mean density of the earth is taken at 5·576, and the surface density of the earth at 2·56, being about that of limestone.

In the Tables I. and II. are given the results of the swings at Washington and Ottawa. For comparison the results are grouped by pendulums and not chronologically.

The ratio of gravity at two places is readily obtained from the fundamental formula of the simple pendulum, $P = \pi\sqrt{\frac{l}{g}}$ where P is the period, l the length of the corresponding pendulum, and g the force of gravity.

For the invariable pendulum we have then $P_o^2 : P_w^2 :: g_w : g_o$ or $g_o = \frac{P_w^2}{P_o^2} g_w$.

The observed value of g, at Washington is taken as 980.098 (not reduced to sea level), as this value has been used by the Coast and Geodetic Survey for the deduction of all other values of g in the United States. Commandant Defforges obtained the value, relatively to Paris, 980·167,* and based on the value of g at Potsdam, the observations of Mr. G. R. Putnam at Potsdam and Washington with the same pendulums gave for Washington $g = 980.111$,† agreeing pretty well with the tentative value 980:098.

From the subjoined Table III. the interagreement between the ratios of the periods of the individual pendulums at Washington and Ottawa can be seen in the deduced value of g for Ottawa, obtained for each pendulum from the above formula.

TABLE III.

Pendulum.	Period Washington.	Period Ottawa.	Deduced gravity Ottawa.	Difference from mean 3 decimal place.
I.	·5014337	·5013073	980·592	+1
II.	·5015795	·5014531	980·592	+1
III.	·5015530	·5014259	980·594	−1

Clairaut's Theorem.—This is generally expressed in the form $\frac{g^1 - g}{g} = \frac{5}{2} m - e$, in which g^1 and g are respectively the force of gravity at the pole and equator, m the ratio of the centrifugal force at the equator to gravity, and e the ellipticity of the meridian.

Clairaut also proved that the increase of gravity towards the poles is as the square of the sine of the latitude: $g_\varphi = g \left\{ 1 + (\frac{5}{2}m - e) \sin^2 \varphi \right\}$ for sea-level.

The evaluation of g_φ is dependent upon the values assigned for g, m and e, for none of which have as yet absolute values been obtained. This is one of the reasons why, in making comparison between the observed gravity and the theoretical values 'anomalies' of different magnitude and also of different sign are found. The other reason is in the uncertainty of the 'reduction to sea-level.'

In Appendix 1, Report Coast and Geodetic Survey, 1894, Mr. G. R. Putnam discusses the relative measurements of gravity at twenty-six stations in the United States obtained by means of the half-seconds pendulums. He says: 'So as to be able to study the results more intelligently, the values at sea-level have been compared with those computed by an assumed theoretical formula $g = 978·066\ (1 + ·005243 \sin^2 \varphi)$, which is based on Clairaut's theorem, Clarke's figure of the earth, and the assumption that gravity is normal on the eastern coast of the United States.'

As Washington is the fundamental station for referring the Canadian values of gravity, the above formula has been adopted in the reduction.

For comparison two other well known formulæ may be given:—

Helmert (Höhere Geodäsie, Vol. II., p. 85) gives

$$g = 978·00\ (1 + ·005310 \sin^2 \varphi)$$

and by Harkness (Smithsonian Tables, 1897)

$$g = 980·60\ (1 - ·002662 \cos 2\varphi)$$

which reduces to

$$g = 977·985\ (1 + ·005338 \sin^2 \varphi).$$

* App. 1 C. & G. S. Report, 1894. † App. 5 C. & G. S. Report, 1901.

TABLE

PENDULUM OBSERVATIONS

STATION—WASHINGTON, D.C.

Date.		Swing Number.	Pendulum.	Position.	Knife-edge.	Coincidence Interval. Chronometer—Negus. No. 1828.	Coincidence Interval. Chronometer—Negus. No. 1836.	Arc. Initial.	Arc. Final.	Temperature.	Pressure.	Period Un Chronome No. 1828.
1902.						s	s	′	′	C. °	m.m.	s
May	21	1	1	D	I.	168·295	171·464	51	21	20·65	54·05	·5014899
"	24	10	1	D	I.	168·566	170·887	56	20	21·30	60·45	·5014875
"	22	2	1	R	I.	168·434	171·554	65	23	20·20	53·40	·5014887
"	24	9	1	R	I.	168·322	170·824	59	22	21·10	61·35	·5014897
"	22	3	2	D	II.	153·664	155·957	60	22	20·05	57·30	·5016322
"	25	11	2	D	II.	153·108	155·114	59	21	21·62	58·40	·5016382
"	22	4	2	R	II.	153·869	156·160	61	23	20·10	54·85	·5016301
"	24	8	2	R	II.	153·594	155·802	58	23	20·75	59·10	·5016330
"	23	5	3	D	II.	156·232	158·651	59	22	20·10	56·55	·5016053
"	25	12	3	D	II.	155·633	157·758	57	17	21·82	59·25	·5016115
"	23	6	3	R	II.	156.121	158·540	61	22	20·30	57·90	·5016065
"	23	7	3	R	II.	156·145	158·474	59	22	20·60	58·00	·5016062

TABLE

PENDULUM OBSERVATIONS

STATION—OTTAWA.

Date.		Swing Number.	Pendulum.	Position.	Knife-edge.	Coincidence Interval. Chronometer. No. Howard Clock.	Coincidence Interval. Chronometer. No. 48419 Dent.	Arc. Initial.	Arc. Final.	Temperature.	Pressure.	Period Un Chrono No. Howard Clock.
1902.						s	s	′	′	C. °	m.m.	s
Aug.	6	1	1	D	I.	187·423	185·082	58	19	19·73	38·2	·5013374
"	10	12	1	D	I.	187·903	185·021	57	17	18·55	43·8	·5013340
"	7	2	1	R	I.	187·137	184·773	65	17	19·60	44·3	·5013395
"	10	11	1	R	I.	187·846	185·678	59	15	18·60	42·6	·5013344
"	8	6	2	D	II.	169·014	166·673	95	27	19·10	44·9	·5014836
"	9	7	2	D	II.	169·169	167·194	71	15	19·65	47·0	·5014822
"	9	5	2	R	II.	169·253	167·447	66	16	19·23	45·0	·5014815
"	9	8	2	R	II.	169·539	167·651	65	15	18·95	44·5	·5014789
"	7	3	3	D	II.	171·955	169·723	59	15	19·65	44·5	·5014581
"	10	10	3	D	II.	172·753	170·816	59	14	18·70	45·3	·5014514
"	8	4	3	R	II.	171·994	170·128	66	15	19·35	45·9	·5014578
"	9	9	3	R	II.	172·740	170·580	57	14	18·80	42·9	·5014515

No I..

AND REDUCTIONS.

OBSERVERS—Otto J. Klotz and Edwin Smith.

CORRECTED.	CORRECTIONS (7th DECIMAL PLACE).						PERIOD CORRECTED.		
ter—Negus.				Rate.			Chronometer.		
No. 1836.	Arc.	Temp.	Pressure.	1828.	1836.	Flexure.	No. 1828.	No. 1836.	Mean.
s							s	s	s
·5014623	—8	—236	+10	—320	—46	—5	·5014340	·5014338	·5014339
·5014673	—9	—264	+4	—287	—67	—5	·5014314	·5014332	·5014323
·5014615	—12	—218	+10	—316	—48	—5	·5014346	·5014342	·5014344
·5014678	—10	—255	+3	—290	—65	—5	5014340	·5014346	·5014343
·5016082	—10	—211	+7	—312	—51	—5	·5015791	·5015812	·5015802
·5016169	—10	—277	+6	—283	—70	—5	·5015813	·5015813	·5015813
·5016061	—11	—213	+9	—309	—53	—5	·5015772	·5015788	·5015780
·5016098	—10	—241	+5	—294	—62	—5	·5015785	·5015785	·5015758
·5015808	—10	—213	+7	—305	—55	—5	.5015527	·5015532	·5015530
·5015897	—8	—285	+5	—279	—72	—5	·5015543	·5015532	·5015537
·5015819	—10	—222	+6	—301	—58	—5	·5015533	·5015530	·5015531
·5015825	—10	—234	+6	—298	—60	—5	·5015521	·5015522	·5015521
Mean..							·5015219	·5015223	·5015221

No. II.

AND REDUCTIONS.

OBSERVER—OTTO J. KLOTZ.

CORRECTED.	CORRECTIONS (7th DECIMAL PLACE).						PERIOD CORRECTED.		
meter.				Rate.			Chronometer.		
No. 48419 Dent.	Arc.	Temp.	Pressure.	Clock.	48419.	Flexure.	No. Howard Clock.	No. 48419 Dent.	Mean.
s							s	s	s
·5013544	—9	—198	+22	—121	—280	—5	·5013063	·5013074	·5013069
·5013549	—8	—149	+16	—128	—332	—5	·5013066	·5013071	·5013069
·5013567	—10	—193	+16	—119	—297	—5	·5013084	·5013078	·5013081
·5013501	—8	—151	+18	—124	—284	—5	·5013074	·5013071	·5013073
·5015045	—22	—172	+15	—112	—325	—5	·5014540	·5014536	·5014538
5014998	—10	—169	+13	—110	—284	—5	·5014541	·5014543	·5014542
·5014975	—10	—177	+15	—113	—269	—5	·5014525	·5014529	·5014527
·5014957	—9	—165	+16	—111	—274	—5	·5014515	·5014520	·5014518
·5014773	—9	—195	+16	—118	—310	—5	·5014270	·5014270	·5014270
·5014679	—8	—155	+15	—120	—279	—5	·5014241	·5014247	·5014244
·5014738	—9	—182	+14	—116	—276	—5	·5014280	·5014280	·5014280
·5014699	—7	—159	+17	—116	—307	—5	·5014245	·5014238	·5014242
Mean							·5013954	·5013955	·5013954

By either of the last two the value of g for Washington becomes 980·047, while by the first it is 980·087, a difference of 40 in the third place of decimal.

The theoretical value (sea-level) for Ottawa, =45° 25′ 23″, is 980·668 by the first formula.

We have then for final values:—

Station.	Latitude.	Computed g.	Observed g.	Reductions to sea-level.	Observed corrected g.	Anomaly O-C.
Washington.............	38° 53′ 13″	980·087	980·098	·002	980·100	+13
Ottawa	45° 25′ 23″	980·668	980·593	·015	980·608	−60

From this it appears that there is an excess in the force of gravity of Washington of ·013 dynes and a defect at Ottawa of ·060 dynes.

The defect at Ottawa is not surprising when one considers that the station is on the escarpment of the Ottawa river, with its wide valley running in an easterly-westerly direction, and extending far in both directions.

It may be stated that had the reductions for ‘computed g’ been made by either of the other two formulæ the anomaly for both of the above stations would have been increased algebraically, but the defect at Ottawa would nevertheless persist.

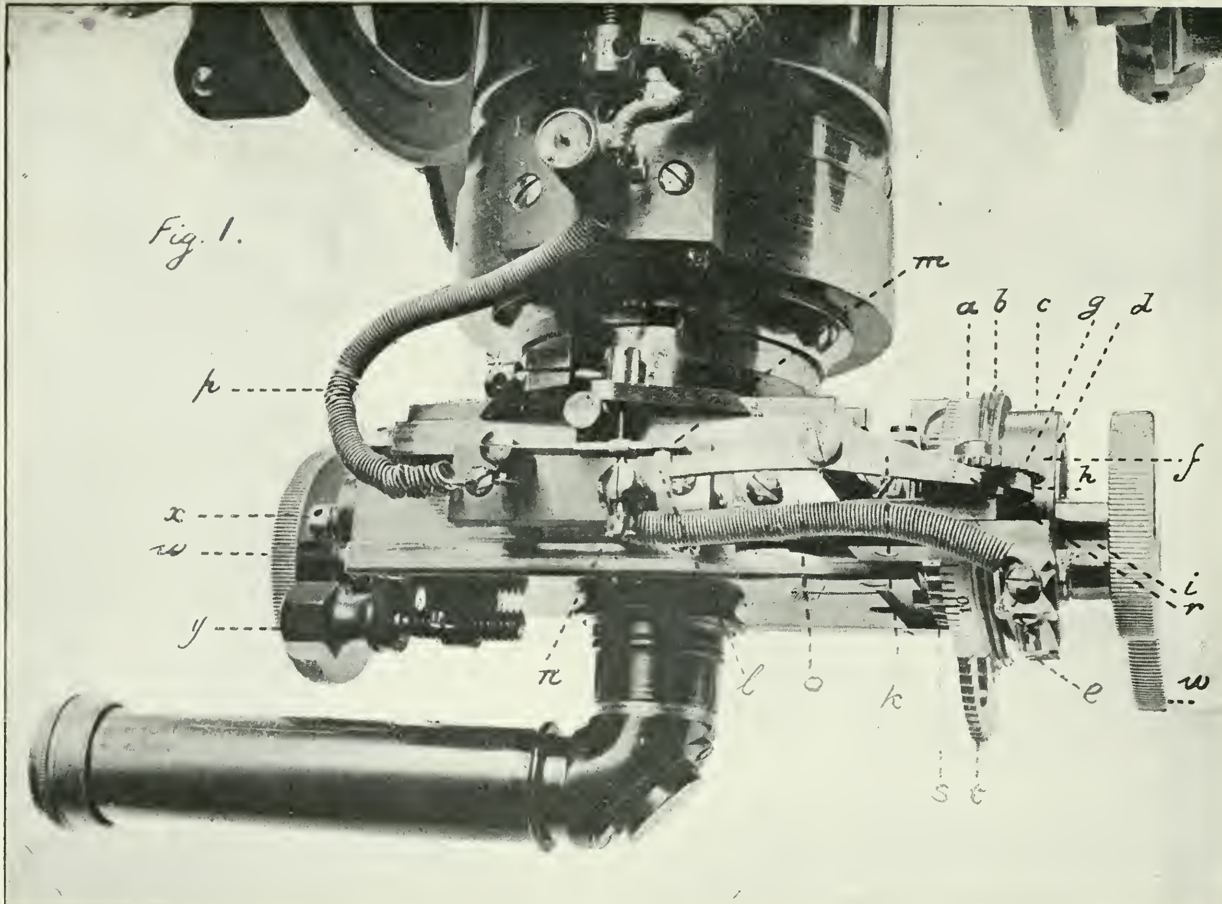

Fig. 1.—Transit Micrometer.

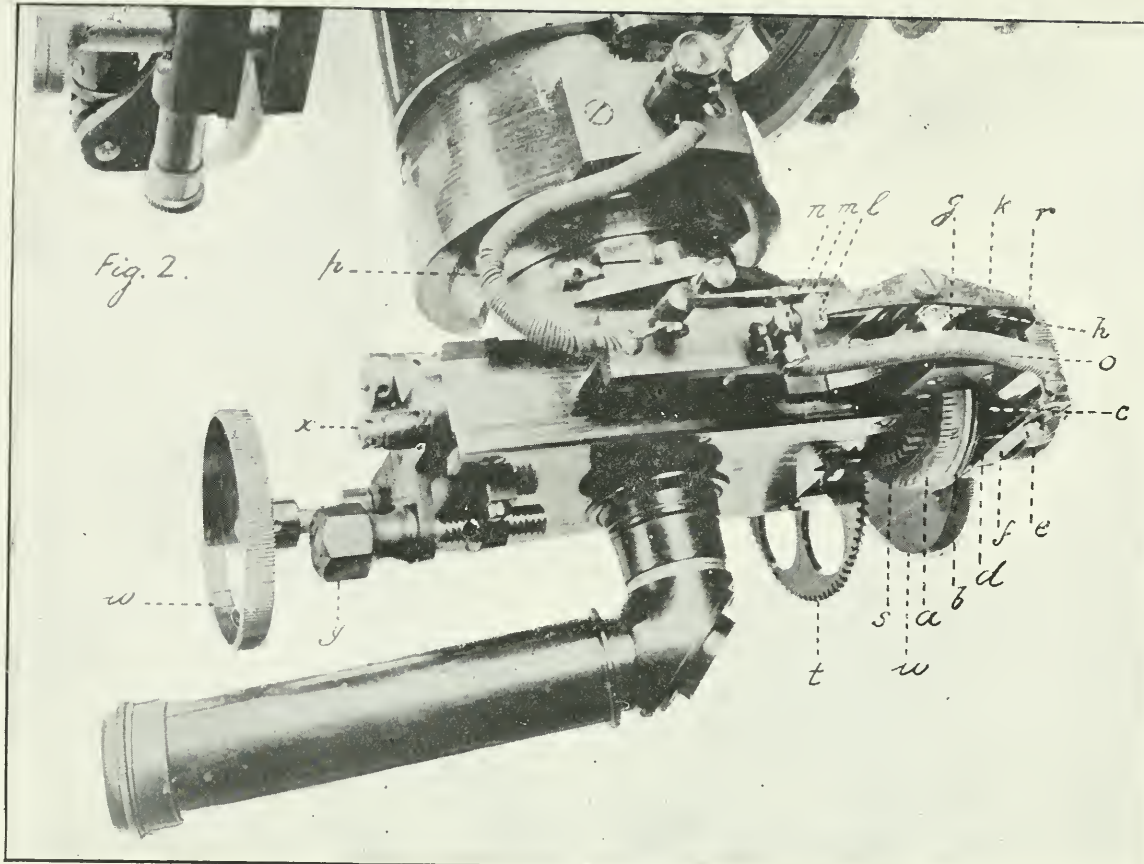

Fig. 2.—Transit Micrometer.

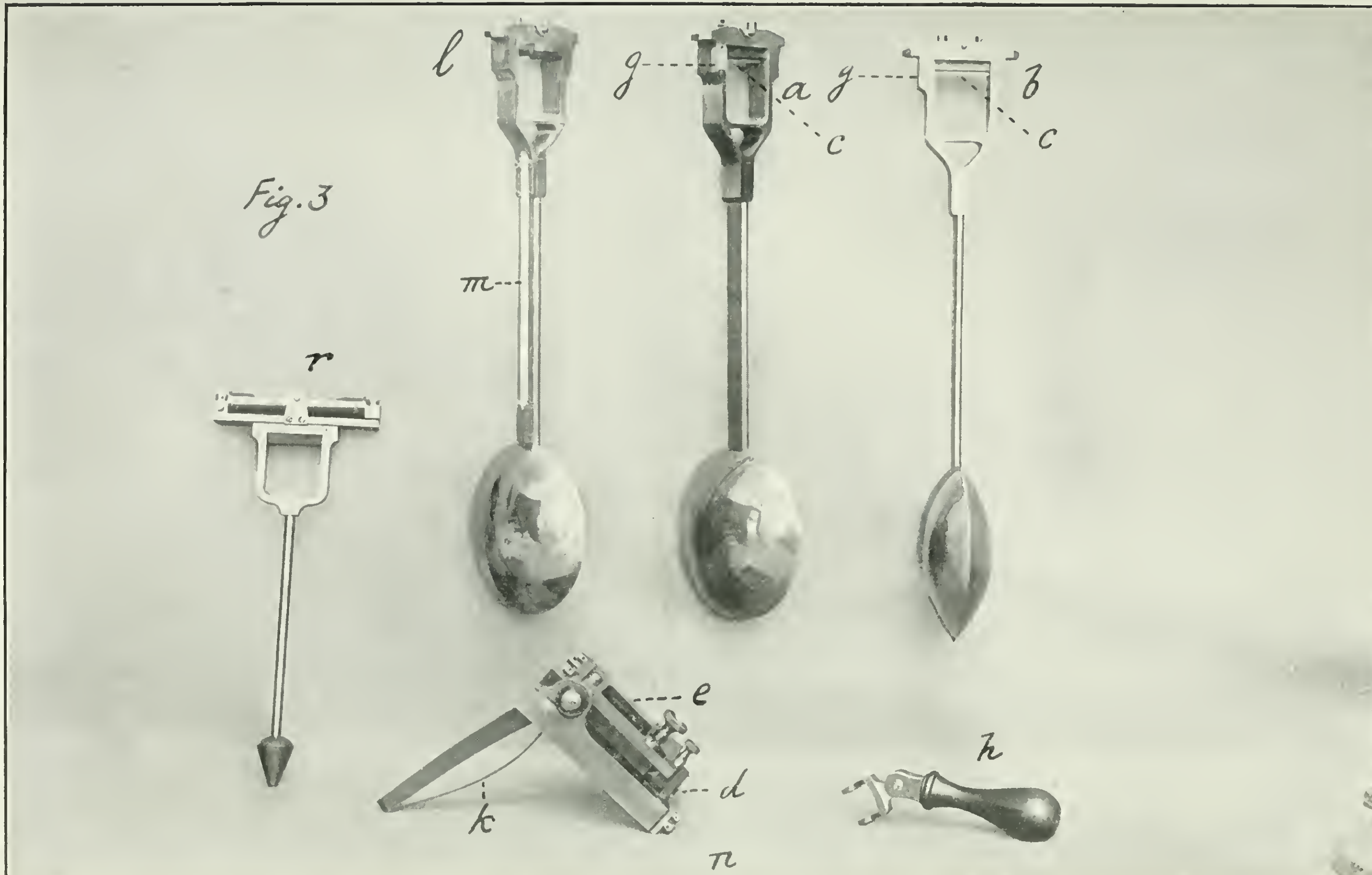

Fig. 3.—Pendulum Apparatus.

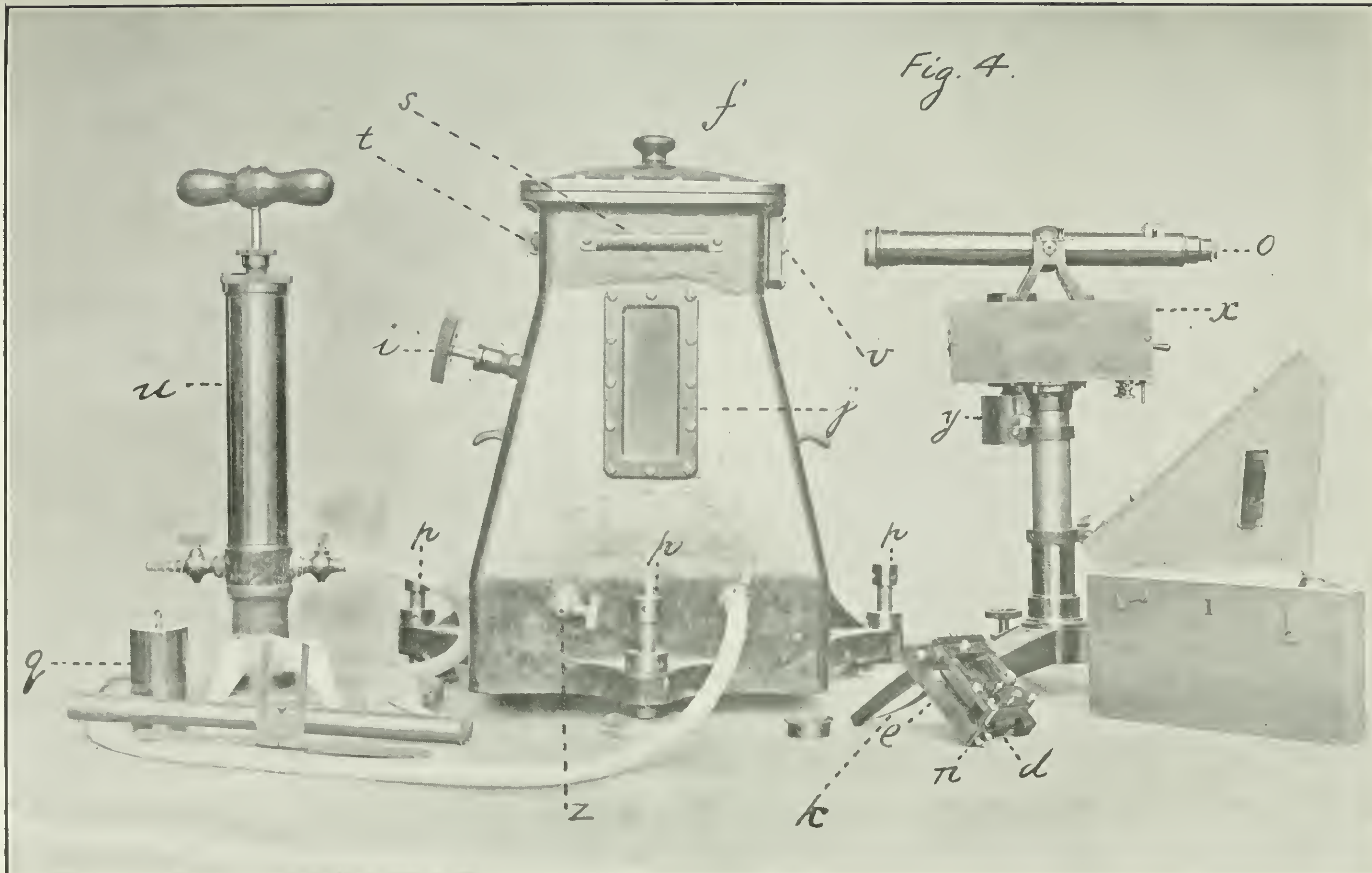

Fig. 4.—Pendulum Apparatus.

APPENDIX 3.

REPORT OF THE CHIEF ASTRONOMER, 1905.

TRANSPACIFIC LONGITUDES BETWEEN CANADA AND AUSTRALIA AND NEW ZEALAND, EXECUTED DURING THE YEARS 1903 AND 1904

BY

OTTO J. KLOTZ, LL.D.

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ILLUSTRATIONS.

APPENDIX 3.

Department of the Interior,
Office of Chief Astronomer,
Ottawa, Can., December 30, 1905.

W. F. King, Esq., LL.D.,
Chief Astronomer,
Ottawa.

Sir,—I have the honour to submit the final report on 'Transpacific Longitudes' carried out under my charge.

With me in the work was associated Mr. F. W. O. Werry, B.A., as observer, and he occupied Fanning and Norfolk islands.

Mr. F. A. McDiarmid, B.A., attended to the clock exchange at Bamfield, Vancouver Island, with the observatory at Vancouver and the one at Fanning. He also computed all the transits.

I occupied Vancouver; Suva, Fiji; Southport, Queensland; and Doubtless Bay, New Zealand, besides the observatories at Brisbane, Sydney and Wellington for personal equation.

I have the honour to be, sir,
Your obedient servant,
OTTO J. KLOTZ.

REPORT ON TRANSPACIFIC LONGITUDES BETWEEN CANADA AND AUSTRALIA AND NEW ZEALAND, EXECUTED DURING THE YEARS 1903 AND 1904.

NOTES ON THE BRITISH PACIFIC CABLE.

On December 31, 1900, articles of contract were made by Her Majesty's Government, Canada, New South Wales, Victoria, New Zealand and Queensland on the one part and the Telegraph Construction and Maintenance Company on the other, for the construction and laying of the Pacific Cable.

The contract called for the completion of the whole cable on or before December 31, 1902. The cable was finished two months earlier, and after undergoing the required test of a month, entered upon its commercial career on December 8, 1902.

Thus was the project, that had been advocated with persistence from some quarters for a quarter of a century, made an accomplished fact. The missing link of about 8,000 miles across the Pacific between Canada and Australia in the world's metallic girdle was now supplied.

Before the cable was laid a survey was made of the route and the character of the ocean bed examined.

From the survey the number of miles (nautical) of cable required for the different sections was as follows:—

From Vancouver Island to Fanning Island	3,654
" Fanning Island to Suva, Fiji	2,181
" Suva to Norfolk Island	1,019
" Norfolk to Queensland (Moreton Bay)	906
" Norfolk to New Zealand	513

The first section of the cable is about a thousand miles longer than any that had been laid before. This necessitated a considerable increase in copper for the conductor and in gutta percha for the dielectric. The working speed of a submarine telegraph cable depends on, and is inversely proportional to, the product of the total resistance of the conductor multiplied by the total electro-static capacity of the core, so that, other things being equal, the speed varies inversely as the square of the length of the cable. In the long section there were used 600 lbs. of copper and 340 lbs. of gutta percha per nautical mile. On the Fanning-Suva section 220 lbs. of copper and 180 lbs. of gutta percha; and on the remaining three sections the copper and dielectric were in equal proportions of 130 lbs. each.

In the neighbourhood of Fiji at a depth of 2,500 fathoms, a temperature of 34°·1 Fahrenheit was noted, being the lowest temperature taken during the survey. There is very little difference in the temperature of the ocean at great depths, say below 3,000 fathoms, over a great extent of the earth's surface, the temperature being only a few degrees above freezing point, or 32° Fahrenheit. The greatest depth, 3,070 fathoms, about three and a half miles, was found on the Fiji-Fanning section, where the bottom specimens consisted principally of radiolarian ooze. This ooze is found at the greatest depths, and was obtained by the *Challenger's* deepest sounding in 4,475 fathoms. The United States steamer *Nero* sounded in 5,269 fathoms, 6 miles (this last being the deepest sounding recorded in the ocean), and the material brought from the bottom was radiolarian ooze.

Of the 597 samples of sea bottom obtained on the Pacific Cable survey, 497 were such that they could be divided into distinct types of deposits. It was found that;—

294	samples	referred to	globigerina ooze.
65	"	"	red clay.
43	"	"	radiolarian ooze.
45	"	"	coral mud or sand.
27	"	"	pteropod ooze.
12	"	"	blue or green muds.
11	"	"	organic mud or clay.

The pressure at a depth of 3,000 fathoms, in which a considerable portion of the Pacific Cable is laid, is about four tons to the square inch. When the cable is being laid at such depths, it will be approximately twenty miles astern of the ship before it touches the bottom.

Deep sea cables last longer in the tropics than in the northern oceans. The reason is to be found in the fact that in the tropics marine life, from which globigerina ooze is derived, is more abundant than in the more northerly or southerly waters. It is the sun and the warm surface water that call into life these countless globigerina, which live for a short space, then die and fall to the bottom like dust, making such a good bed for the cable to rest in. In the Arctic currents, where the surface is cold the water does not teem with life in the same way as it does in the tropics, and consequently there is less deposit on the bottom of the ocean.

A submarine cable consists, first of a core, which comprises the conductor, made of a strand of copper wires, or of a central heavy wire surrounded by copper strips as in the Pacific Cable, and the insulating covering, generally made of gutta percha, occasionally of india rubber, to prevent the escape of electricity. As far as cabling is concerned, this is really all that is necessary, an insulated conductor. This, however, would not, in the first place, be sufficiently heavy to lay in the ocean, and secondly, would be too easily injured and destroyed by the many vicissitudes to which it would be subjected. For this reason, a protection in the form of a sheathing of iron or steel wires surrounds the core; the nature, size and weight of the sheathing being dependent upon the depth of the water and kind of ground over which it has to be laid. The deep sea section, being the best protected from all disturbing influences outside of displacement of the earth's crust by earthquakes or volcanic action, is naturally the one of smallest dimensions; and for the shore end, which is exposed to the action of the waves, to driftwood, to the grinding of ice in the more northerly latitudes, and to the danger of anchorage, especially of fishing boats, the sheathing must be very heavy. So that while the deep sea cable is somewhat less than an inch in diameter, that for the shore ends is nearly 2½ inches in diameter. The action of the waves is limited to a depth of only about 13 fathoms, so that their influence on the cable, manifested by wear and chafing, is confined to the shore end.

The Pacific Cable is equipped with the most modern apparatus at the various stations, and the cable is worked duplex, that is, messages are sent and received on the same cable at the same time.

Canada had carried longitude work from Greenwich across the Atlantic and thence to Vancouver. The completion of the British Pacific Cable offered an opportunity for continuing the work across the Pacific in the interests of navigation and geography, besides tying for the first time longitudes brought eastward from Greenwich with those brought westward, making the first longitude girdle round the world.

In October, 1902, the Honourable Mr. Clifford Sifton, Minister of the Interior, authorized the carrying out of the Transpacific longitudes, and the Governors of the South Sea, Australia and New Zealand were respectively officially notified thereof.

In preparing the programme for carrying out the work, the climatic conditions of the various stations to be occupied were studied so that the most favourable times and seasons might be chosen. It was found that Suva, Fiji, was the governing factor, as it was by far the rainiest place of the series.

Besides the transit outfit, I carried, too, a half-seconds pendulum apparatus, and a Tesdorpf magnetic instrument, the latter similar to the ones furnished to Drygalski of the *Gauss* on his Antarctic expedition.

ITINERARY.

Mr. Werry left Ottawa on February 27, 1903, and proceeded to San Francisco, whence he sailed for Samoa, where he took the northbound steamer for Fanning island. The southbound steamers in passing Fanning do not call there. In the latter part of March, Mr. McDiarmid and I proceeded to Bamfield, Vancouver island, the eastern terminus of the Pacific Cable. After installing the sideral clock and its connection with the cable, I returned to the Vancouver observatory to begin observations. Bamfield, where no observations were taken, was simply used as a clock exchange station for making comparison between the Fanning and Vancouver clocks.

By the end of April a satisfactory number of observations had been obtained at Fanning and at Vancouver, and the first link of the Transpacific longitudes completed.

I took passage on the Canadian-Australian steamer *Miowera,* and sailed on May 2 for Suva, Fiji. We called en route at Honolulu. Here were met the two American astronomers, Mr. Edwin Smith and Mr. Fremont Morse, who were engaged in the determination of the difference of longitude, San Francisco-Honolulu. Suva was reached May 20, and immediate steps were taken for the erection of the pier and the observatory. The Fanning-Suva longitude was completed on June 24. It may be stated that as Suva is just west of the 180th meridian, and Fanning east of it, the dates for the observations of the same night differ by a day. Mr. Werry left Fanning on June 27 for Norfolk island some 3,000 miles distant. This necessitated a rather circuitous route of about 7,000 miles for lack of suitable steamer connections. He had to return to Honolulu thence to Samoa, Auckland, New Zealand, Sydney Australia, and finally to his destination, which he reached in the beginning of August, occupying about six weeks to reach the cable station at Norfolk island. During this interval I made pendulum and magnetic observations at Suva, and also paid a visit on invitation of Roko Kandavu, grandson of the great cannibal king, Cakobau, the present ruler, at the old Fijian capitol on the small island of Bau, some 20 miles from Suva.

About a month was occupied in determining the difference of longitude, Suva-Norfolk. On September 7 I sailed on the *Aorangi* for Brisbane, where we arrived on Saturday, the 12th. On the following Monday I proceeded by rail with the astronomic outfit of many cases to Southport, the cable station, fifty miles south of Brisbane.

Mr. H. C. Russell, government astronomer at Sydney for New South Wales, hearing of my arrival, immediately wired his hearty co-operation in connecting Sydney with Southport. Similar co-operation was readily granted by Mr. A. A. Spowers, Chief Surveyor for Queensland, with the Brisbane observatory in charge of Mr. T. D. Fraser. By September 25 the pier and observatory were built and observations begun. Southport formed a unique station, for nightly clock exchanges were had in succession with Brisbane, with Norfolk and with Sydney, at each of which time observations were being taken. It was on September 29 that the first mutual observations and clock exchange were had with Sydney, and so this night may be considered as the one when for the first time longitude from the west clasped hands with longitude from the east, and the first astronomic girdle of the world was completed.

By October 16 the last link, Norfolk-Southport, of the direct Transpacific longitude was completed. Mr. T. D. Fraser and I observed for personal equation at Southport and at the Brisbane observatory. Magnetic observations at Southport were also taken. On November 3 I arrived at Sydney, and after observing for personal equation, with the two observers, Mr. H. A. Lenehan, acting government astronomer, and Mr. W. E. Raymond, left on November 7 for Wellington, New Zealand. Here I was met by Sir James Hector, the former director of the observatory, and by Mr. Thomas King, who now has charge of the time observations. The Premier, the Honourable R. J. Seddon, extended every facility the government could offer to further the success of the work. Observations were made for personal equation by Mr. King and myself. After making the necessary arrangements for subsequent clock exchange signals at the observatory, I left for the cable station at Doubtless Bay, at the north end of New Zealand, going by rail to New Plymouth, thence by steamer to Onehunga, across the narrow isthmus by rail to Auckland and thence by steamer to Mangonui, the most northerly port on the east coast. From there I had to drive over an execrable road some miles to the cable station. Here a pier and observatory were built similar to the ones at Suva and Southport. Longitude observations were begun on December 3 and finished on December 19. Before leaving this station a set of pendulum observations was obtained, and the magnetic elements were also determined.

Returning to Wellington, another set of personal equation observations was taken, and similarly in Sydney in January, 1904.

This completed the work of the Transpacific longitudes.

I wish here to express thanks for the hearty co-operation of the chief electrician of the Pacific Cable and of the superintendents at all the stations; of the superintendents, Mr. Hesketh, of the government telegraphs in Queensland; Mr. Young, for New South Wales, and Mr. John Logan, for New Zealand. Mr. G. A. Buzacott, Deputy Postmaster General of Queensland; Mr. J. Dalgarno, for New South Wales, and Sir Joseph Ward, Postmaster General of New Zealand, kindly placed the use of the respective telegraph lines at my disposal for the nightly clock exchanges.

At the Wellington observatory batteries and telegraph instruments had to be installed for the clock exchanges with Doubtless Bay. This was done by Mr. Buckley, government electrician, who also kindly attended every night during the campaign at the observatory to the exchange of signals. In short, wherever and whenever any assistance was required it was readily and cheerfully extended, and the success of the work is in no small measure attributable thereto.

The number of stations between Vancouver and Australia, as well as between Vancouver and New Zealand, is odd, and as the two observers occupied alternate stations, the terminal stations, Southport and Doubtless Bay, are each free by this means from personal equation.

KLOTZ—INSTRUMENTAL EQUIPMENT.

Transit.—The transit (Fig. 1) is by T. Cooke and Sons, and known as No. 504 of their catalogue, 1900, with slight modifications. This instrument was specially ordered for the Transpacific longitude, and was received only a short time before departure for Vancouver, where it was mounted for the first time, and the large inequality of pivots discovered. It has an object glass of three inches, clear aperture, and is mounted in a tube of double conical shape with dew-shade; focal length about 36 inches, axis $1\frac{1}{4}$ inches in diameter, Y's $1\frac{1}{16}$ inches in width; the support of each end of the axis is two cylindrical segments having arcs $\frac{3}{4}$ inch long.

The telescope is provided with two $6\frac{3}{4}$-inch setting circles reading by verniers to 20 seconds of arc. One of these circles is provided with a special arm for carrying the latitude level, when using the transit as a zenith telescope. Above the level there is a device for an attachable mirror, a strip of silver glass set in a metal frame. In using the transit as a zenith telescope the level readings cannot be satisfactorily read for stars near the zenith, as one end of the bubble will be directly behind one of the transit standards. To avoid parallax in reading the level, the mirror, secured at an angle of 45 degrees, and at the height of the eye, overcomes the difficulty.

A striding level is provided. The vial rests on cork tips, and is retained in position by light cork tipped springs. There is a glass covering to prevent sudden change of temperature of the vial. A single wooden knob on the level frame serves for handling the striding level. On account of the long legs it was found necessary to attach lateral legs to prevent accident from toppling over through gusts of wind or other cause. A dew-cap 6 inches long is used when observing. The eye-piece attachment carries a micrometer for the movable thread used for latitude work. The micrometer is divided into a hundred parts, equivalent to about 56 seconds of arc, so that by estimation to tenths of a division, about six-hundredths of a second of arc may be read. The eye-piece attachment with micrometer may be turned through 90° from the ordinary position when observing transits, in order to make the movable thread available for measuring zenith distances in latitude work. Instead of having a comb for counting the revolutions of the micrometer there is a small, toothed, geared and numbered wheel outside to effect the same purpose. This has the advantage of obviating erroneous counting which may happen with the comb in counting from left to right, instead of from right to left or vice versa.

Of the different eye-pieces with which the telescope is provided the same rectangular (erecting) eye-piece was used throughout. The eye-piece is set in a cross-slide with quick-traversing screw and milled-head.

There are on the diaphragm thirteen spider threads, two outside ones and then two groups of three each placed symmetrically about a middle group of five threads. The equatoral interval between two adjoining threads in a group is about 1·6 seconds of time. The illumination of the threads was effected through the hollow axis by an oil lamp, placed on an arm 9 inches long. To prevent unequal heating of the axis, a lamp was placed at each end of the transit axis. Lucca oil is found the most satisfactory for burning in the small instrument lamps.

The transit was supplied with reversing apparatus. The cast-iron stand rested on a base-plate and was supported by three large screws, one at one end and two at the other, fitting into spherical holes in the base-plate. For meridional adjustment two opposing screws at the foot of the stand and near the supporting screws acted on a projection on the base-plate, the levelling was done by the single supporting screw at one end. The base-plate was not bolted to the cement capping of the pier. The weight of the whole instrument and plate was sufficient to retain the latter in a permanent position with reference to the pier.

Clocks.—Two clocks or rather chronometers were carried. They were adjusted to sidereal time. Both had break-circuit electrical attachments.

Dent No. 48419 had two-second breaks at the even seconds, omitting the 58th second break in order to indicate the 60th or minute break.

To the inside of the outside case were attached maximum and minimum thermometers and an ordinary thermometer within the chronometer box proper. One dry cell was generally found sufficient for the clock circuit, and would retain its efficiency for two months. During the day time when not observing, the clock circuit was of course left open. The clock at each cable station was placed in one of the 'artificial line' cabinets, so that its temperature might be as uniform as possible. The fluctuation in temperature during the twenty-four hours was small, being confined within about two degrees Fahrenheit. At Vancouver the chronometer was kept in a small brick vault near the observatory, used for storing the powder for the signal gun, a quarter of a mile distant, which is fired daily at 9 p.m. Pacific standard time. Insulated copper wire connected the clock with the switchboard in the observatory, hence with the chronograph circuit; and by another set of wires with the sounder on the pier of the cable instruments, by means of which, as more fully explained elsewhere, the clock was made to record its beats by a special siphon on the cable fillet of paper.

The clock was wound daily at 4.30 p.m.

Bond No. 516 made two second breaks also; instead of omitting the 58th second break, however, a break for the 59th second was interpolated to identify the following one for the full minute.

Chronograph.—A Fauth (Saegmüller) barrel or cylinder chronograph was used. The cylinder was 6¾ inches long and 4 inches in diameter. It was geared to two speeds, but the slower speed of one revolution per minute was the one always used. A Waterman fountain pen answered the purpose as recording style, but it requires attention. The perversity of some things at times seems inexplicable.

The pen, being actuated by the small armature of the magnet of the chronograph, and the electric circuit of the latter by the clock, also by the observing key, records both the clock and star transit.

It was customary to use one chronograph sheet for each position of the instrument, so that for a complete set there would be four sheets for a night's observations, and an extra sheet when there was an exchange of clock signals over land lines. The chronograph sheets are infinitely more convenient for scaling a set of observations than the Morse fillet so common in the European observations. For subsequent reference too the sheet is vastly superior to the yards or fathoms of fillet.

The measurements on the chronograph sheets were made by means of a convergent-divergent glass scale, covering the two-second spaces, and dividing the same into tenths of a second, which by estimation were read to hundredths. Fig. 2 shows one of the chronographs used.

Levels.—Both the latitude and striding levels used were supplied with the transit by T. Cooke & Sons.

Their value was determined before and after the work by means of a level-trier, 114·40 inches between the pivots, and the Whitworth micrometer screw for raising and lowering one end of the trier read directly to one-thousandth of an inch. Determinations for value of one division of level were also made by placing the level longitudinally on the telescope tube of transit No. 2, then comparing the displacement of the bubble with the corresponding angular movement of the telescope as measured by the micrometer on some distant fixed object.

The method by level-trier is more accurate than the one by the micrometer, as the latter involves the uncertainty of constant bisection with the micrometer thread.

Electrical Apparatus.—The switchboard which has been used for many years very satisfactorily in connection with the Canadian transcontinental longitude work, was used at every station. For clock exchange by cable all its parts were not required; it then only served for the observations themselves by making the necessary connection between clock, chronograph and observing key.

However, at Vancouver, Southport and Doubtless Bay, where clock exchange signals were made over land lines and the conversation was done over the wires from the observatory, all parts of the switchboard were brought into requisition.

The accompanying diagram (Fig. 3) will illustrate the various parts and connections of the switchboard.

When observing, the switch is to the left, and plug 1 is in. The chronograph circuit is broken by the chronometer at the points of the clock relay, as well as by the observing key.

For simply talking over the line the switch is to the left, plug 2 in, plug 3 out, and also plug 8 out if the sounder is to be used. Experienced operators do not need the sounder but read off the relay.

For clock exchange, both clocks (of the two stations) beating simultaneously over the wire, the switch is put to the right, plugs 1 and 2 out; 3 may be out or in. When 3 is in, the talking relay is cut out. In clock exchange the main line current passes over the points of the clock relay and is there broken; similarly the distant clock breaks the local chronograph circuit at the points of the signal relay.

For arbitrary signals, sent with the break-circuit signal key, the switch is to left and plugs 1 and 2 out, so as to throw the chronograph circuit over the points of the signal relay. Under all conditions the chronometer always records on its own chronograph.

When the switch is to one side, the opposite points are in contact. The switch separates them, and changes thereby route of current. One dry cell (Mesco) is sufficient for the clock circuit. This is always independent of any other current, and to protect the points of clock contact only one cell is used.

For the circuit of the observing key and chronograph two or sometimes three cells are used.

Cable Attachment.—From former experience it was found undesirable to have a direct connection between the clock and the cable siphon, *i.e.*, to have the clock recording directly by means of the cable siphon. It is better to have an independent clock siphon tracing a line parallel to the one of the cable siphon.

To obtain the local clock record or two-second beats on the cable fillet, an ordinary sounder (Fig. 4) was provided with a 4½-inch long threaded rod attached vertically to one end of the sounder arm. Over the rod fitted loosely an oval ring held in position by two opposing screws and also by two nuts, one above and the other below the ring. The heads of the screws were perforated to admit of centering and fastening the silk fibre, to be spoken of presently. The sounder was screwed on a small board and the latter securely attached to the pillar on which the cable instruments are set, as it was found that by placing the sounder on the table the vibrations to which it was subjected by walking or other causes, made the siphon record unsatisfactory. On the brass frame (of the cable instrument) carrying the ordinary cable siphon was stretched another thin wire to which was attached a siphon which was connected by a raw silk fibre with the rod of the sounder arm, so that the siphon responded to the pulsations of the sounder and hence when filled with ink would leave a record on the cable fillet.

The recording of this siphon differed from that of the ordinary cable siphon, in as much as it dragged a continuous line on the fillet, while the other makes necessarily a dotted line, produced by the small vibrator tapping the frame. The magnetic effect, produced by the weak current used on cables, and which actuates latterally the cable siphon, is too weak to permit the siphon to rest permanently on the fillet, it could not draw it aside, so the siphon is kept just above the paper and by means of the vibrator is made to deposit drops of ink—about 60 per second—and thereby leave a record.

Before attaching the silk fibre to the sounder rod and siphon it was subjected to a constant pull by means of a small weight for a day in order to remove its elasticity sufficiently to permit of instantly responding on the siphon to the movements or pulsations of the rod. The tension of the fibre was adjustable by means of the two small opposing screws in the oval rings of the rod.

The local clock record on the cable fillet was necessary in order to be able to interpret the arbitrary signals sent from the other observing station and recorded by the cable siphon. In receiving signals there were two records on parallel lines on the fillet, the signals as shown by the cable siphon, and the clock beats shown by the other siphon. The trace of the latter was the foot-rule, so to speak, or scale for measuring the other. The two-second breaks in the line drawn by the clock siphon were projected vertically by a fine pencil line on the line of the cable siphon and the relative position of the arbitrary signals measured by a glass scale, similar to the one described, but somewhat larger, as the two-second breaks on the fillet were made considerably larger than those on the chronograph sheets. The speed of the fillet is adjustable by the small motor.

Although the siphons were generally placed fairly opposite each other, that is, in the same perpendicular to the fillet, yet it was necessary to know their parallax. To attain this end the local clock circuit was put in connection with one of the cable keys, the one (positive) used for sending arbitrary signals. A special arm was attached to that cable key so that when the cable key was depressed to make circuit and send a signal into the cable, the arm would at that moment break the local clock circuit, hence record the time on the fillet. By comparing the relative positions to a vertical of the break made by the cable siphon with that of the other siphon for an arbitrary signal, the apparent parallax of the siphons is obtained. To this parallax there may be a small outstanding correction due to want of perfect adjustment, that is, that the make of the cable key absolutely synchronizes with the break on the clock circuit. To obtain the absolute parallax the metal frame carrying both siphons was given a slight sharp tap, generally with the back of a pocket knife. By this means there was a momentary simultaneous displacement of both siphons and the parallax obtained, and by comparison with the above, an adjustment, if necessary, made.

The correction was always a small quantity—if anything at all—and about one-hundredth of a second of time.

Observing key.—This was an ordinary American telegraph key mounted on a small piece of wood. The spring adjustment was made weak, and the platinum points about a fortieth of an inch apart. The same conditions were maintained throughout the work. The moment the key was touched the circuit was broken and the transit recorded, independent of the spacing between the points of the key, which is not the case in a make-circuit key.

SYSTEM OF WORKING.

Programme.

It was decided that for each final differential longitude there should be five mutually complete nights or their equivalent.

Time set.—A complete night's programme comprised twenty-eight stars, divided into four sets of seven stars each. One of the seven being a polar, while the others were distributed between the zenith and an equatorial zone.

Two of these sets—one clamp east and one clamp west—comprised a time determination, so that each night, when clear, there would be two independent time determinations, and a measure of the individual hourly clock rate obtained, beside the daily rate shown by the observations of successive days.

For the northern hemisphere the Berliner Jahrbuch has generally been used for the selection of stars, but for the southern hemisphere the British Nautical Almanac furnished the most suitable stars. Both were supplemented by the American Ephemeris and Connaissance des Temps. On account of the difference in longitude between any two stations, and for other reasons it was not practicable for the two observers to use the same sets of stars for the purpose of eliminating errors in right ascension, which in the standard stars alone used is supposedly a very small quantity. The programmes were always so arranged that each observer would, with clear sky, have completed his first time determination, that is, would have observed one set clamp east and one set clamp west, before the time of exchange, generally at 9.30 p.m., of clock signals. These signals would therefore fall between the first and second independent time determinations. It is all-important that the respective clock errors be accurately known at the time of exchange of clock signals. This is best obtained and assured when there is a time determination immediately preceding and one immediately following such exchange. Through clouds or rain, or other unpropitious weather it was not always possible to obtain the time determination when desired.

Exchange on Cable.—Along the whole system of the Pacific cable Greenwich mean time is used for the commercial work. For Fiji through which runs the anti-meridian of Greenwich, the Greenwich mean time 12 hour clock dials would practically show local time for Suva. It was desirable in the cable offices that the time for exchange of clock signals be fixed at some definite time so that the officers could govern themselves accordingly and have the spare cable instrument in readiness at the appointed time. The time was so arranged that the westerly observer had time to obtain his first time determination before the exchange. In the tropics observing may be begun almost immediately after sunset, as there is little twilight. The exchange consisted in each observer sending alternately not less than thirty arbitrary signals at irregular intervals, averaging about two seconds apart, the interval being always sufficiently long to permit the siphon to have well resumed its normal position in tracing the zero line of dots on the fillet. The signals having been mutually and satisfactorily received, the record of the night's work and of the preceding night was mutually communicated, and this ended the use of the cable for the night. If all went well, the whole exchange of signals and communications would occupy less than ten minutes. This was, however, not always the case; the ink in the siphon might give trouble, or the vibrator, or some other vicissitude for which one must always be prepared not only at the cable instrument, but also in the observatory.

Throughout the whole work, received signals were scaled by Klotz on the cable siphon record, by projecting the 2 second breaks of the clock on the lower or clock siphon record upon the upper one. This method was preferred to projecting the received signals (beginning of deflection of cable siphon) on the lower line to avoid obliterating or obscuring by a pencil line as ordinate the dot or dots (vibration of siphon) indicating the arrival of the signal. In the method pursued, after adjusting the glass scale to cover the intersection of the ordinates from the clock breaks with the zero line of the cable siphon, one could deliberately determine the first indication of the cable siphon leaving its zero line of undisturbed position.

The scaling of the signals sent, which were recorded by both siphons, was always done on the clock siphon record, hence it is necessary to apply to all scaling of signals received, which were recorded of course only on the cable siphon, the parallax of the cable siphon. This parallax was readily obtained from the signals sent, because in that case we have the record for each signal by the two siphons. To test the adjustment of the cable key with the local clock circuit, *i.e.*, whether the two siphons recorded simultaneously, the cable key make and the clock circuit break, the frame carrying the two siphons was lightly tapped after the exchange of signals thereby making simultaneously a break in the two lines made by the siphons, and the absolute parallax expressed in time found. If the apparatus is well adjusted, this absolute parallax is identical with the one obtained as described above. When a difference was found it was confined to about one-hundredth of a second.

Mr. Werry invariably scaled the cable siphon record both for sending and receiving signals on the clock siphon line by projecting the same on that line. The parallax of the siphons was obtained in a manner similar to the one described above.

The accuracy with which a comparison between two clocks or chronometers can be made by means of a cable, is practically only a matter of careful scaling of the time signals on the tape. So that with the tape running out approximately an inch a second it is found that an exchange of thirty signals gives a probable error for the mean difference of the two chronometers of less than $\pm^s.002$. Small as this quantity is, it includes error of scaling, irregular running out of tape, irregularity of clock beats, and differential rate.

Compared with the many other quantities—star places, level readings, temperature with its hidden effects on instrument and chronometer, errors of observation, personal equation—entering into the determination of the difference of longitude, the probable error of an exchange of time signals is almost a vanishing quantity. The same remark holds true for an exchange over land lines. Fig. 5 illustrates a cable record, both receiving and sending.

Clock Exchange on Land Lines.—Land line exchanges were made between Vancouver and Bamfield, Southport and the observatories at Brisbane and Sydney, the former fifty miles distant by wire, and the other 753 miles. Also between Doubtless Bay and the observatory at Wellington, 704 miles. The exchanges were effected without the interposition of relays on the line.

It was customary to allow both clocks to record over the wire at the same time and record on the chronographs of the two stations. This was a mere check on the actual exchange by arbitrary signals and to show the relative position on the chronographs of some one minute (the 60th second) of the one clock and some one minute of the other clock. Experience has long shown that a more accurate comparison between two clocks can be made by arbitrary signals, that is by breaking the local clock circuit as shown on the chronograph, and by that same depression of the key, breaking the main line and hence sending a signal to the distant station there to be recorded on the chronograph, than by simply allowing the clocks to record over the line. The particular merit of the arbitrary signals lies in the fact that in scaling the chronograph sheets the mind is and remains unbiased in making the measurements, whereas when scaling the record of the two clocks recording simultaneously on the chronograph, the mind involuntarily becomes biased after making one measurement. We know in advance what the remaining measurements should be. It is impossible to get rid of the influence of knowing in advance what to expect. This undesirable condition in exchange of clock signals is obviated by adopting the method of arbitrary signals. The measurements on the chronograph sheets as well as on the cable fillets were read to the one-hundredth of a second of time.

At the three observatories, Brisbane, Sydney and Wellington the Morse register with fillet of paper and two styles was used for recording the exchange of clock signals. It is somewhat surprising how tenaciously this form of chronograph is maintained not only at these observatories (Sydney had a drum chronograph too) but also at those in Europe. The cylinder chronograph is to one who has used both so manifestly superior for convenience of reference and reading and saving of time that it is difficult to understand why the Morse form is retained.

Rate.—Rate is one of the most difficult problems with which we have to deal in longitude work. It is not the magnitude of the rate, although a small rate is very desirable, but the constancy. This is the crux. A chronometer may have an apparently constant daily rate, yet the hourly rate for the twenty-four hours may and does vary. Again the rate is not the same when the current is on, as when it is off; the former condition obtaining when observing, and the latter the rest of the day. The rate deduced from two indepedent time determinations of the same night, when the temperature is practically constant for the clock during the time of observation, and the clock is in circuit with the battery only during that time, is seldom, if ever, the same as that obtained from day to day observations.

In our programme we have two independent time determinations for each night. Each set of transits is reduced to the epoch of the mean of the times of transit of the stars comprising the set. The rate which is applied for each transit to the mean epoch, and for which some magnitude must be assumed, is practically a vanishing quantity in the resulting clock correction. The ideal time of exchange would be at that epoch, when the effect of rate is eliminated. But for various reasons this is found to be impracticable. In the programme then of two independent time determinations, for obvious reasons the exchange was arranged to take place about midway between the two epochs. An interpolation between the two epochs gives the clock correction at the instant required, that of the signals. This assumes that the rate is constant during the interval, and is represented by a straight line. If extrapolation is necessary, as sometimes occurs, the rate value has less weight.

Transmission Time.—On the assumption that the time of transmission is the same in both directions and that the chronometers have the same rate, the difference of records at two stations of the exchange of time signals will represent twice the time of transmission.

We are obliged to assume that the transmission time is the same in both directions, but to the difference of the records of exchange of time signals there must be applied the relative rate for the interval between the means of the times of the two exchanges. This interval is confined to about two minutes.

From the two independent time determinations made at each station on the same night the hourly rate of each chronometer when in circuit is obtained. The algebraic difference of these hourly rates gives the relative hourly rate of the two chronometers and the proportional part for the above interval is the quantity entered in the column 'Relative rate' of Table......

On exchange by land-lines, it will be seen, referring to the diagram of the switchboard that the deduced transmission time is free from any retardation by the signal relays or by the secondary circuits of the chronographs. The effect upon the comparison of the clocks of retardation by the signal relays and secondary circuits will disappear in the mean of the two exchanges provided the sum of the retardations by signal relay and secondary at one station is equal to that at the other. This condition is, however, not necessary for finding the time of transmission.

Personal Equation.—Fortunately for the connection between Canada (Vancouver) and Australia (Southport), also New Zealand (Doubtless Bay), the personal equation between the two observers was eliminated. This is, of course, on the supposition that the personal equations remained constant. As the climatic conditions, as far as temperature was concerned, and the surroundings were favourable for personal comfort, there was no *a priori* reason for suspecting any change during the campaign in the personal equation. The elimination referred to was due to the fact that the number of stations was odd, and that the observers occupied alternate stations. I occupied the terminal and middle stations, while Mr. Werry occupied the other two—Fanning and Norfolk islands,—and for these two stations differential personal equation must be applied. To determine such we observed on our return with the same two transits of the Transpacific longitude, on several nights in a manner identical with that at work in the South seas, and under similar climatic conditions. It may be remarked that it was impracticable before leaving Ottawa to observe for personal equation. In the first place it was winter, thermometer below zero, and secondly my Cooke transit had not yet arrived when Mr. Werry set out for Fanning island, via Samoa.

For the longitude of Brisbane, Sydney and Wellington, I observed with each of the observers at the respective observatories, by determining the clock correction for the respective common epochs.

Instrumental Constants.

Thread Intervals.—These were determined by both instruments by observing the transits of slow-moving (polar) stars and the intervals were all referred to the mean and not to the middle thread. The times of transit are corrected for level (if any change of level has taken place during the transit) and for rate. Multiplying the time interval of any thread from the mean thread by the cosine of the star's declination gives the equatorial interval for the same. For circumpolar stars, whose motion during the time of transit from one thread to another is sensibly an arc of a circle the interval must be further multiplied by the cube root of the cosine of the hour angle of the star for the respective threads.

The following are the values of the equatorial intervals for Klotz transit, determined from transits of α Crucis, γ Trianguli, α Trianguli and β Chamaeleontis.

Clamp East.

	s.
1	− 9·939
2	− 8·273
3	− 6·690
4	− 3·279
5	− 1·640
6	+ 0·036
7	+ 1·576
8	+ 3·200
9	+ 6·662
10	+ 8·352
11	+ 9·995

For the Werry transit, the values determined from transits of λ Centauri. α Crucis, Groombridge 1930 and 8 Draconis are:—

Clamp East.

	s.
1	−14·209
2	−11·903
3	− 9·573
4	− 4·794
5	− 2·196
6	− ·110
7	+ 2·454
8	+ 4·681
9	+ 9·591
10	+11·906
11	+14·153

Inequality of Pivots.—The Klotz transit was received from the maker in the dead of winter and just prior to leaving for the Pacific so that no opportunity was afforded to determine any of its constants at Ottawa.

The inequality of pivots was determined both by special series of observations and also from the many level readings just before and after reversal of transit in the daily (clear nights) time determinations.

In this transit there was a considerable change in the inequality of pivots from April to December. For Vancouver and Suva the values are identical. thence onward there is an increase for Southport and still more for Doubtless Bay. The cause of the change is not apparent. Before beginning observing in Southport I removed with great difficulty the plug carrying the lens in the clamp end of the axis as the inner surface of the lens was covered with brass filings. In re-inserting the plug I did not get it quite 'home.' This might perhaps have affected the diameter of that pivot. Whatever the reason, the quantity was accurately determined and applied to the level correction.

The mean value for Vancouver of seven determinations gave for p the pivot inequality correction $^s.080$, the inequality being twice that quantity.

A similar determination at Suva gave $p = {}^s.080$.

At Southport a double series was taken, one by continuous readings on many reversals, the other from many nights level readings during the time of transit observations. From these we obtain $p = {}^s.117$.

At Doubtless Bay the value was obtained from level readings extending over the whole period of time determinations in December and the resulting value for the correction of inequality of pivots is $p = {}^s.151$.

All the corrections are additive for clamp east, the axis opposite the clamp being the larger. The respective values of p were applied for each station.

Level.—The value of the striding level of Klotz transit was obtained from two series of readings on different days, by placing the striding level longitudinally on the telescope of the Werry transit. The telescope was clamped in a position to allow the bubble in the striding level to play near one end of the tube. By means of the micrometer and its thread a reading was taken on a distant object. Then by means of the tangent screw of the telescope, the latter together with the level was displaced. This displacement was measured by the micrometer screw and expressed in angular measure. Repeated and satisfactory measurements were thus obtained.

The mean value of one division of the level at 68° F. is $^s.085$.

By the use of the level trier the mean value of the striding level (a Pessler) of the Werry transit was found to be $^s.100$.

Micrometer.—The value of the micrometer of either instrument was not required in the longitude work, only for the latitude determinations, by using the transit as a zenith telescope and observing by Talcott's method. The value of the micrometer was obtained from a series of transits of slow-moving stars over the micrometer thread, set in advance at intervals of five revolutions. The times of transit were corrected for rate and for hour angle. The mean of the time intervals was taken and reduced by multiplying by the cosine of the star's declination.

From such observations the value of one revolution of the Klotz transit micrometer was $56''\cdot878$.

That for the Werry transit is $60''.556$.

Diurnal Aberration.—The correction for diurnal aberration was obtained for each star by the usual formula $-{}^s.0207$ Cos. ϕ Sec. δ and applied to the time of transit, ϕ and δ being the latitude and declination respectively.

For lower transit the correction is positive.

Collimation.—The correction for collimation was determined from the simultaneous reduction of a set (clamp east and clamp west) of transits for time.

No direct measures were made by means of observations with collimating telescope or mercury collimator.

Azimuth.—For the determination of the deviation of the transit instrument from the meridian a polar or slow-moving star was observed in each position of the instrument in the set of time observations. The value was obtained as in the preceding case from the simultaneous reduction of the condition equations constituting a time determination. As the principal unknown sought is the clock correction, the stars comprising an observation set may be so chosen that both the collimation and azimuth corrections, irrespective of magnitude, have little effect on the deduced time.

Reduction of Observations.—As already stated a complete time determination consisted of the observation of fourteen stars, seven for position clamp east and seven for clamp west.

On a clear night two of such determinations were made. For each position there was one polar star the others being time stars. The mean of the eleven threads was taken for the time of transit. This time was corrected for level, inequality of pivots, aberration and rate, giving thereby the corrected time of transit, but still involving the azimuth and collimation corrections besides the clock error.

The right ascensions for a given date were interpolated from the respective ephemerides, and 'the corrections to the R.A. of the Nautical Almanac' as well as of the Berliner Jahrbuch, were applied.

Assuming then a clock correction ΔT for the mean clock time of the transits of a set, and to which time the rate was referred for obtaining the rate correction, we have for each star observed a condition equation of the form,

$$\Delta T + \delta T = (a - t) + Aa + Cc.$$

where $\Delta T + \delta T$ is the clock or chronometer correction. From the fourteen (or less) condition equations the three normal equations are deduced in the usual manner, and the three unknowns determined. As a rule, after beginning observing no attempt was made to level the instrument, but instead frequent readings of the level were taken. There was only one azimuth deduced for one set of clamp east and clamp west, except in a few instances, which showed displacement in azimuth after reversal. This change was due either to reversal or to the levelling done at the time of reversal. The latter reason is apparently the one for the Werry transit, and may be explained by the unsymmetrical motion of the base of the heavy levelling screw in its socket in the base plate. The change in azimuth in the few cases became only apparent, when making the final reductions. In the recomputation for such cases the normal equations were solved for two azimuths, one for each position of the instrument.

Ordinarily the exchange of clock signals took place during the interval between the two independent time determinations which each observer made nightly, provided the sky was clear. The arithmetic mean corrected for parallax of siphons of the differences of the clocks from the individual signals was taken as the difference of the clocks at the mean time of all the signals sent from or received by the respective observers, so that there was no necessity for applying a correction for differential rate. The thirty-five arbitrary signals sent by each observer were usually comprised within less than two minutes. The differential rate, however, was applied for determining the time of transmission. That is, in comparing the differences between the clocks at the mean times of the two exchanges, differential rate was applied for the interval between the mean times of the two exchanges.

We have then two clock comparisons, and they differ from each other by twice the time of transmission.

To obtain the difference of longitude, the necessary data is now available, and a simple computation from the following formula gives the difference sought.

Let t_e and ΔT_{oe} = the chronometer time and its correction at the eastern station when sending a signal.

t_w and ΔT_{ow} = similarly for the western station, when receiving the above signal.

and t'_w and $\Delta T'_{ow}$ = the chronometer time and its correction at the western station when sending a signal.

t'_e and $\Delta T'_{oe}$ = similarly for the eastern station when receiving this signal.

μ = transmission time.

$d\lambda$ = difference of longitude, west longitude being reckoned positive.

We have then from an eastern signal.

$$d\lambda - \mu = t_e + \Delta T_{oe} - (t_w + \Delta T_{ow}) = d\lambda_e$$

and from a western signal,

$$d\lambda + \mu = t'_e + \Delta T'_{oe} - (t'_w + \Delta T'_{ow}) = d\lambda_w$$

$$\text{hence } d\lambda = \tfrac{1}{2}\ (d\lambda_e + d\lambda_w)$$

This is on the supposition that the relative personal equation has been applied to the chronometer correction, and furthermore, that the time of transmission from east to west is the same as from west to east, an assumption which must be made.

Hence we obtain also $\mu = \tfrac{1}{2}\ (d\lambda_w - d\lambda_e)$

If we let K = relative personal equation between the two observers the following formulæ express the difference of longitude for the several links across the Pacific, the observers occupying alternate stations.

Vancouver-Fanning $d\lambda^{I} = \frac{1}{2}\ (d\lambda^{I}_{e} + d\lambda^{I}_{w}) + K.$

Fanning-Suva $d\lambda^{II} = \frac{1}{2}\ (d\lambda^{II}_{e} + d\lambda^{II}_{w}) - K$

Suva-Norfolk $d\lambda^{III} = \frac{1}{2}\ (d\lambda^{III}_{e} + d\lambda^{III}_{w}) + K.$

and Norfolk-Southport $d\lambda^{IV} = \frac{1}{2}\ (d\lambda^{IV}_{e} + d\lambda^{IV}_{w}) - K.$

hence for Vancouver-Southport $dL = \frac{1}{2}\ (\Sigma d\lambda_{e} + \Sigma d\lambda_{w})$

That is, the difference of longitude between Vancouver and Southport, Australia, and similarly for Suva and Doubtless Bay, New Zealand, is free from personal equation even without knowing its magnitude, which, however, was determined, as stated elsewhere, for application to the Fanning and Norfolk longitudes.

The probable error of a difference of longitude was found from the probable errors of the two chronometer corrections and the probable error of the exchange of time signals.

We have then $E_{d\lambda'} = \sqrt{E^2_e + E^2_w + E^2_x}$

For the weighted mean difference of longitude of a number of nights we have

$d\lambda = \left(d\lambda_1 \frac{1}{E^2_1} + d\lambda_2 \frac{1}{E^2_2} + d\lambda_3 \frac{1}{E^2_3} + \ldots\right)$ divided by $\left(\frac{1}{E^2_1} + \frac{1}{E^2_2} + \frac{1}{E^2_3} + \ldots\right)$, the latter quantity representing the sum of the weights, which we may write $[p]$. From the weighted mean and the individual values of the difference of longitude we obtain a series of residuals v.

The probable error of the weighted mean is found from

$$E_0\ d\lambda = .6745 \sqrt{\frac{[p\,v\,v]}{[p]\ (n-1)}}$$

where n represents the number of individual values.

This gives then the probable error for the final difference of longitude between two successive stations.

The probable error of the longitude of a station is the square root of the sum of the squares of the probable errors of the various stations forming the chain from the prime meridian, or Greenwich, that is, $E_L = \sqrt{[E^2_0 d\lambda]}$

SYDNEY OBSERVATORY.

The following description of the instruments used at Sydney in the recent determination of the difference of longitude Sydney-Southport, has been kindly furnished by Mr. H. A. Lenehan, F.R.A.S., acting government astronomer at Sydney for New South Wales.

'The transit has a 6-inch object glass by Troughton & Simms, of London, who constructed the instrument in 1875. The focal length is 6 feet, and it is provided with a dew-cap 18 inches long.

'The bearings of the instrument are on fixed gun-metal bearings on cast-iron columns; no adjustment for corrections of level or azimuth being provided. This was designedly done, so that there would not be a possibility of alteration in any way. The eye-piece used magnifies 148 times. The instrument has two circles 2 feet in diameter, graduated to every 5 minutes of arc, and these graduations are still further sub-divided by the micrometer microscopes, which are readily read to the tenth of a second of arc. There are two setting circles one on each side of the tube, graduated to 20 minutes of arc, and further divided by the vernier.

'Counterpoises on each pier take off the greater weight on friction wheels from the bearings, leaving very little resistance on moving in declination. A sliding reflector in the instrument regulates the illumination of the field of wires from a lamp at the end of the axis. A set of seven vertical wires and a horizontal one is provided; the equatorial intervals being about 5 seconds of time apart; and these wires are from the cocoon of one of the silk worms readily got in the gardens here. These cocoons have small sticks attached to the outer surface. We find the fibres of silk are stronger than the spider lines, and they last longer, the only drawback being their varying thickness, but this is not so marked as to cause them to be rejected.

'The instrument has a collimating telescope outside the building to the north, and reading by this (with the micrometer moving the wires) in its field, through holes in the transit circle and again through a 40-foot lens on the southern wall to a silver plate with vertical and horizontal crosses on its face. This plate is on a pier on the same level as the northern collimating telescope. We adjust the moving wires of the collimating telescope on this mark, and then take readings with the transit circle telescope on both, the mean of the adjusted wires on the northern collimator and on the southern mark gives the collimation of the transit circle, which deducting ″·010 for aberration is the final setting of the R. A. micrometer.

'Level readings are by reflection of the wires in a mercury trough on Pritchett's principle, viz., a shallow copper trough 6 inches square with an amalgamated surface containing only about 1/16 inch of mercury. This is placed in a recess below the instrument on the solid stone which carries the piers. The instrument is protected in every way from any vibrations of the building or floors, being on a separate pier extending from the bed-rock below the foundation. The observer mounted on the remover reads through a Bohnenberger eye-piece the wires covering their reflections by moving the micrometer, and the mean of these (10) readings are subtracted from the collimation, a smaller reading giving a +, a greater — sign, and expressed in the equivalent of the micrometer screw.

'Azimuth is determined by the stars by observing upper and lower transits of slow-moving circumpolar stars, and we find the instrument so extremely steady that any variation of over a fraction of a second of arc is practically not existant.

'The sidereal clock is by Frodsham, of London, and has at present a small wheel on the pendulum rod, which as it swings to the vertical presses a delicate spring into contact and marks on the chronograph for each second, omitting the 60th, thus only recording 59 beats to the minute and one break.

'A cylinder chronograph is used for observations and by diversion of current these contacts go to a tape chronograph; this is generally used with longitude. On this tape can be recorded with two pens, and can vary the beats of the clock to each pen, and the same with any signals received from longitude stations.

'The transit observations are recorded on the same chronograph as the clock by a flexible connecting wire and handle held by the observer, who presses a small spring with his thumb to make the necessary contacts recording the bisection of the star.

'The electricity is generated in four Edison-Laclande large cells, and the life of the battery is long.

'The seven wires observed are entered in the transit book and a mean taken for the central wire. This is corrected for the inequality of the divisions of the wires from the central wire, and then level and azimuth are applied, collimation being non-existing as already explained. Then follows the usual mode for arriving at the errors of the true and observed transits. The mean of these results gives the clock error at the mean time of transits. Correction for rate is applied to each star.

'The value of the wires determined from many observations of slow-moving southern stars is here given.

	s.		
Wire 1	15·156 from central wire		s.
2	10·176	}	+ 30·486
3	5·154		
4	0·000		
5	5·247		s.
6	10·207	}	− 30·861
7	15·407		
			s.
		Difference −	·375
		−	·054

BRISBANE OBSERVATORY.

The services of the observatory are essentially for time purposes. The transit is by Troughton and Simms, 1883, and is mounted on a stone pillar. The objective is of 2½ inches clear aperture and 30 inches focal length. The reversing is done by hand. The reticule has seven threads, the five central threads at equatorial intervals of about six seconds. The pivots are cylindrical and there is no inequality of pivots.

On the striding level provided, fifty-six divisions are equivalent to sixty seconds of arc.

The time-piece used for the longitude work, including personal equation, was a Kullberg sidereal chronometer, provided with a one-second electric break. The chronometer had a losing rate of about three-quarters of a second per day.

The transits and exchange of clock signals were recorded on a Morse register by embossing. The register has two styles, one always recording the clock and the other, the transit key or the time signals to or from Southport, when making exchange for difference of longitude. For the clock circuit three Leclanche cells were used, and the same number for the chronograph circuit. The telegraph line connecting Brisbane with Southport is fifty miles in length.

The following are the equatorial intervals, determined by means of the micrometer, one revolution of which = 70″·8, by Mr. T. D. Fraser.

Clamp West.

	s.
1	+23·95
2	+12·46
3	+6·12
4	+0·33
5	− 5·96
6	−12·55
7	−24·35

WELLINGTON OBSERVATORY.

The observatory was established in 1869 and is used for time service only. It is situated on the summit of the hill within the old cemetery, and overlooks the city, harbour and surrounding country. The building has two rooms, a clock-room and a transit-room.

Clocks.—In the former are three mean time clocks, and one sidereal—Dent No. 39720—having electrical attachment making contact or circuit every second except the 60th in order to identify the minute. The clocks are all mounted on brick and cement bases, and are fastened to substantial braced frames.

Transit.—The transit is by Troughton & Simms, and is mounted on a rather high stone pillar. It has an aperture of 2¾ inches, and a focal length of 32 inches. The reticule has seven threads at equal equatorial intervals of about 17 seconds of time. There is a sensitive striding level, and one oil lamp for illuminating the field. The single small setting circle reads to minutes and the reversing of the telescope is done directly by hand.

Meridian Mark.—The meridian mark, placed 35 years ago, which also serves for testing collimation in the day time, is a 3-inch iron bar set in cement, and shows well above the sky-line of the Tinakori range to the north.

Chronograph.—The chronograph is of the Morse pattern and records on a tape. It is provided with two styles, side by side. The one records, embossing by make circuit, the second-beats of the sidereal clock, while the other similarly records the signals by the transit key, also the clock or arbitrary signals received (from Doubtless Bay), when making a comparison of the clocks for the determination of the difference of longitude. The transit and arbitrary signals on the tape are readily interpolated, and expressed in time, from the embossed dots or records indicating the seconds of the local sidereal clock.

Electrical Apparatus.—Mr. J. K. Logan, Superintendent of Government Telegraphs, has furnished the following description and diagram (Fig. 6) of the arrangement especially installed at the Wellington observatory, for the differential longitude work with Doubtless Bay as this was the first time that an automatic exchange of clock signals had been made with the observatory.

The Wellington clock made contact (circuit) every second, while the chronometer at Doubtless Bay was arranged to 'break' circuit.

" Two British post office polarised relays, the coils of each of which were joined in parallel, giving a resistance of 150 ohms for each relay, were connected in multiple through three Leclanche cells to the terminals of the clock. One hundred and twenty Leclanche cells, with the copper earthed were joined to one of the local terminals of one of these relays and by adjustment, the tongue of this relay was made to bear against the stop connected to that terminal. The terminal connected with the tongue was then joined to the copper terminal of a Siemens relay of 500 ohms resistance. The line was connected to the Z (zinc) terminal of the Siemens relay through a switch arranged to disconnect it from the time recording instruments and connect it to the speaking (Morse) instruments when required.

The local terminals of the Second British P.O. polar relay were connected through 8 Leclanche cells to the terminals of the magnet coils of the back style of the chronograph. The local terminals of the Siemens' relay were connected through 8 Leclanche cells to the terminals of the magnet coils of the front style of the chronograph. At every make of the clock the tongue of the P.O. relay that was connected to the back style coils, made contact and caused the style to emboss, thus registering every clock beat. The other P.O. relay at every beat of the clock broke contact at its tongue, the line current was thus broken and a signal recorded at Doubtless Bay. As this line current passed through the Siemens' relay at the observatory, and while passing held the tongue of that relay open against the bias given to it, at every break of the current the tongue by reason of that bias, moved across and closed the local circuit, thereby recording marks on the front style.

When signals were to be received from Doubtless Bay, the observatory battery of 120 cells was cut off, battery being applied at the sending end.

At every break of the current at Doubtless Bay the Siemens' relay tongue moved to close the circuit and the breaks were recorded by the front style, marks being made at the same time by the observatory clock with the other style. Arbitraries were received from Doubtless Bay in the same way.

When arbitraries were being sent from the observatory it was arranged by means of a two-way switch, to cut off the clock from one P.O. relay, i.e., the one, the tongue of which was in the main line circuit. This relay was then worked by the closing of a key, the line current being broken at the tongue of the relay in the same way as when the clock was operating the relay. This break was recorded at Doubtless Bay and also on the front style at Wellington by the movement of the tongue of the Siemens' relay, at the same time the clock was recording on the back style.

It is desired to indicate that for received signals the tongue of the Siemens' relay had to move to close the circuit and the front style then to move to mark the tape. The signals of the observatory clock had to cause the P.O. relay tongue to move to close the circuit and the back style then to move to mark the tape. The record of the outgoing signals either from the clock or by arbitraries was got after the clock or the key had caused the P.O. polar relay tongue to break the circuit which in turn caused the Siemens' relay tongue to move to close the circuit of the front style and which style had then to move to impress the tape.

The line was 704 miles long, Wellington to Doubtless Bay, and was of 11½ copper throughout, 200 pounds to the mile."

No repeaters were used.

DESCRIPTION OF STATIONS.

Vancouver.

At Vancouver the permanent observatory built in 1900 for longitude work was occupied. It is situated on Brockton Point, immediately to the south of the lighthouse. The transit was mounted on a brick pier and a single wire connects the observatory with the city office, distant about 3 miles, of the Canadian Pacific Telegraph system. Every night at a given time, 10.30 p.m., the observatory was put in circuit with the line to Bamfield, the terminus of the Pacific Cable, for exchange of clock signals.

Fanning Island.

This island or the group of three islands, of which it is one, was discovered by Captain Edmund Fanning on June 11, 1798.* At the time of its discovery it was uninhabited, although 'a stone case, filled with ashes, fragments of human bones, stone, shell and bone tools, various ornaments, spear and arrow heads of bone and stone, &c.,' were found.

The island is a coral atoll, about 10 miles long and 5 wide. It is only about 10 feet above the level of the ocean. The lagoon is surrounded by a fringe a quarter to half a mile in width on which is the plantation of cocoa-nut trees, for the production of the commercial article known as copra, owned by Greig brothers.

The cable station is at the northwest part of the island at Whaler Anchorage, and the observatory with pier was erected near the cable station. (See Fig. 7.)

Suva, Fiji.

The Fiji group, comprising several hundred islands, is too well known to require any further description. The two larger islands, Viti Levu and Vanua Levu, are both mountainous and have extinct volcanoes. The red volcanic soil of Taviuni, reminding one of the soil of the Hawaiian islands, is very fertile. The sea surrounding the group is studded with coral reefs dangerous to navigation. The vegetation on the islands is tropical and luxuriant. Commercially the principal products are sugar, copra and green fruits. Among other products may be mentioned the vanilla bean and trepang or bêche de mer, the latter for the Chinese market. The natives at one time the most ferocious cannibals are now docile under British rule. Bounteous nature makes them indolent, since their vocation—fighting—is gone.

Two factors militate against the development of Fiji—one is, want of labour, and the other, the difficulty of acquisition of land,—all the land, save a small part, being

*'Voyages Round the World' by Edmund Fanning; London, O. Rich, 1834.

still held by the natives and in common, so that there is great difficulty in securing land for cultivation. Suva, on Viti Levu, is the official capital, and the residence of the governor of the South Sea Islands. No military is stationed here, but a native constabulary is maintained.

The observatory (Fig. 8) was built on the Pacific Cable premises (Figs. 9 and 10). The material used in construction was planed, tongued and grooved flooring throughout. The building is ten feet square, gable roofed, and has a three-inch opening around the eaves for circulation of air. This arrangement worked very well and prevented the instrument during the day-time becoming unduly heated. There were two shutters on each side of the roof, giving a clear opening of two feet.

The pier was built of concrete. A cubic yard of concrete was sunk in the earth and the pier proper, 22 inches by 27 inches, built to a height of 30 inches above the floor of the observatory. It was learned afterwards that the ground upon which the pier was built had been filled in something over a year before to a greater depth than the excavation for the pier. This may in a measure account for the movement of the pier, although part of this motion is undoubtedly attributable to the tides. That is, the daily loading (twice) of the ocean bottom near the shore by high tide would have the tendency to tilt the pier towards the sea, which effect would later be counteracted when low tide had set in. The pier is situated 17 feet west from the cable building (verandah), 42 feet north from the south limit of the cable lot, and 11 feet from the edge of the sea at high tide.

For the pendulum observations another similar pier but only 2 feet above the floor was built within an adjoining hut, 7 feet square, to the east. The south walls of the observatory and pendulum huts were in a straight line. The floors of the two buildings were 5 feet 8 inches above high tide, so that the pendulum bob was, say, 8 feet above high tide.

The tides at Suva harbour average between 3½ to 5 feet.

For the magnetic station it was not so easy to find ideal ground. The ground has to be within reasonable distance from the observatory, to carry the instrument and chronometer to and fro.

Corrugated iron has become a most important element in building operations of the most diverse kinds in the tropics. It is used for roofs, for fences, in place of weather boards, and for many other purposes. Especially in Australia does corrugated iron meet the eye at every turn.

After examining the vacant grounds in Suva, the embryo park to the south of the cable premises was chosen for a site for the magnetic station.

The local surveyor, Mr. G. Heimbrod, who laid down a meridian for erecting the pier and observatory, also made the connection between the astronomic and magnetic stations and gave the true azimuth of some reference points from the latter. The Honourable Geo. Moore, Commissioner of Public Works, kindly placed a tent at my disposal for shelter to the instruments while observing at the magnetic station.

Norfolk Island.

Historically this isolated island (about 9,000 acres) is best remembered as a British penal colony, and later (1856) as the new home of the Pitcairn islanders, the descendants of the mutineers (1789) of the ship *Bounty,* Captain Bligh. In former days the island was the chief centre of the large whale fishing industry of the South seas. This industry has, however, much declined. The best known product of the island is the Norfolk island pine (Araucaria excelsa). An avenue of these trees is a superb sight, but in the individual tree the branches are rather too far apart to give it a finished symmetry and beauty.

The cable lands at Anson bay at the northwestern part of the island, and the cable buildings are in close proximity to the precipitous cliffs of the shore. The observatory with pier was erected between the cable buildings and connected in distance and azimuth to a stone monument as shown on the accompanying diagram (Fig. 11).

Southport.

The observatory built here was erected 30 feet southerly from the brick pillar supporting the water tank near the south entrance to the offices of the cable building. The magnetic station was in the vacant field of the cable premises and 186 feet southward from the astronomic station (Fig. 12). The observatory was 10 feet square and built similar to the one at Suva already described. For foundation of the pier a cube of grouting was built in the earth, leaving its sides free from firm contact with the earth. The pier 22 inches by 27 inches itself was built of brick with an inch cap of concrete.

The alignment for the pier and observatory was obtained without the aid of instruments by low north and south stars and a plummet, sidereal time having been deduced from the noon mean time signal from the observatory at Brisbane.

At this station, connection was made with the observatories at Brisbane and Sydney; and for this purpose, the land line in the cable office was led to the observatory so that the clock and arbitrary signals during the nightly exchange with those observatories could be recorded on the chronograph.

The route line distance to Brisbane was 50 miles, and to Sydney, 773 miles. The conductor was of copper, weighing 200 lbs. to the mile. The line was cut through to Sydney direct during the exchange, that is, no relay was interposed between the terminal stations.

Doubtless Bay, N.Z.

At the foot of the deep bay of the above name the cable from Norfolk island lands on a sandy beach. Close to the cable station the pier and observatory were built (Fig. 13). The foundation of the brick pier was in compact sand, and hence very satisfactory. The building and pier were of the same dimensions as those of Southport and Suva.

A triangulation has been carried over the North island by the Survey Department of New Zealand. By instruction of the Surveyor General, Mr. J. W. A. Marchant, the district surveyor, Mr. V. J. Blake, made a connection of the triangulation system with the observatory, pendulum pier and magnetic station, as shown on the accompanying sketch (Fig. 14).

The country about the station is open and hilly. Much of the ground is covered with ti-tree scrub, and in the valleys the tree fern, cabbage tree and the kauri pine are found. Near the sea-coast on rocky exposures scattered pohutukawas, or Christmas trees, with their beautiful, large, red flowers and glossy leaves are seen. The English name of the tree was given because it flowers at that season.

The rocks observed were strongly impregnated with iron.

AUSTRALIAN LONGITUDES.

Former Values.

Australia.

The transit of Venus in 1874 gave an impetus to the determination of longitudes. Some of these longitudes were determined by means of the telegraphic submarine cables, while others were dependent upon absolute methods,—moon culminations and occultations.

To the latter belonged Sydney. Consequent to the German Venus expedition to the Auckland islands, Dr. A. Auwers recomputed the voluminous data (mostly from Mr. Tebbutt and Mr. Russell) on hand for the longitude of Sydney, through which he laid the fundamental meridian for Australia.

This gives the longitude of Sydney as $10^{h.}\ 04^{m.}\ 49^{s}\cdot 60$.*

* Astron. Nach. No. 2036.

In the joint report † of the government astronomers, Ellery, Todd and Russell we read: 'Some time prior to the transit of Venus, in December, 1882, we severally received communications from the President of the Royal Society, London, relative to the telegraphic determination of the longitude of Australian observatories, which involved, as a first step, the telegraphic determination of the difference of longitude between Port Darwin and Singapore . . . . . . Singapore being the initial point of these determinations, the actual longitude of Port Darwin and hence all Australian longitudes would depend on the accuracy of the assumed longitude of Singapore, which has twice been telegraphically determined—first, in 1871, by Dr. Oudemans, of Batavia, and Mr. Pogson, of Madras, and more recently, in 1882, by Commander Green, United States Hydrographic Department. For reasons given in the appendix, we agreed, after full consideration, to accept Commander Green's position of Flagstaff at Fort Canning, viz., $6^{h.}\ 55^{m.}\ 23^{s}\cdot50$. Reducing this to Captain Darwin's observing station $+1^{s}\cdot51$, makes the longitude of Captain Darwin's transit instrument $6^{h.}\ 55^{m.}\ 25^{s}\cdot01$. The difference of longitude, Port Darwin-Singapore, determined by Captain Darwin and Mr. Baracchi, is $1^{h.}\ 47^{m.}\ 57^{s}\cdot48$, making the longitude of Port Darwin $8^{h.}\ 43^{m.}\ 22^{s}\cdot49$ E. of Greenwich.'

The station at Port Darwin was marked by a masonry pillar 4 x 2 x 2 feet, upon which the transit stood, and is the origin of Australian longitudes.

By means of the telegraph lines Port Darwin, Adelaide, Melbourne and Sydney were connected in longitude, and similarly by cable Melbourne with Hobart, and Sydney with Wellington, New Zealand. It must be remembered that up to this time in most cases, when the cable was used for the exchange and comparison of clock signals, the small deflecting mirror, throwing a beam of light on a scale, indicated the arrival of the signal impulse. This visual manifestation had then to be recorded in time, either by the 'eye and ear' method or by tapping a key in circuit with a chronometer and chronograph. Comparison of chronometers over a cable by this means has not nor cannot have that accuracy obtained in more recent times by the exclusive use of the Thomson (Lord Kelvin) siphon recorder, to be described later. In the Bombay-Aden-Suez, 1877 longitude, the siphon was used.

In order to estimate the value of Australian longitudes it is necessary to examine the assumed position of Singapore upon which those longitudes rest.

Mr. P. Baracchi, who was the observer at Port Darwin, and is now Government Astronomer, at Melbourne, for Victoria, presented a paper on 'The most Probable Value and Error of Australian Longitudes' to the Australasian Association for the Advancement of Science, at the meeting in Brisbane in 1895.

Mr. Baracchi has expended much labour in compiling from so many sources the required data, and has put the results in such compact form, that I avail myself in reproducing the greater part of it here. He always gives the 'mean error' instead of the 'probable error' as is customary in our work. The former is readily converted to the latter by simply multiplying it by ·675.

He writes:—I shall therefore commence at the beginning, viz., the prime meridian. The values of intervals, as given in Appendix, Table 1, will be referred to by the letters respectively attached to them.

Longitude of Alexandria—Six different values—viz., (*a*), (*b*), (*c*), (*d*), (*e*) and $\frac{1}{2}(f+f_1)$—may be combined, giving three values for this longitude, two of which are quite independent.

(*a*) *Greenwich-Mokattam*.—This was determined by exchange of galvanic signals between Greenwich and Porthcurno; Porthcurno and Alexandria (by joining the five lengths of cable, Porthcurno, Vigo, Lisbon, Gibralter, Malta, Alexandria); and finally, between Alexandria and Mokattam. Time observations were made with transit instruments at Greenwich, Alexandria, and Mokattam, but those at Alexandria were not used for this interval. The observers were Mr. Criswick at Greenwich, Mr. Ellis

† Report of the Telegraphic Determination of Australian Longitudes—Melbourne, 1886.

at Porthcurno, Mr. S. Hunter at Alexandria, and Capt. C. Orde Brown, R.A., at Mokattam. Transits were recorded by eye and ear at these two latter places. All galvanic signals were sent by hand, and observed by eye and ear. The operations were executed in November, 1874, on the four nights, 14th, 15th, 21st and 22nd. The personal equation in observing transits between Mr. Criswick and Capt. Brown was determined before and after the longitude operations, and varied from 0·025 sec. to 0·655 sec.—(8) page 288.

(*b*) *Alexandria-Mokattam.*—(8) On the same four nights, November 14, 15, 21 and 22, Mr. Hunter, at Alexandria, made transit observations with a portable transit instrument, in addition to exchange of signals with Mokattam. His station, which was on the roof of the Hotel de l'Europe, does not seem to have offered the necessary stability for delicate work. Dr. Gill remarks of this station—(7) page 63—'The observer had to abstain from movement during each complete observation, otherwise the level was disturbed by the change of his position.' The personal equation of the two observers was determined after their return to England. At Alexandria the chronometer had to be carried to the telegraph office for exchange of signals, which was at a distance of about five minutes' walk.

(*c*) *Greenwich-Berlin.*—Result of several determinations—(9) page 490.

(*d*) *Berlin-Malta.*—Observers: At Malta, Dr. Löw, chief of the German expedition of the Transit of Venus, 1874, to Mauritius; at Berlin, the astronomers of the observatory, Drs. Becker, Auwers and Knorre. Dr. Löw made time observations with a portable transit instrument, recording by the eye and ear. Galvanic signals exchanged by hand on six nights in 1875, March 10, 11, 12, 13, 14 and 15. Personal equation well determined. Signals satisfactory—(9) page 360-393.

(*e*) *Malta-Alexandria.*—Observers: Dr. Löw at Malta, Dr. Gill at Alexandria, same station as Mr. Hunter's. Dr. Gill made his time determinations with an altazimuth. Operations repeated on the nights of March 10, 11, 12, 13 and 14 (1875). Personal equation of these observers well determined.

The chronometers had to be carried to the telegraph station for exchange of signals, as in the case of (*b*)—(9) page 306-320.

(*f*) *Berlin-Alexandria.*—Direct measurement made on February 28, March 6, 7, 10, 12, 13 and 14 (1875). Personal equations of the observers, known through Dr. Löw; the observers being Dr. Gill at Alexandria, and the astronomers of the observatory at Berlin. This value was deduced by Dr. Copeland. It is remarked in (9) that the signals were unsatisfactory, and the combination of the two intervals (*d*) and (*e*) was adopted in preference of the direct value—(9) page 320-348.

(f_1) *Berlin-Alexandria.*—Same operations as in (*f*). Value deduced by Dr. Auwers—(7) page 60.

The three values for the longitude of Alexandria are:—

	h.	m.	sec.
By the combination $(a)-(b)$	1	59	33·69
$(c)+(d)+(e)$	1	59	33·827
$(c)+\frac{1}{2}[(f)+(f_1)]$	1	59	33·750

The following values were adopted, viz.—

(9) Page 491—

By Dr. Copeland.... $1^{h.}\ 59^{m.}\ 33^{s}·807$

(7) Page 60— mean $1^{h.}\ 59^{m.}\ 33^{s}·846 \pm 0^{s}·078$ I. (Mean error.)

By Dr. Auwers.... $1^{h.}\ 59^{m.}\ 33^{s}·885$

(8) Page 330—

By British Transit of Venus Expedition. $1^{h.}\ 59^{m.}\ 33^{s}·69 \pm 0^{s}·156$ II.

The values I. and II. of the longitude of Alexandria are independent. Their difference is 0·156 seconds.

(*g*) *Alexandria-Suez.*—Observers: Dr. Löw at Suez, Dr. Gill at Alexandria. Instruments for time determination, same as already stated above. Galvanic signals exchanged on five nights, viz., 1875, February 19, 20, 23, 24 and 25. Signals sent by hand; observations made by eye and ear. At both stations the chronometers had to be carried for some distance to exchange signals. Result computed by Dr. Copeland—(9) page 492.

(g_1) *Alexandria-Suez.*—Same operations as in (g). Result deduced by Dr. Auwers—(7) page 60.

(h) *Mokattam-Suez.*—Observers: Mr. Hunter at Suez, Captain Brown at Mokattam. The instruments used by these observers have already been referred to in (a) and (b). The signals were sent by hand, and the observations made by eye and ear. Operations repeated on four nights, viz., 1874, December 4, 5, 7 and 14. The station used by Mr. Hunter was not the same as Dr. Löw's station. The former appears to have given trouble on account of its instability. It is remarked by Mr. Hunter—(8) page 333—'The only defect arose from the looseness of the soil, causing the level readings to vary a good deal.' The same complaint is also made by the officers of the Great Trigonometrical Survey of India, who used this station in 1877, viz., that their observations may be somewhat vitiated by the unsteadiness of their instruments, due to looseness of the soil—(12) page 45*a*.

(i.) Difference of longitude between Dr. Löw's and Mr. Hunter's stations at Suez.

This was determined by Dr. Gill by time observations made by himself with Dr. Löw's transit instrument mounted at one station, and with his altazimuth mounted at the other station, and by transportation of nine chronometers to and fro. The value thus found was 0·32 seconds—(9) page 262-266.

(i_1) The same interval as (i), determined by a traverse under the direction of Captain (now Colonel) Campbell, R.E.; its value was found to be 0·025 seconds—(9) page 491 and (11) Appendix to Part II., page 109. The discordance between the two above values is 0·295 seconds. This may be probably accounted for, or at least partly, by the length and complex character of Dr. Gill's operations, when compared with a simple traverse; and also by the circumstance remarked in (9) page 262, that 'these operations required seven and a-half hours of continuous observing, involving great fatigue.'

We have thus the two following independent values for the interval Alexandria-Suez, reduced to Hunter's station, by adopting value (i_1), viz.:—

	h.	m.	sec.	sec.
$\frac{1}{2}\{(g)+(g_1)\}+i_1$	0	10	39·025	± 0·082
$(b)+(h)$	0	10	39·481	± 0·160

which differ by 0·456$^{sec.}$

The value for Alexandria-Suez, deduced from the two above, weighted in terms of their respective mean error, is—

	h.	m.	sec.	sec.	
Interval Alexandria-Suez	0	10	39·120	± 0·073	. . . III.

(k) *Suez-Aden.*—Observers: Dr. Löw at Suez, Dr. Gill at Aden. Time observations at Aden were made with some difficulty; in fact, 'opportunities for observing were few and unsatisfactory'—(9) page 5. At Aden, the distance between the observing station and the telegraph office where signals were sent and received was nearly two miles. The operations were very limited, and the result depends on time observations of the single night of January 31, and on the exchange of galvanic signals on the two nights of January 30 and 31. This result was computed by Dr. Copeland—(9) pages 196-227.

(k_1) *Suez-Aden.*—Same operations as in (k). Result given by Dr. Auwers—(7) page 61.

(k_{11}) *Suez-Aden.*—Observers: Captain (now Colonel) Campbell, R.E., at Suez; Captain (now Colonel) Heaviside, R.E., at Aden. Station at Suez the same as Mr. Hunter's. Station at Aden, a few yards north of the cable offices at Telegraph Bay.

These officers aimed at the highest refinement possible, and had at their disposal the necessary equipment and conveniences wherewith to attain their purpose—(11), Part I., Chapter I. Their transit instruments were of similar dimensions and workmanship (5″ object glass, with collimators, and means of levelling by mercury reflection, &c.). They recorded observations by chronograph. Galvanic signals were always exchanged directly between the stations, being sent by hand, and simultaneously recorded on both chronographs. Their operations were repeated on the six nights of 1877, May 25, 26, 27, 28, 29, and 30, giving very accordant results. Their personal equation was determined on four nights in April, 1877; and although it was not redetermined after the expedition, no serious consequences may be feared on that account. The observers themselves are confident that it remained fairly constant—(11), Part I., page 34. On the other hand, if their usual mode of observing was liable to sudden changes of considerable magnitude (of which there is no evidence), a redetermination after the expedition would have given very little help in finding the actual changes that took place at Suez and Aden. The only disadvantage in this measurement is to be attributed to the unsteadiness of the station at Suez, as already pointed out in (*h*)—(11), Part II.

(*l*) Difference of longitude between Dr. Gill's and Captain Heaviside's station at Aden.

This was determined by a careful triangulation, made under the direction of Captain Heaviside—(11) App., Part II.

We have, then, for the interval Suez-Aden reduced to Mr. Hunter's station at Suez, and Captain Heaviside's at Aden—

	h.	m.	sec.	sec.
$\frac{1}{2}\{(k)+(k_1)\}-i_1-l$	0	49	42·839 ±	0·120
(k_{11})	0	49	42·662 ±	0·060

The difference between these two independent results is 0·177 sec. Combining them according to their mean errors, we have—

	h.	m.	sec.	sec.	
Suez-Aden	0	49	42·697 ±	0·054	IV.

The longitude of Aden, reduced to Captain Heaviside's longitude station, may now be derived by combining the several values shown in the foregoing, in the manner adopted by Dr. Gill—(7) pp. 60-62—omitting the value given for Alexandria-Mokattam, viz.:—

By the British Transit of Venus Expedition of 1874, and the officers of the G. T. S. of India.

	h.	m.	sec.	sec.
(a)	2	05	06·240 ±	0·098
(h)	0	05	06·931 ±	0·103
(k_{11})	0	49	42·662 ±	0·060
A	2	59	55·833 ±	0·154

By Lord Lindsay's Expedition of 1874, and Dr. Löw.

	h.	m.	sec.	sec.
I	1	59	33·846 ±	0·078
$\frac{1}{2}\{(g)+(g_1)\}$	0	10	39·000 ±	0·082
$\frac{1}{2}\{(k)+(k_1)\}$	0	49	43·742 ±	0·120
$(l$	—0	00	00·877 ±	0·
B	2	59	55·711 ±	0·165

	h.	m.	sec.	sec.
A	2	59	55·833 ±	0·154
B	2	59	55·711 ±	0·165
Longitude of Aden (Capt. Heaviside's sta.)	2	59	55·776 ±	0·113

Dr. Gill considered the mean errors of the two values A and B as equal, and adopted for the definitive longitude of Aden $\frac{1}{2}$ (A + B) (7) p. 62, viz.:—

Aden E. of Greenwich $2^{h.}$ $59^{m.}$ $55^{s}{\cdot}772 \pm 0{\cdot}079^{sec.}$ (should be $0{\cdot}076^{sec.}$?)

(*m*) *Aden-Bombay.*—Observer: Dr. Gill at Aden (Gill's station). The operations at Bombay were conducted under the direction of Mr. C. Chambers, Superintendent of the Colaba Observatory. Time at Bombay was determined by a transit instrument 5 feet focal length. Records made by chronograph. Time signals sent by hand, and observed by eye and ear at both stations. These operations took place in 1875, on 31st January, concurrently with the determination Suez-Aden by Drs. Gill and Löw; the time observations of this single night being all that could be secured at Aden. The personal equation between the observers not determined—(9) pages 182-195.

(m_1) *Aden-Bombay.*—Observers: Captain Campbell at Aden, and Captain Heaviside at Bombay. This measurement was made with the same instruments and methods described in (k_{11}). The station at Aden was the same as that occupied by Captain Heaviside in determining the interval (k_{11}). That at Bombay was $0{\cdot}134^{sec.}$ east of the Colaba Observatory transit instrument. The operations were repeated on nine nights in 1877—April 30, May 1, 2, 3, 4, 5, 7, 8, and 9—giving accordant results.

The two values (m) and (m_1) are quite independent. The former is based on observations and conditions not altogether satisfactory (as we have seen), with very limited time and great disadvantages, and involving the unknown element of the personal equation of the observers. The latter value (m_1) is the result of elaborate operations extending over a period of nine nights, and made under the best possible conditions; yet these two results differ only by $0{\cdot}03^{sec.}$

(*n*) *Bombay.*—Difference of longitude between Captain Heaviside's station and the transit instrument of the Colaba Observatory. This was determined by a traverse measured under the direction of Captain Heaviside (11).

(*o*) *Bombay-Madras.*—Observers: Captains Campbell and Heaviside. Station at Bombay the same as that used for the interval (m_1). That at Madras was 65 feet due north of the transit circle of the Madras Government Observatory. This interval, though not determined directly, is certainly as well ascertained as any other—(11), Part I.

Its value is deduced from the telegraphic measurement of the difference of longitude of nine Indian arcs joining the six stations—Bombay, Bolarum, Bellary, Mangalore, Vizagapatam, Madras; the most direct route being Bombay-Bellary-Madras. (See diagram in (11) Part I., page 16.) The operations were executed by these officers in 1875-76-77 through the land lines, using the same instruments as mentioned in (k_{11}). Time signals were exchanged automatically, and simultaneously recorded at the two stations. Every possible precaution was taken to guard against error, systematic or accidental, and the work generally was carried out with a completeness that leaves nothing to be desired. The result for this interval is shown in (11) Preface to, Part I., page (xviii.).

We are now enabled to deduce the longitude of Madras; but before doing so, I shall mention and consider another set of totally independent operations, which must be regarded as a powerful check upon all others hitherto discussed—viz., the determination of the longitude of Madras, via Ispahan-Kurrachee. Indeed, if it were not for the very limited and somewhat incomplete observations at Kurrachee, and the undetermined personal equation of the observers at Ispahan and Madras, this chain would be entitled to much greater weight than the one via Suez-Aden-Bombay, because it connects Madras with Greenwich in four steps including only five stations, three of which are fixed national observatories, in addition to having the interval Kurrachee-Madras measured twice independently. I regret that, with the exception of the operations at Madras and Kurrachee, the details of the observations are not at hand; the results given here being taken from General Addison's paper—(10) page 83, and (13) pages 47, 54, 81. The actually measured intervals are as follow:—

(p) *Berlin-Ispahan.*—Observers: The astronomers of the Berlin Observatory, at Berlin; and Dr. Fritsch, chief of German Transit of Venus Expedition in Persia (1874), at Ispahan. The operations were repeated on eight nights—viz., November 16, 17, 18, 19, 20, 21, 23 and 27.

(q) *Ispahan-Kurrachee.*—Observers: Dr. Fritsch at Ispahan, and General T. Addison, C.B., at Kurrachee. General Addison observed for time with a portable transit instrument, and recorded his observations as well as galvanic signals by chronograph. Signals were exchanged on December 11 and 12, 1874. Personal equation between the observers not determined—(10) page 83.

(r) *Kurrachee-Madras.*—General Addison at Kurrachee, and Mr. Norman Pogson, Government Astronomer, at Madras. Galvanic signals were exchanged on one night only—viz., December 13. The time at Kurrachee depends on the observation of three stars. Results given by General Addison—(10) page 83.

(r_1) *Kurrachee-Madras.*—Same operations as in (r); value deduced by Mr. Pogson—(13) pages 47, 54, 81.

(r_{11}) *Kurrachee-Madras.*—This interval was determined indirectly through Bombay and Bellary and other Indian arcs by Captains Campbell and Heaviside in their usual excellent manner, as already spoken of. The operations were executed in 1880-81.

(s) Difference of longitude between General Addison's and Captain Campbell's station. The position of the former was $0·6^{sec.}$ east of the station 'used in the Great Trigonometrical Survey at that place'—(10) page 84. The position of the latter is described in (11) Part I., page 252, as being 61 feet north. and 152 feet =1″ ·65= $0·11^{sec.}$ west of the 'Telegraph Office Station,' which is a point 'on the eastern terrace of the upper story of the block of dwelling quarters standing in the angle between Macleod road and Telegraph road, marked by a circle and dot engraved on the floor of the terrace, and connected with the Hill Stations A and Mutrani of the G. T. S.' It seems, therefore, that the 'Telegraph Office Station' is the one referred to by General Addison as being $0·6^{sec.}$ west of his observatory.

We may now compare the three values (r), (r_1), (r_{11}) of the interval Kurrachee-Madras, reducing them all to the Telegraph Office Station of the Great Trigonometrical Survey.

	sec.	h.	m.	sec.
(r)	+ 0·60 =	0	53	06·82
(r_1)	+ 0·60 =	0	53	06·45
(r_{11})	− 0·11 =	0	52	55·61

The two values (r) and (r_1) are derived from the same few and simple observations of a single night. Their difference is $0·37^{sec.}$ and has not been accounted for by the astronomers concerned. The value (r_{11}) is $11·21^{sec.}$ smaller than (r), and $10·84^{sec.}$ smaller than (r_1). This large error was pointed out in (6), page 31. No doubt some clerical mistake occurred somewhere, or the position of General Addison's station may be misunderstood; but to assume that this is a clerical error of ten seconds so as to make it a round number, as Mr. Pogson proposes—(13) page 81—seems arbitrary. It is strange that in all these years we have never heard an explanation of this matter.

The longitude of Madras is thus arrived at by two routes, as follows:—

Via Suez-Aden-Bombay.

	h.	m.	sec.	sec.
Longitude of Aden (Gill)	2	59	55·772 ±	0·113
Aden-Bombay (m_1)	1	51	19·973 ±	0·056
Bombay-Madras (o)	0	29	43·530 ±	0·058
Longitude of Madras, VI	5	20	59·275 ±	0·139

Via Ispahan-Kurrachee.

	h.	m.	sec.
(c).	0	53	34·865
(p).	2	33	05·44
(q).	1	01	13·09
$\frac{1}{2}\{(r) + (r_1)\}$.	0	53	06·035
Longitude of Madras.	5	20	59·430 . . VII.

It would appear from result VII. that the error at Kurrachee vanishes in the sum of the two intervals Ispahan-Kurrachee and Madras-Kurrachee; in which case the results VI. and VII. compare very well indeed, considering that the unknown personal equation (Fritsch-Pogson) is involved in VII. I think, however, that this latter value may not be used for any further purposes at present. It would be difficult to do proper justice to it, even if favourable assumptions were made, which is always a dangerous course.

(t) *Madras-Singapore.*—Observers: Dr. J. A. C. Oudemans, Surveyor-General of Java, at Singapore; Mr. Pogson, at Madras. This measurement was made in July, 1871, by the exchange of galvanic signals, through the cable, on the evenings of 24th, 25th, 26th and 28th. Mr. Pogson observed with the transit circle of the observatory and clock, but had to carry a mean time chronometer to the cable offices for exchange of signals at a distance of four miles. Dr. Oudemans made his time determinations on the 24th by observing zenith distances of two stars with a universal instrument. On the 25th and following dates the observations were made with a 'broken transit instrument'—viz., one of the form in which the eyepiece is at one end of the horizontal axis. He also had to carry his chronometer to the cable offices for exchange of signals at a distance of three-quarters of a mile. Observations at both stations were made by eye and ear, no chronographs being used. The personal equation of the observers was not determined—(13) page 11, and (15) page 69. The point to which Dr. Oudemans referred his longitude was the position of the flagstaff on Fort Canning in 1871—see (15) page 69, and (14) page 211.

This result was deduced by Dr. Oudemans—(14) page 214.

(t_1) *Madras-Singapore.*—Same operations as in (t). Result given by Mr. Pogson—(13) pages 11-24.

(t_{11}) *Madras-Singapore.*—This determination was made by Lieut. Commander C. M. Davis, U.S.N., at Madras, and Lieut. John A. Norris, U.S.N., at Singapore, in 1882; the operations being repeated on the five nights of January 20, 21, 23, 26, and 27. These officers made their time observations with the so-called 'broken transit instruments,' which offer the great advantage that the observer remains in the same position during observations of stars at all altitudes—a condition greatly favouring the constancy of personal equation. They exchanged galvanic signals directly from their huts, thus avoiding the danger of having their chronometer rates accidentally disturbed, and errors of comparison. They had chronographs upon which their observations were recorded, and their personal equation was continuously tested by 'absolute personal equation instruments,' each observer being provided with one. This equation, however, was not introduced in the results, on account of its being always very small, and probably no greater than its possible variations. Cable signals were observed by reflecting galvanometers. The observers were especially well trained for that class of work, having made together many longitude determinations in various parts of the world. Their plans were all prearranged and methodically carried out, and the excellence of their results is shown in the agreement of values deduced from each night's observations. The discrepancy between the values (t) and (t_{11}) is 0·71 seconds, and that between (t_1) and (t_{11}) is 0·51 seconds. The Australian astronomers, in their report—(6) page 31—adopted the value (t_{11}), which course, considering the circumstances surrounding the two determinations of this interval, was no doubt the best.

(u) *Singapore to Port Darwin.*—This interval was determined in 1883, the observers being Captain (now Major) L. Darwin, R.E., at Singapore, and myself at Port Darwin. Captain Darwin made his time observations with the transit instrument previously used by the British Expedition of the Transit of Venus in New Zealand in 1882, and I observed with an excellent portable transit instrument (3½ inches object glass). The observations were recorded by chronograph. Galvanic signals were exchanged directly between the stations, sent by hand, and observed by reflecting galvanometer at each receiving observatory. Our personal equation was determined before the undertaking at Melbourne, and experiments were made at Melbourne and Sydney to test our mode of observing and transmitting signals. Three different methods were used in exchanging signals, in accordance with a plan proposed by Captain Darwin, which was strictly adhered to throughout. This plan is described in (6) page 26. The operations were repeated on the nights of February 13, 14, 15, 22, 23, 25, and 26.

The two cable lengths Singapore-Banjoewangie and Banjoewangie to Port Darwin were joined; and the signals, though passing through a distance of over 2,000 miles, were satisfactory when the circuit was good. On some occasions they appeared unsteady; but the greater attention then required in observing them seemed to compensate for their inferior quality, as the individual results show.

(v) Difference of longitude between the flagstaff on Fort Canning (position of 1871) and Lieut. Norris' station at Singapore in 1882. This latter is the same as that occupied by Captain L. Darwin in 1883. This value is given in (15) page 68, and was determined by measurement by Lieut. Norris. The flagstaff was west of Lieut. Norris' station. My station at Port Darwin was on the ground of the Eastern Extension Telegraph Company, 56 feet N. 40·22° E. of the veranda post at the northeast corner of the cable officer's quarters. It was marked by a masonry pillar 4 x 2 x 2 feet, upon which the transit instrument stood. This point is now the origin of the Australian longitudes (6).

(w) *Singapore-Banjoewangie.*—Observers: Captain Darwin at Singapore, and Captain H. Helb of the general staff, Batavia, at Banjoewangie. Captain Helb made his time determinations by observing zenith distances with a portable universal instrument. Galvanic signals were exchanged on February 17, 18, 19, 21, and 23, 1883. The personal equation between the observers was not determined—(6) page 29.

(w_1) *Banjoewangie to Port Darwin.*—This interval was determined by Captain Helb and myself. Signals were exchanged on four nights—viz., January 28, February 1, 22, and 23, 1883. Personal equation between the observers not known.

These operations were arranged at the request of the Dutch Government in order to verify the longitudes of Batavia. We were glad to have Captain Helb's co-operation, as it was not certain whether the direct signals between Singapore and Australia would be good enough for the purpose, and also as a check to our work. Captain Helb shortly after sent all his observations in detail over to Melbourne, where they were found in every respect excellent.

The two values (w) and (w_1) offer a partly independent value of the interval Port Darwin to Singapore, although the Banjoewangie longitude itself remains affected by the unknown personal equation of H. D. and B. The difference between the direct value (u) and the indirect one (w) + (w_1) is as follows, viz.:—

	h.	m.	sec.	sec.
(*w*)............................	0	42	06·78 ±	0·076
(w_1)............................	1	05	50·84 ±	0·091
	1	47	57·62	
Personal equation (D.B.)............			·02	

	h.	m.	sec.	sec.	
Singapore to Port Darwin (indirect)..	1	47	57·60 ±	0·119	Difference
Singapore to Port Darwin (direct) (*u*)	1	47	57·48 ±	0·046	0·12$^{sec.}$

These combined in terms of their mean errors give:—
Singapore (Captain Darwin's station)—

	h.	m.	sec.	sec.	
Port Darwin........	1	47	57·49 ±	0·045	........VIII.

The longitude of Port Darwin may now be deduced, viz.:—

	h.	m.	sec.	sec.
Longitude of Madras (VI.)..........	5	20	59·275 ±	0·139
Madras to Singapore (t_{11})............	1	34	24·07 ±	0·040
(*v*)............			1·51 ±	
Singapore to Port Darwin (VIII.)......	1	47	57·49 ±	0·045
Longitude of Port Darwin (IX.)......	8	43	22·34 ±	0·152

(*x*) *Port Darwin to Adelaide.*—Observers: Mr. (now Sir Charles) Todd at Adelaide, and myself at Port Darwin. The observations at Adelaide were made with the transit instrument of the observatory. The exchange of galvanic signals here consisted in sending clock-beats to each other automatically (generally two sets of two minutes each), which were simultaneously recorded on the chronographs at the two stations, the chronograph of the receiving station recording at the same time the beats of its own clock. The personal equation between the observers was determined on several occasions through Mr. E. J. White, then Chief Assistant at the Melbourne Observatory, and directly in Melbourne. The operations were repeated on six nights—viz., February 14, 15, 22, 23, and 26, and March 2, 1883—(6) page 22.

(*y*) *Melbourne-Adelaide.*—The operations for this interval were carried out at the two observatories under the direction of their respective government astronomers, Mr. Ellery and Mr. Todd. The observations were made by the latter at Adelaide, and by Mr. E. J. White at Melbourne. Clock-beats (generally two sets of two minutes each) were exchanged, and simultaneously recorded on the chronograph of both stations, &c., as in the case of the interval (*x*), Port Darwin to Adelaide. Personal equation between Messrs. Todd and White was determined several times. Comparisons made on five nights—viz., February 15, 17, 23, 26, and March 2 (1883).

(x_1) *Port Darwin to Melbourne.*—Observers: Mr. E. J. White at Melbourne, and myself at Port Darwin. The operations were exactly similar to those described in the two preceding intervals. Time signals were exchanged on four nights—viz., February 15, 23, 26, and March 2 (1883), the individual results being very fairly accordant. The personal equation between the observers was determined before and after the expedition—(6) page 22.

The value (x_1) ought to be equivalent to the sum of (*x*) and (*y*).
We have, in fact—

	h.	m.	sec.	sec.
Adelaide to Port Darwin (*x*)..........	0	30	57·80 ±	0·041
Melbourne to Adelaide (*y*)............	0	25	33·84 ±	0·050
Melbourne to Port Darwin, indirect......	0	56	31·64	
Melbourne to Port Darwin (x_1), direct....	0	56	31·66 ±	0·044

(z) *Sydney-Melbourne.*—This interval was measured five times by direct connection of the observatories between the years 1861 and 1884. The operations consisted, as usual, in the automatic exchange of clock-beats, producing chronographic records at the two observatories, and in time determinations made with the transit circles of these institutions, the whole under the direction of the respective government astronomers. An indirect determination was made in 1868 through the longitude station at the western boundary of Victoria, of which more hereafter.

The last indirect measurement took place in 1887, through Mr. John Tebbutt, private observatory at Windsor, New South Wales. Mr. Tebbutt made his time determinations with a small transit instrument; sent his signals by hand from the local telegraph office, which is at a distance of (?) miles from his observatory, using a mean time chronometer, and observing the incoming signals by coincidence of beat. His operations were conducted with great care, and gave very satisfactory results.

The astronomers at Melbourne give great weight to the value of 1861, and to those of May and August, 1884. The mean of the five independent values is $24^{m.}$ $55{\cdot}408^{sec.}$ The mean of the last two is $24^{m.}$ $55{\cdot}395^{sec.}$, and that of 1861 is $24^{m.}$ $55{\cdot}38^{sec.}$ The value $24^{m.}$ $55{\cdot}40^{sec.}$ was adopted in (6) page 24 as the most probable. We may now conclude the longitudes of the three principal observatories east of Greenwich on the evidence of the telegraphic method alone, as follows, viz.:—

	h.	m.	sec. sec.
Longitude of Port Darwin, IX.	8	43	22·34 ± 0·152
Port Darwin to Adelaide Observatory (x). .	0	30	57·80 ± 0·041
Longitude of Adelaide Observatory, X. . . .	9	14	20·14 ± 0·157
Melbourne-Adelaide (y).	0	25	33·84 ± 0·050
Longitude of Melbourne Observatory.	9	39	53·98 ± 0·165
Longitude of Port Darwin, IX.	8	43	22·34 ± 0·152
Melbourne to Port Darwin (x_1).	0	56	31·65 ± 0·044
Longitude of Melbourne Observatory, XI. .	9	39	53·99 ± 0·158
Sydney-Melbourne (z).	0	24	55·40 ± 0·091
Longitude of Sydney Observatory, XII. . . .	10	04	49·39 ± 0·182

Probable amount of Uncertainty of the Australian Longitudes.

It remains now to be seen with what degree of confidence the given results may be taken.

The theoretical errors attached to the longitudes of Adelaide, Melbourne and Sydney, found above, are respectively $\pm 0{\cdot}157^{sec.}$, $\pm 0{\cdot}158^{sec.}$, and $\pm 0{\cdot}182^{sec.}$ It has already been stated that these errors represent only that part of the probable uncertainty due to the disagreement of separate results of the same measure derived from each night's work, when compared with their mean value. It would appear then that the really and purely accidental errors incurred in each single night of the period upon which a longitude result depends are fairly measured by the theoretical errors; or, if this measure is not quite satisfactory, is at least the best that can be obtained. But there may be involved systematic errors common to all the nights of that period, some of which are beyond the reach of investigation, and others that might possibly be discovered only by delicate and continued experiments in fixed institutions, but not in the temporarily arranged longitude observatories.

Altered personal equations at each new place of observation, instrumental changes, flexure, physical peculiarities of the localities, and many other known and unknown causes may bring in systematic errors not easily discovered. The theoretical error has no concern in these matters, and gives no help. It is when new instruments and new observers are employed in different years, so as to make the redeterminations entirely independent, that the existence of these systematic errors is revealed, if the results do not agree. But even then it is difficult, if not sometimes impossible, to locate them. There are, besides, inaccuracies the causes of which are traceable, such as unsteadiness of stations, imperfect adjustment of electric instruments, changeable strength of circuits, level imperfections, unfavourable conditions such as having to carry time pieces to a distance, and others; but their effect can only be made evident by new measurements.

Every determination of differential longitude, however short the interval may be, is weakened by at least some of the causes here enumerated.

Admitting consummate skill in the great majority of the observers concerned, we may then look at the conditions under which this long longitude chain, Greenwich-Australia was developed, in order to see where its deficiency in strength is more especially to be feared.

There appears to be at first a natural division at Aden. The three intervals on the western portion were all measured twice, the results giving, as we have seen, the following discordances:—

	sec.
Greenwich-Alexandria.	0·156
Alexandria-Suez.	0·456
Suez-Aden.	0 177

Indeed, remembering the circumstances, these differences seem very small. Yet, although the aggregate error in the Aden longitude may not be more than one-fifth of their sum, it would not be unreasonable to suspect that it may amount to half a second of time or even more, for the unsteadiness of the stations at Alexandria and Suez and the great variations in the personal equation of the observer at Mokattam are serious matters.

The operations east of Aden all along to Australia were decidedly made under better conditions and with more complete equipments, and, unlike the others (which were only chiefly made for the purposes of the observations of the Transit of Venus), they were intended for the establishment of fundamental longitudes.

The portion from Aden to Madras depends on the elaborate and refined operations of the officers of the Great Trigonometrical Survey of India, of which the interval Aden-Bombay, with its two independent and extremely accordant values, obtained under such uneven share of advantages, offers a remarkable instance of how a good result is sometimes found where we might be justified by the nature of the case in giving it but little weight.

From Bombay to Madras the telegraphic results, though in every respect highly trustworthy, are not corroborated by any other entirely independent telegraphic determination. It appears also that the geodetic value of this interval, derived from the principal triangulation, is $12''\cdot29 = 0\cdot819^{\text{sec.}}$ in excess of the telegraphic value, the difference being partly attributed to local attractions—(11) Preface, page xviii.

Up to this point we have another test for the whole of the operations in the longitude chain via Berlin-Ispahan-Kurrachee, and but for the doubts attached to the Kurrachee station this test would be invaluable.

We have now the determinations Madras-Singapore of 1871 and 1882. It is not unfair to assume the superiority of the latter value. The chief weakness of the earlier one arises, perhaps, in the carriage of the chronometers to considerable distances for the exchange of signals, and in the unknown personal equation of the observers. There is a difference of more than half a second of time between the two results, and it is not quite certain, though most probable, that the whole of this error is attributable to the observations of Dr. Oudemans and Mr. Pogson. The interval Singapore to Port Darwin depends solely on one set of operations—viz., those of 1883. I can only say that the observers felt satisfied about the quality of their work; but still the receiving of galvanic signals by observing the sudden motion of a beam of light not always regular or well defined, involves greater uncertainty than transit observations, and may be subject to comparatively large variations in its amount. The result is partly checked by the two separate intervals formed by the intervention of Banjoewangie, but is not corroborated by entirely independent operations. The difference between the direct and indirect result is $0 \cdot 12^{sec.}$

There remain now the Australian operations. In the two intervals Port Darwin to Adelaide and Port Darwin to Melbourne, the unknown error of the results rests almost entirely on the time determinations at Port Darwin, as the exchange of signals was entirely automatic, and transit observations at the fixed observatories involve very little uncertainty.

The various measurements of the interval Sydney-Melbourne, as we have repeatedly observed in these pages, range from $24^{m.}\ 55 \cdot 10^{sec.}$ to $24^{m.}\ 55 \cdot 81^{sec.}$, which may give reason to suspect some unknown disturbing cause interfering with this kind of work. Fortunately, fresh determinations may be frequently repeated without inconvenience, and I believe it is the intention of the government astronomers of these colonies to make arrangements for that purpose.

We have, finally, the boundary longitudes.

Here an error of more than half a second of time was disposed of in what was thought the only possible way under the circumstances; but it does not by any means clear the doubts attached to the discrepancies produced by the operations of 1868.

These are the principal facts upon which an opinion is to be formed as to the amount of uncertainty inherent to the adopted results.

I think that the longitudes of the Australian observatories may be accepted as true only within one second of time.

Possible Improvements of the Adopted Values.

No doubt, even with the present means of astronomical science, the Australian longitudes could be strengthened by a new determination of the longitude of Aden, as recommended by Dr. Gill, and of the interval Ispahan-Kurrachee. The importance of these operations could not be overrated, and it is to be hoped that they will be undertaken at the first opportunity.

Appendix—Table I.

Reference Letter.	Difference of Longitude. h.	m.	sec.	Computed Mean Error. sec.	Description of Interval for which the Difference of Longitude is given.
(a)	2	05	06·240	± 0·098	Greenwich-Mokattam (Cairo).
(b)	0	05	32·550	± 0·122	Alexandria (Hunter's station) to Mokattam.
(c)	0	53	34·865	....	Greenwich-Berlin (Transit Circle).
(d)	0	04	28·316	± 0·058	Berlin-Malta.
(e)	1	01	30·646	± 0·030	Malta-Alexandria.
(f)	1	05	58·750	± 0·078	Berlin-Alexandria. Dr. Copeland's value.
(f_1)	1	05	59·020	± 0·078	Berlin-Alexandria. Dr. Auwers' value.
(g)	0	10	38·923	± 0·082	Alexandria (Hunter's station) to Suez (Löw's station). Dr. Copeland's value.
(g_1)	0	10	39·078	± 0·082	Alexandria (Hunter's station) to Suez (Löw's station). Dr. Auwers' value.
(h)	0	05	06·931	± 0·103	Mokattam-Suez (Hunter's station).
(i)	0	00	00·320	....	Suez (Hunter's station, east of Löw's station) to Dr. Gill's determination.
(i_1)	0	00	00·025	. . ..	Suez (Hunter's station, east of Löw's station) to Captain Campbell's traverse mesaurement.
(k)	0	49	43·750	± 0·120	Suez (Löw's station) to Aden (Gill's station). Dr. Copeland's value.
(k_1)	0	49	43·733	± 0·120	Suez (Löw's station) to Aden (Gill's station). Dr. Auwers' value.
(k_{11})	0	49	42·662	± 0·060	Suez (Hunter's station) to Aden (Heaviside's station).
(l)	0	00	00·877	± 0·	Aden (Gill's station, east of Heaviside's station).
(m)	1	51	18·940	± 0·	Aden (Gill's station) to Bombay (Chamber's station, Colaba Observatory).
(m_1)	1	51	19·973	± 0·056	Aden (Heaviside's station) to Bombay (Heaviside's station).
(n)	0	00	00·134	.. ..	Bombay to Captain Heaviside's station (east of the Colaba Observatory Transit Instrument or Chamber's station).
(o)	0	29	43·530	± 0·058	Bombay (Heaviside's station) to Madras (Observatory Transit Circle).
(p)	2	33	05·440	±	Berlin-Ispahan.
(q)	1	01	13·090	±	Ispahan-Kurrachee (Addison's station).
(r)	0	53	06·220	±	Kurrachee-Madras (Addison and Pogson). General Addison's value.
(r_1)	0	53	05·850	±	Kurrachee-Madras (Addison and Pogson). Mr. Pogson's value.
(r_{11})	0	52	55·720	±	Kurrachee (Captain Campbell's station) to Madras Observatory. Determination by the officers of the G.T.S.
(s)	0	00	00·710	±	Kurrachee (Campbell's longitude station, west of Addison's station).
(t)	1	34	23·365	±	Madras (Observatory) to Singapore (flag staff on Fort Canning, 1871). Prof. Oudemans' value.
(t_1)	1	34	23·560	±	Madras (Observatory) to Singapore (flag staff on Fort Canning, 1871). Mr. Pogson's value.
(t_{11})	1	34	24·070	± 0·040	Madras (Observatory) to Singapore (Lieut. Norris' station).
(u)	1	47	57.480	± 0·046	Singapore (Lieut. Norris' and Captain Darwin's station) to Port Darwin (Baracchi's station).
(v)	0	00	01·510	....	(Lieut. Norris' station is the same as Captain Darwin's station). (Darwin's station, east of flag staff on Fort Canning, 1871).
(w)	0	42	06·780	± 0·076	Singapore (Darwin's station) to Banjoewangie (Capt. Helb's).
(w_1)	1	05	50·840	± 0·091	Banjoewangie (Helb's station) to Port Darwin (Baracchi's station).
(x)	0	30	57·800	± 0·041	Port Darwin (Baracchi's station) to Adelaide (Observatory).
(y)	0	25	33·840	± 0·050	Melbourne (Observatory) to Adelaide (Observatory).
(x_1)	0	56	31·660	± 0·044	Port Darwin (Baracchi's station) to Melbourne (Observatory).
(z)	0	24	55·400	± 0·091	Sydney (Observatory) to Melbourne (Observatory).

II.—List of Works Consulted.

(1) Report on the Determination of Differences of Longitude in the West Indies and Central America. By Lieut.-Commander F. M. Green, U.S.N.

(2) Smithsonian Contributions to Knowledge, No. 223, vol. 16.

(3) Astronomische Nachrichten, No. 2636.

(4) United States Coast Survey Report. App. 18.

(5) Royal Astronomical Society, vol. 51.

(6) Report on the Telegraphic Determination of Australian Longitudes, via Singapore, Banjoewangie, and Port Darwin.

(7) Annals of the Cape Observatory, vol. i., Part II. (Dr. Gill.)

(8) Account of Observations of the Transit of Venus of 1874. (Edited by Sir George Airy.)

(9) Dunecht Observatory Publications, vol iii. (By the Earl of Crawford and Balcarres.)

(10) Royal Astronomical Society, vol. 38. (General T. Addison, C.B.)

(11) Account of the Operations of the Great Trigonometrical Survey of India, vol. ix. (General J. T. Walker, C.B., R.E., F.R.S., &c.)

(12) Report of the Great Trigonometrical Survey of India for 1876-77.

(13) Telegraphic Determinations of the Difference of Longitude between Karachi, &c., and the Government Observatory, Madras. (By Norman Pogson, C.I.E., F.R.A.S., &c., Government Astronomer.)

(14) Astronomische Nachrichten, No. 2486. (Prof. J. A. C. Oudemans.)

(15) Telegraphic Determination of Longitudes in Japan, China, &c. (By Lieut. Commanders F. M. Green and C. H. Davis and Lieut. J. A. Norris, U.S.N.)

(16) Royal Astronomical Society, vol. xlviii. (By John Tebbutt, F.R.A.S., &c.)

(17) Report on the Determination of the Boundary Line of Colonies of South Australia and New South Wales. (By Charles Todd, F.R.A.S., Observer and Superintendent of Telegraphs, South Australia, 14th December, 1868.)

Since Mr. Baracchi compiled the preceding, a fresh determination, Greenwich-Madras via Potsdam, has been made (1894-96) by Capt. Burrard and Capt. Conyngham, and still later (1903) a re-determination of Greenwich-Potsdam, whereby the preceding suffers a small correction so as to bring Capt. Burrard's value for Potsdam in accord with that of Professor Albrecht. From the recently published details of Professors Albrecht and Wanach's work, it would appear that we now have a practically absolute value for the difference of longitude Greenwich-Potsdam, and hence Berlin, that will not suffer material correction.

The meridian of Madras is the one of reference for the Great Trigonometrical Survey of India, and on its position the one of Singapore rests.

For over a century observations have been taken, from time to time to determine the longitude of Madras. In 1891 the survey of India had not adopted the then best value, so that at the International Geographic Congress held at Berne in that year the question arose, why the known error in longitude of 2′ 30″ was not corrected on the Indian maps and charts. This gave rise to a discussion in India and the whole longitude work was reviewed, with the result that a determination *de novo* was decided upon, carrying the work directly from Greenwich via Potsdam, Teheran, Bushire and Karachi, where connection was made with the three arcs of the Great Trigonometrical Survey between Karachi and Madras. This is the work referred to above and carried out in 1894-96.

In Volume xvii., Appendix No. 2—Great Trigonometrical Survey of India, 1901, Major S. G. Burrard, R.E., tabulates the various independent values of Madras into Series A, B, C, D and E.

Series A leads via Pulkowa to Vladivostock, with thirteen links, carried out by the Russian general staff, and thence by officers of the U. S. navy via Shanghai, Hong Kong, St. James, Singapore to Madras.

Series B was obtained in connection with the German Transit of Venus expeditions of 1874 and 1882, but owing to some serious error at Karachi, its value is rejected.

Series C gives the results of the most recent (1894-96) determination and the details are given in Capt. Burrard's report. The value for Madras of this series, corrected for Dr. Albrecht's value of Potsdam will be used for deducing Singapore. The difference between this new value for Singapore and the one adopted in the Singapore-

Port Darwin determination will be applied to the present value of Sydney, Brisbane, and Wellington for comparison with the Canadian longitudes brought across the Pacific.

Series D.—This leads via Berlin, Malta, Alexandria, Suez, Aden, Bombay and Bellary to Madras.

Mr. (now Sir) David Gill, who was one of the observers on this series, writes in volume I. of the Annals of the Cape Observatory: 'In the case of Lord Lindsay's Expedition (i.e. of Series D.) the observations lay no claim to high refinement. They were made throughout in the open air, with small portable instruments, which in the case of Alexandria were placed on the roof of a hotel, where the observer had to abstain from movement during each complete observation, otherwise the level was disturbed by the change of his position. At Aden and Alexandria the chronometers had to be carried a long distance between the observing station and the telegraph office. The observers were without personal assistance and the crucial observations for time had often to be made under conditions of extreme fatigue, amounting on one or two occasions nearly to exhaustion on the part of the observer engaged. In fact the character of the work was only such as it was possible to organize and execute en route, and the results fully realised the accuracy expected from them.'

Series E. This leads from Greenwich to Mokattam (Cairo) and thence to Suez and Madras as in Series D.

This series, too, Sir David Gill considers wanting in that refinement essential for fundamental longitudes.

The result of the five series of operations, Capt. Burrard tabulates as follows:—

	Longitude of Madras.			Probable Error.
	h.	m.	sec.	sec.
Series A.	5	20	59·750	±·155
B.			59·010	±·163
C.			59·137	±·022
D.			59·233	±·127
E.			59·421	±·123

On the first link Greenwich-Potsdam of Series C, there is a check by another determination.

The adopted value of Berlin, as given in the Berliner Jahrbuch, up to 1903 is $0^{h.}\ 53^{m.}\ 34{\cdot}910^{sec.}$

Berlin-Potsdam, $1^{m.}\ 18{\cdot}721^{sec.}$, Astron. Geod. Arbeiten in 1891. Longitude Potsdam, $0^{h.}\ 52^{m.}\ 16{\cdot}189^{sec.}$ By Series C, $0^{h.}\ 52^{m.}\ 15{\cdot}953^{sec.}$, Vol. xvii. p. 208 G. T. S. India. Or $\cdot 234^{sec.}$ less than the German value.

The value of Potsdam of Series C. $0^{h.}\ 52^{m.}\ 15{\cdot}953^{sec.}$ is the mean of the two values $0^{h.}\ 52^{m.}\ 15{\cdot}623^{sec.}$ and $0^{h.}\ 52^{m.}\ 16{\cdot}283^{sec.}$, obtained by exchange of stations by the observers Capt. Burrard and Capt. Conyngham. This gives a difference of $\cdot 660^{sec.}$ between the two results, and the personal equation is half, or $\cdot 330^{sec.}$, a quantity larger than had been obtained by direct observation therefor both at Greenwich and in India.

In 1903 a re-determination of Greenwich-Potsdam was carried out by Dr. Albrecht and Mr. Wanach. Stations were exchanged and the observations made with a Repsold registering micrometer. The whole work was carried out with so high a degree of refinement, that it is not probable that the work will ever require revision or repetition.

From the above 1903 determination, we have Potsdam $0^{h.}\ 52^{m.}\ 16{\cdot}051^{sec.} \pm \cdot 003^{sec.}$ p.e.* or $\cdot 098^{sec.}$ more than that of series C, and $\cdot 138^{sec.}$ less than the former German value.

New Zealand.

In volume 35 of the Transactions of the New Zealand Institute, Mr. T. King, observer at Wellington, gives a full account of the various determinations made for

* P. 77. No. 15 Veröffentlichung des K. Preussischen Geodätischen Instituts.

the longitude of a prime meridian for New Zealand. This meridian, passing through the former Mount Cook observatory, is the one to which the surveys of New Zealand are referred. It may be remarked that the observatory was not on or near the well-known Mount Cook of the South or Middle island, but in Wellington on a site now occupied by prison buildings.

The longitude hitherto adopted for that meridian is $11^{h.}\ 39^{m.}\ 09 \cdot 92^{sec.}$, derived from moon culminations, 1869-71. In 1876 a telegraphic difference of longitude was obtained between Sydney and Wellington by Messrs. Russell and Stock. However, as the accurate longitude of Sydney was at that time in doubt, no definitive meridian for New Zealand resulted from the 1876 work.

In 1883, as already noted, Sydney was connected with Greenwich by a chain of telegraphically connected stations entering Australia at Port Darwin, and the resulting longitude was $10^{h.}\ 04^{m.}\ 49 \cdot 54^{sec.}$†

In the same year Messrs. Russell and Adams connected Sydney with Wellington (Mount Cook station), obtaining a difference of longitude $1^{h.}\ 34^{m.}\ 16 \cdot 983^{sec.} \pm \cdot 020^{sec.}$ (A very full and interesting account of this good work is given by Mr. C. W. Adams in the report on the surveys of New Zealand for the years 1883-84.)

This gave for the longitude of Mount Cook Initial Station, $11^{h.}\ 39^{m.}\ 06 \cdot 52^{sec.}$

This value is less than the hitherto accepted value by $3 \cdot 40^{sec.}$, or 51 seconds of arc.

By triangulation a connection has been made between the Mount Cook station and the present observatory, both in Wellington. The latter was found east of the former $1 \cdot 21^{sec.}$, so that the longitude of the present Wellington Observatory, is $11^{h.}\ 39^{m.}\ 05 \cdot 31^{sec.}$ east of Greenwich.

This value is based on:—

1883, Wellington-Sydney. Adams and Russell.
1883-84, Sydney-Melbourne-Port Darwin. Ellery, Todd, Russell, Baracchi.
1883, Port Darwin-Singapore. Baracchi, Capt. Darwin.

As Singapore is dependent upon Madras, whose longitude has already been discussed, all New Zealand longitudes, by accepting the last quoted longitude for Wellington, will be affected by any change in the value of Madras. Although the 1883 value for Mount Cook initial station was at the time considered definitive, yet its value has not for a period of twenty years thereafter, been introduced on the Admiralty Charts (except on No. 1423) nor on the maps of New Zealand. This was due to the great labour involved in changing the engraved plates.

Mr. T. King in his report,* writes: 'I understand, however, that the Surveyor General purposes taking advantage of an intended reissue of the Department maps to revise the longitudes on the basis of Mr. Russell's and Mr. Adams' determination.'

The change of longitude by the $3 \cdot 40^{sec.}$, will shift the topography relative to the meridians about three quarters of a mile to the west.

LATITUDE.

For the differential longitude determinations, the value for the latitude enters only for computation of the star factors, and was not required to be of such accuracy as in geodetic computations.

Vancouver.—The value used was that of former years, this station having been occupied at various times for longitudes in British Columbia:—

$$\phi = 49^\circ\ 17'\ 48''$$

Fanning Island.—Mr. Werry observed here 29 pairs of stars between the 19th April and 11th May, 1903, Talcott's method, and obtained the value:—

$$\phi = +3^\circ\ 54'\ 37'' \cdot 53 \pm '' \cdot 015$$

† Report on the Telegraphic Determination of Australian Longitudes.—Melbourne, 1886.
* Trans. New Zealand Institute Vol. 35, p. 446.

Suva, Fiji.—Between June 27 and July 27, 1903, Dr. Klotz obtained here 28 pairs of stars from which the latitude was found to be:—

$$\phi = -18° \ 08' \ 45''{\cdot}02 \pm {''}{\cdot}014.$$

Norfolk Island.—Mr. Werry observed here 28 pairs of stars between Sept. 17 and 23, 1903, and obtained the value:—

$$\phi = -29° \ 00' \ 28''{\cdot}91 \pm {''}{\cdot}014.$$

Southport, Queensland.—The transit instrument not being available for latitude work on account of the broken micrometer thread, several observations for latitude were taken by the method of observing pairs of stars at eastern and western elongation respectively, with a 6-inch transit theodolite, kindly loaned by Mr. A. A. Spowers, Chief Surveyor, Brisbane.

The mean value of three pairs was:—

$$\phi = -27° \ 58' \ 53''.$$

Brisbane.—The position of the observatory, where the observations were taken is (given in the Nautical Almanac):—

$$\phi = -27° \ 28' \ 00''{\cdot}0.$$

Sydney.—The position of the observatory, where the observations were taken is (given in the Nautical Almanac):—

$$\phi = -33° \ 51' \ 41''{\cdot}1.$$

Wellington.—The position of the observatory, where the observations were taken is:—

$$\phi = -41° \ 16' \ 47''{\cdot}1.$$

Doubtless Bay.—The observatory here was connected, through the courtesy of the Surveyor General, J. W. A. Marchant, by Mr. Vincent J. Blake, Government Surveyor, with Station 20 of the triangulation system, spread over the North Island.

The latitude of Station 20, based on initial Station Mt. Cook at Wellington, was furnished by the Surveyor General under date November 11, 1902, as—

$$\phi = -34° \ 58' \ 58''{\cdot}1$$

Applying it to Mr. Blake's survey we have:—

Station 20—A	−		22″·87
Station A	− 34°	59′	20″·97
Station A—Observatory	−		1″·07
Observatory	− 34°	59′	22″·04

The following is an abstract of the transit observations at the various stations:—

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 10th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer Correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·06	s.		h. m. s.	s.	s.
E	137	9 24 17·77	− ·80	+ ·35	+ ·23	− ·04	− ·10	17·41	9 23 22·31	− 55·10	·00
	419	29 14·01	− ·17	− ·03	+ ·04	− ·03	− ·02	13·80	28 18·79	·01	− ·09
	142	41 17·88	− ·13	− ·04	+ ·04	− ·02	− ·02	17·71	40 22·59	·12	+ ·02
	572	47 17·76	− ·08	− ·08	+ ·03	− ·01	− ·01	17·61	46 22·58	·03	− ·07
	423	56 02·42	− ·10	− ·06	+ ·03	·00	− ·02	02·27	55 07·11	·16	+ ·06
	145	10 02 59·87	− ·12	− ·05	+ ·03	·00	− ·02	59·71	10 02 04·56	·15	+ ·05
W	148	10 12 15·05	− ·24	− ·04	− ·04	+ ·01	− ·02	14·72	11 19·68	·04	− ·06
	149	17 30·65	− ·32	− ·02	− ·04	+ ·02	− ·02	30·27	16 35·16	·11	+ ·01
	426	23 14·10	− ·30	− ·02	− ·04	+ ·02	− ·02	13·74	22 18·56	·18	+ ·08
	150	27 51·35	− ·91	+ ·18	− ·14	+ ·03	− ·06	50·45	26 55·36	·09	− ·01
	431	41 25·80	− ·27	− ·03	− ·04	+ ·04	− ·02	25·48	40 30·37	·11	+ ·01
	432	45 06·99	− ·20	− ·06	− ·03	+ ·04	− ·02	06·63	44 11·55	·08	− ·02

$a = -{}^{s}\cdot094$ $c = +{}^{s}\cdot033$

Chronometer correction at $10^{h}\ 00^{m} = -55^{s}\cdot098 \pm {}^{s}\cdot012$

TRANSIT OBSERVATIONS.

Station : VANCOUVER. Date, April 15th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of cor. transit.	R. A.	Chronometer Correction.	r.
		h. m. s.	s.	s.	s.	s. r = + ·06	s.		h. m. s.	s.	s.
E	127.	8 41 38·51	+ ·03	+ ·04	+ ·03	− ·05	− ·02	38·54	8 40 51·22	− 47·32	− ·13
	129.	51 04·82	+ ·02	+ ·08	+ ·03	− ·04	− ·01	04·90	50 17 45	·45	·00
	132.	55 09·67	+ ·04	+ ·02	+ ·04	− ·04	− ·02	09·71	54 22·34	·37	− ·08
	133.	57 49·33	+ ·04	·00	+ ·04	− ·04	− ·02	49·35	57 02·01	·34	− ·11
	134.	9 10 08·04	+ ·02	+ ·08	+ ·03	− ·03	− ·01	08·13	9 09 20·62	·51	+ ·06
	136.	15 57·97	+ ·03	+ ·03	+ ·04	− ·02	− ·02	58·03	15 10·49	·54	+ ·09
	137.	24 09·32	+ ·15	− ·41	+ ·21	− ·01	− ·10	09·16	23 21·68	·48	+ ·03
W	142.	41 10·07	− ·08	+ ·05	− ·03	+ ·01	− ·02	10·00	40 22·50	·50	+ ·05
	423.	55 54·47	− ·06	+ ·07	− ·03	+ ·02	− ·02	54·45	55 07·05	·40	− ·05
	145.	10 02 52·00	− ·07	+ ·06	− ·03	+ ·03	− ·02	51·97	10 02 04·50	·47	+ ·02
	148.	12 07·15	− ·08	+ ·05	− ·03	+ ·04	− ·02	07·11	11 19·62	·49	+ ·04
	149.	17 22·68	− ·11	+ ·02	− ·04	+ ·04	− ·02	22·57	16 35·07	·50	+ ·05
	426.	23 06·11	− ·10	+ ·03	− ·04	+ ·05	− ·02	06·03	22 18·48	·55	+ ·10
	150.	27 43·10	− ·31	− ·21	− ·13	+ ·05	− ·06	42·44	26 55·04	·40	− ·05

$a = +^{s}\cdot 111$ $c = +^{s}\cdot 030$

Chronometer correction at $9^{h}\ 34^{m} = -47^{s}\cdot 453 \pm {}^{s}\cdot 014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of cor. transit.	R. A.	Chronometer Correction.	r.
W	433.	10 53 04·18	− ·35	− ·28	+ ·02	− ·03	− ·07	03·47	10 52 16·18	− 47·29	− ·02
	154.	58 34·84	− ·17	− ·06	+ ·01	− ·02	− ·04	34·56	57 47·14	·42	+ ·11
	434.	11 00 50·18	− ·06	+ ·08	+ ·01	− ·02	− ·02	50·17	11 00 02·82	·35	+ ·04
	155.	05 02·11	− ·11	+ ·01	+ ·01	− ·02	− ·02	01·98	04 14·82	·16	− ·15
	156.	09 46·42	− ·08	+ ·06	+ ·01	− ·01	− ·02	46·38	08 59·04	·34	+ ·03
E	160.	11 16 57·38	+ ·05	+ ·08	− ·01	− ·01	− ·01	57·48	16 10·16	·32	+ ·01
	162.	26 29·25	+ ·17	− ·12	− ·01	·00	− ·05	29·24	25 41·90	·34	+ ·03
	163.	41 45·14	+ ·09	·00	− ·01	+ ·02	− ·02	45·22	40 58·00	·22	− ·09
	164.	44 56·01	+ ·05	+ ·07	− ·01	+ ·02	− ·02	56·12	44 08·82	·30	− ·01
	166.	49 33·40	+ ·10	− ·02	− ·01	+ ·03	− ·03	33·47	48 46.15	·32	+ ·01
	167.	12 01 05·43	+ ·05	+ ·08	− ·01	+ ·04	− ·02	05·57	12 00 18·24	·33	+ ·02

$a = +^{s}\cdot 118$ $c = -^{s}\cdot 005$

Chronometer correction at $11^{h}\ 23^{m} = -47^{s}\cdot 309 \pm {}^{s}\cdot 016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of cor. transit.	R. A.	Chronometer Correction.	r.
						r = + 056					
E	177.	13 08 10·13	+ ·04	+ ·01	+ ·01	− ·04	− ·02	10·13	13 07 22·99	− 47·14	− ·04
	178.	20 50·75	+ ·06	− ·01	+ ·01	− ·03	− ·03	50·75	20 03·61	·14	− ·04
	452.	24 29·88	+ ·11	− ·09	+ ·02	− ·02	− ·05	29·85	23 42·68	·17	− ·01
	179.	30 34·50	+ ·02	+ ·02	+ ·01	− ·02	− ·01	34·52	29 47·32	·20	+ ·02
	180.	43 28·47	+ ·03	+ ·02	+ ·01	·00	− ·02	28·51	42 41·34	·17	− ·01
	182.	50 53·23	+ ·03	+ ·02	+ ·01	·00	− ·02	53·27	50 06·14	·13	− ·05
W	184.	14 02 35·68	− ·15	− ·02	− ·01	+ ·01	− ·03	35·48	14 01 48·27	·21	+ ·03
	458.	06 47·86	− ·07	+ ·01	− ·01	+ ·02	− ·02	47·79	06 00·68	·11	− ·07
	459.	10 04·29	− ·29	− ·07	− ·03	+ ·02	− ·07	03·85	09 16·72	·13	− ·05
	188.	13 31·22	− ·10	·00	− ·01	+ ·02	− ·02	31·11	12 43·96	·15	− ·03
	190.	22 43·31	− ·11	·00	− ·01	+ ·03	− ·02	43·20	21 55·88	·32	+ ·14
	192.	28 28·41	− ·07	+ ·01	− ·01	+ ·04	− ·02	28·36	27 41·10	·26	+ ·08

$a = +^{s}\cdot 029$ $c = +^{s}\cdot 007$

Chronometer correction at $13^{h}\ 48^{m} = -47^{s}\cdot 181 \pm {}^{s}\cdot 013$

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 16th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer Correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·07	s.		h. m. s.	s.	s.
E	150	10 27 41·11	− ·15	− ·26	+ ·12	− ·05	− ·06	40·71	10 26 54·98	−45·73	+ ·02
	431	41 16·02	− ·05	+ ·05	+ ·03	− ·03	− ·02	16·00	40 30·30	·70	− ·01
	432	44 57·12	− ·03	+ ·09	+ ·03	− ·03	− ·02	57·16	44 11·49	·67	− ·04
	152	48 40·90	− ·05	+ ·04	+ ·03	− ·02	− ·02	40·88	47 55 29	·59	− ·12
	434	11 00 48·61	− ·04	+ ·09	+ ·03	− ·01	− ·02	48·66	11 00 02 82	·84	+ ·13
	155	05 00·53	− ·06	+ ·02	+ ·04	00	− ·02	00·51	04 14·80	·71	·00
W	159	14 02·39	− ·21	+ ·04	− ·03	+ ·01	− ·02	02·18	13 16·48	·70	− ·01
	160	16 55·82	− ·14	+ ·09	− ·03	+ ·01	− ·01	55·74	16 10·15	·59	− ·12
	162	26 28·22	− ·39	− ·14	− ·08	+ ·02	− ·05	27·58	25 41·87	·71	·00
	438	32 46·85	− ·12	+ ·10	− ·03	+ ·03	− ·01	46·82	32 01·06	·76	+ ·05
	164	44 54·65	− ·13	+ ·08	− ·03	+ ·04	− ·02	54·59	44 08·81	·78	+ ·07

$a = +^{s}\cdot 138$ $c = +^{s}\cdot 028$

Chronometer correction at $11^{h}\ 8^{m} = -45^{s}\cdot 708 \pm {}^{s}\cdot 017$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer Correction.	v.
W	177	13 08 08·47	− ·01	+ ·06	+ ·06	− ·05	− ·02	08·51	13 07 23·00	−45·51	− ·05
	451	13 59 33	− ·01	+ ·03	+ ·07	− ·04	− ·02	59·36	13 13·84	·52	− ·04
	178	20 49·13	− ·01	− ·03	+ ·09	− ·03	− ·03	49·12	20 03·61	·51	− ·05
	452	24 28·44	− ·03	− ·20	+ ·17	− ·03	− ·05	28·30	23 42·67	·63	+ ·07
	454	31 15·59	− ·01	+ ·04	+ ·06	− ·02	− ·02	15·64	30 30·11	·53	− ·03
	180	43 26·84	− ·01	+ ·08	+ ·05	− ·01	− ·02	26·93	42 41·35	·58	+ ·02
E	182	50 51·68	+ ·08	+ ·08	− ·05	·00	− ·02	51·77	50 06·15	·62	+ ·06
	183	57 30·40	+ ·06	+ ·10	− ·05	+ ·01	− ·01	30·51	56 44·88	·63	+ ·07
	184	14 02 33·67	+ ·20	− ·09	− ·12	+ ·02	− ·03	33·65	14 01 48·27	·38	− ·18
	458	06 46·27	+ ·09	+ ·06	− ·06	+ ·02	− ·02	46·36	06 00·68	·68	+ ·12
	459	10 02·58	+ ·37	− ·32	− ·24	+ ·03	− ·07	02·35	09 16·73	·62	+ ·06
	188	13 29·43	+ ·13	+ ·01	− ·07	+ ·03	− ·02	29·51	12 43·97	·54	− ·02
	192	28 26·55	+ ·10	+ ·05	− ·06	+ ·05	− ·02	26·67	27 41·11	·56	·00

$a = +^{s}\cdot 139$ $c = -^{s}\cdot 050$

Chronometer correction at $13^{h}\ 48^{m} = -45^{s}\cdot 561 \pm {}^{s}\cdot 017$

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 18th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	r = + .03	s.		h. m. s.	s.	s.
E	141	9 36 43·36	+ ·05	+ ·08	− ·02	− ·02	− ·02	43·43	9 36 00·10	− 43·33	− ·07
	142	41 05·76	+ ·06	+ ·06	− ·03	− ·02	− ·02	05·81	40 22·46	·35	− ·05
	144	47 59·92	+ ·06	+ ·05	− ·03	·02	− ·02	59·96	47 16·59	·37	− ·03
	423	55 50·36	+ ·05	+ ·08	− ·02	− ·01	·02	50·44	55 07·01	·43	− ·03
	162	11 26 25·30	+ ·15	− ·13	− ·06	+ ·03	− ·05	25·24	11 25 41·81	·43	+ ·03
	438	32 44·37	− ·03	+ ·10	− ·02	+ ·03	− ·01	44·50	32 01·05	·45	+ ·05
W	152	10 48 38·72	− ·06	+ ·04	+ ·03	+ ·01	− ·02	38·72	10 47 55·28	·44	+ ·04
	433	52 59·83	− ·25	− ·30	+ ·08	+ ·01	− ·07	59·30	52 15·98	·32	− ·08
	153	56 45·30	− ·12	− ·06	+ ·05	+ ·02	− ·04	45·15	56 01·67	·48	+ ·08
	434	11 00 46·12	− ·04	+ ·08	+ ·02	+ ·02	− ·02	46·18	11 00 02·80	·38	− ·02
	155	04 58·16	− ·08	+ ·01	+ ·03	+ ·02	− ·02	58·12	04 14·78	·34	− ·06
	156	09 42·39	− ·05	+ ·06	+ ·02	+ ·02	− ·02	42·42	08 59·02	·40	·00
	159	13 59·90	− ·07	+ ·04	+ ·03	+ ·02	− ·02	59·90	13 16·46	·44	+ ·04

$a = +^{s}\cdot123 \qquad c = -^{s}\cdot024$

Chronometer correction at $10^{h}\ 24^{m} = -43^{s}\cdot402 \pm {}^{s}\cdot011$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
E	180	13 43 24·53	+ ·07	+ ·10	− ·04	− ·03	− ·02	24·61	13 42 41·36	− 43·25	− ·05
	182	50 49·31	+ ·08	+ ·10	− ·04	− ·02	− ·02	49·41	50 06·16	·25	− ·05
	183	57 28·11	+ ·06	+ ·13	− ·04	− ·02	− ·01	28·23	56 44·90	·33	+ ·03
	184	14 02 31·60	+ ·19	− ·11	− ·09	− ·01	− ·03	31·55	14 01 48·29	·26	− ·04
	458	06 43·84	+ ·08	+ ·08	− ·04	− ·01	− ·02	43·93	06 00·70	·23	− ·07
	459	10 00·45	+ ·35	− ·43	− ·18	− ·01	− ·07	00·11	09 16·75	·36	+ ·06
	188	13 27·19	+ ·12	+ ·01	− ·05	− ·01	− ·02	27·24	12 43·99	·25	− ·05
W	190	22 39·47	− ·11	− ·02	+ ·06	·00	− ·03	39·37	21 55·92	·45	+ ·15
	192	28 24·46	− ·07	+ ·07	+ ·04	·00	− ·02	24·48	27 41·13	·35	+ ·05
	197	42 06·22	− ·04	+ ·13	+ ·04	+ ·01	− ·01	06·35	41 22·97	·38	+ ·08
	198	51 45·59	− ·22	− ·28	+ ·14	+ ·01	− ·05	45·19	51 01·98	·21	− ·09
	199	59 02·92	− ·08	+ ·04	+ ·05	+ ·02	− ·02	02·93	58 19·62	·31	+ ·01
	465	15 01 02·69	− ·07	+ ·08	+ ·04	+ ·02	− ·02	02·74	15 00 19·46	·28	− ·02
	201	12 20·87	− ·08	+ ·06	+ ·04	+ ·03	− ·02	20·90	11 37·61	·29	− ·01

$a = +^{s}\cdot186 \qquad c = -^{s}\cdot036$

Chronometer correction at $14^{h}\ 28^{m} = -43^{s}\cdot302 \pm {}^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station : VANCOUVER. Date, April 21st, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·05	s.		h. m. s.	s.	s.
E	194	14 36 49·80	− ·01	+ ·09	+ ·05	− ·03	− ·02	49·88	14 36 12·30	− 37·58	− ·10
	197	42 00·55	·00	+ ·12	+ ·05	− ·02	− ·01	00·69	41 23·00	·69	+ ·01
	198	51 39·84	+ ·06	− ·24	+ ·17	− ·02	− ·05	39·76	51 02·03	·73	+ ·05
	199	58 57·14	+ ·04	+ ·03	+ ·06	− ·01	− ·02	57·24	58 19·66	·58	− ·10
	465	15 00 57·06	+ ·03	+ ·07	+ ·05	·00	− ·02	57·19	15 00 19·50	·69	+ ·01
W	201	12 15·31	+ ·02	+ ·05	− ·06	·00	− ·02	15·30	11 37·65	·65	− ·03
	203	21 33·31	+ ·12	− ·20	− ·15	+ ·01	− ·04	33·05	20 55·43	·62	− ·06
	206	28 06·44	+ ·07	+ ·03	− ·06	+ ·02	− ·02	06·48	27 28·79	·69	+ ·01
	209	31 14·60	+ ·06	+ ·07	− ·05	+ ·02	− ·02	14·68	30 36·95	·73	+ ·05
	210	36 23·23	+ ·08	+ ·04	− ·06	+ ·02	− ·02	23·29	35 45·59	·70	+ ·02
	211	39 19·86	+ ·08	+ ·07	− ·05	+ ·02	− ·02	19·96	38 42·26	·70	+ ·02
	213	42 22·43	+ ·07	+ ·09	− ·05	+ ·03	− ·02	22·55	41 44·78	·77	+ ·09

$a = +^{s}\cdot159$ $\quad c = +^{s}\cdot046$

Chronometer correction at $15^{h}\ 10^{m} = -37^{s}\cdot677 \pm^{s}\ 013$

TRANSIT OBSERVATIONS.

Station : VANCOUVER. Date, April 23rd, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·69	s.		h. m. s.	s.	s.
W	154.	10 58 21·94	− ·23	− ·08	+ ·06	− ·05	− ·04	21 60	10 57 46·92	−34·68	+ ·05
	155.	11 04 49·48	− ·15	+ ·02	+ ·04	− ·04	− ·02	49·33	11 04 14·70	·63	·00
	156.	09 33·63	− ·10	+ ·09	+ ·03	− ·03	− ·02	33·60	08 58·96	·64	+ ·01
	159.	13 51·11	− ·13	+ ·06	+ ·03	− ·02	− ·02	51·03	13 16 40	·63	·00
	160.	16 44·64	− ·08	+ ·12	+ .03	− ·02	− 02	44·67	16 10·09	·58	− ·05
E	162.	26 16·65	− 08	− ·18	− ·08	− ·01	− ·05	16·25	25 41·63	·62	− ·01
	438.	32 35·63	− ·02	+ ·13	− ·03	·00	− ·01	35·70	32 01·01	·69	+ ·06
	163.	41 32·52	− ·05	+ ·01	− ·04	+ 02	− 02	32·44	40 57·89	·55	− ·08
	164.	44 43·32	− ·03	+ ·10	− 03	+ ·02	− ·02	43·36	44 08·77	·59	− ·04
	166.	49 20·81	− ·05	− ·03	− ·04	+ ·03	− ·02	20·70	48 46·03	·67	+ ·04
	167.	12 00 52·81	− ·02	+ ·11	− ·03	+ ·05	− ·02	52·90	12 00 18·21	·69	+ ·06

$a = +^{s}\cdot172$ $c = -^{s}\cdot025$

Chronometer correction at $11^{h}\ 29^{m} = -34^{s}\cdot633 \pm {}^{s}\cdot011$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
E	177.	13 07 57·49	− ·07	+ ·07	+ ·03	− ·06	− ·02	57·44	13 07 23·00	− 34 44	− ·01
	178.	20 38·20	− ·12	− ·03	+ ·04	− ·03	− ·03	38·03	20 03·59	·44	− ·01
	452.	24 17·54	− ·22	− ·24	+ 08	− ·03	− ·05	17·08	23 42·61	·47	+ ·02
	454.	31 04·62	− ·09	+ ·04	+ ·03	− ·02	− ·02	04·56	30 30·12	·44	− ·01
	180.	43 15·84	− ·06	+ ·09	+ ·02	·00	− ·02	15·87	42 41·38	·49	+ ·04
W	182.	50 40·71	− 07	+ ·09	− ·02	+ ·01	− ·02	40·70	50 06·18	·52	+ ·05
	183.	57 19·33	− ·05	+ ·13	− ·02	+ ·02	− ·01	19·40	56 44·93	·47	+ ·02
	184.	14 02 23·03	− ·18	− ·11	− ·05	+ ·03	− ·03	22·69	14 01 48·30	·39	− ·06
	458.	06 35·17	− ·08	+ ·08	− ·03	+ ·03	− ·02	35·15	05 60·73	·42	− ·03
	459.	09 52·12	− ·34	− ·40	− ·11	+ ·04	− ·07	51·24	09 16·76	·48	+ ·03
	190.	22 30·53	− ·13	− ·02	− ·04	+ ·06	− ·03	30·37	21 55·95	·42	− ·03

$a = +^{s}\cdot173$ $c = +^{s}\cdot023$

Chronometer correction at $13^{h}\ 45^{m} = -34^{s}\cdot451 \pm {}^{s}\cdot008$

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 24th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·09	s.		h. m. s.	s.	s.
E	154.............	10 58 18·70	+ ·92	− ·05	− ·02	− ·09	− ·04	19·42	10 57 46·89	−32·53	+ ·06
	156.............	11 09 31·09	+ ·41	+ ·06	− ·01	− ·08	− ·02	31·45	11 08 58·95	·50	+ ·03
	159.............	13 48 45	+ ·50	+ ·04	− ·01	− ·07	− ·02	48·89	13 16·39	·50	+ ·03
	161.............	19 26·30	+ ·35	+ ·07	− ·01	− ·06	− ·02	26·63	18 54·06	·57	+ ·10
	166.............	49 17·66	+ ·75	− ·02	− ·02	− ·02	− ·03	18·32	48 46·01	·31	− ·16
W	170.............	12 15 30·85	+ ·22	+ ·08	+ ·01	+ ·02	− ·02	31·16	12 14 58·79	·37	− ·10
	442.............	21 38·30	+ ·44	+ ·02	+ ·01	+ ·03	− ·02	38·78	21 06·38	·40	− ·07
	171.............	29 55·07	+ ·94	− ·12	+ ·03	+ ·04	− ·04	55·92	29 23·43	·49	+ ·02
	172.............	37 18·99	+ ·22	+ ·08	+ ·01	+ ·06	− ·01	19·35	36 46·95	·40	− ·07
	174.............	51 17·49	+ ·24	+ ·08	+ ·01	+ ·07	− ·01	17·88	50 45·28	·60	+ ·13
	175.............	52 03·59	+ ·43	+ ·03	+ ·01	+ ·08	− ·02	04·12	51 31·62	·50	+ ·03
	451.............	13 13 45·76	+ ·45	+ ·02	+ ·01	+ ·10	− ·02	46·32	13 13 13·84	·48	+ ·01

$a = +^{s}\cdot110 \qquad c = -^{s}\cdot010$

Chronometer correction at $12^{h}\ 01^{m} = -32^{s}\cdot471 \pm {}^{s}\ 020$

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 25th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·09	s.		h. m. s.	s.	s.
E	184.............	14 02 19·94	− ·44	− ·08	− ·03	− ·05	− ·03	19·31	14 01 48·30	−31·01	+ ·07
	190.............	22 27·13	− ·32	− ·01	− ·02	− ·02	− ·03	26·73	21 55·96	30·77	− ·17
	192.............	28 12·37	− ·21	+ ·05	− ·01	− ·01	− ·02	12·17	27 41·18	30·99	+ ·05
	194.............	36 43·48	− ·17	+ ·07	− ·01	·00	− ·02	43·35	36 12·33	31·02	+ ·08
W	197.............	41 54·05	− ·18	+ ·09	+ ·01	+ ·01	− ·01	53·97	41 23·04	30·93	− ·01
	198.............	51 34·06	− ·88	− ·19	+ ·06	+ ·02	− ·05	33·02	51 02·07	30·95	+ ·01
	199.............	58 50·97	− ·34	+ ·02	+ ·02	+ ·03	− ·02	50·68	58 19·70	30·98	+ ·04
	465.............	15 00 50·64	− ·27	+ ·04	+ ·01	+ ·03	− ·02	50·43	15 00 19·54	30·89	− ·05
	201.............	12 08·86	− ·30	+ ·05	+ ·01	+ ·05	− ·02	08·65	11 37·70	30·95	+ ·01

$a = +^{s}\cdot124$ $c = -^{s}\cdot013$

Chronometer correction at $14^{h}\ 37^{m} = -30^{s}\cdot943 \pm {}^{s}\cdot020$

TRANSIT OBSERVATIONS.

Station: VANCOUVER. Date, April 26th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·10	s.		h. m. s.	s.	s.
E	150	10 27 24·44	− ·22	− ·34	+ ·03	− ·09	− ·06	23·76	10 26 54·29	− 29·47	− ·11
	431	40 59·72	− ·07	+ ·06	+ ·01	− ·07	− ·02	59·63	40 30·16	·47	− ·11
	432	44 40·93	− ·05	+ ·11	+ ·01	− ·06	− ·02	40·92	44 11·38	·54	− ·04
	153	56 31·42	− ·11	− ·04	+ ·01	− ·04	− ·03	31·21	56 01·48	·73	+ ·15
	434	11 00 32·34	− ·05	+ ·12	+ ·01	− ·03	− ·02	32·37	11 00 02·72	·65	+ ·07
	155	04 44·39	− ·08	+ ·02	+ ·01	− ·03	− ·02	44·29	04 14·64	·65	+ ·07
	156	09 28·62	− ·06	+ ·09	+ ·01	− ·02	− ·02	28·62	08 58·93	·69	+ ·11
W	438	32 30·49	− ·09	+ ·14	− ·01	+ ·02	− ·01	30·54	32 00·99	·55	− ·03
	163	41 27·68	− ·21	+ ·01	− ·01	+ ·04	− ·02	27·49	40 57·85	·64	+ ·06
	165	46 10·12	− ·10	+ ·13	− ·01	+ ·04	− ·02	10·16	45 40·65	·51	− ·07
	166	49 15·77	− ·24	− ·03	− ·01	+ ·05	− ·03	15·51	48 45·98	·53	− ·05
	167	12 00 47·63	− ·11	+ ·12	− ·01	+ ·07	− ·02	47·68	12 00 18·19	·49	− ·09
	168	08 13·67	− ·60	− ·42	− ·04	+ ·08	− ·07	12·62	07 43·01	·61	+ ·03
	170	15 28 19	− ·09	+ ·14	− ·01	+ ·09	− ·01	28·31	14 58·78	·53	− ·05

$a = +^s\cdot179 \qquad c = +^s\cdot008$

Chronometer correction at $11^h\ 20^m = -29^s\cdot576 \pm {}^s\cdot017$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	182	13 50 35·71	− ·19	+ ·03	+ ·04	− ·07	− ·02	35·50	13 50 06·20	− 29·30	+ ·04
	183	57 14·34	− ·14	+ ·04	+ ·04	− ·06	− ·01	14·21	56 44·94	·27	+ ·01
	458	14 06 30·17	− ·20	+ ·02	+ ·04	− ·05	− ·02	29·96	14 05 60·74	22	− ·04
	459	09 46·88	− ·84	− ·11	+ ·18	− ·04	− ·07	46·00	09 16·74	·26	·00
	188	13 13·46	− ·29	·00	+ ·05	− ·04	− ·02	13·16	12 44·03	·13	− ·13
	190	22 25·43	− ·33	·00	+ 06	− ·02	− ·03	25·11	21 55·97	·14	− ·12
	192	28 10·62	− ·13	+ ·04	+ ·04	− ·01	− ·01	10·55	27 41·19	·36	+ ·10
E	197	41 52·32	− ·03	+ ·04	− 04	+ ·01	− ·01	52·29	41 23·05	·24	− ·02
	198	51 31·79	− 17	− ·07	− ·14	+ ·02	− ·05	31·38	51 02·08	·30	+ ·04
	199	58 49·02	− ·06	+ ·01	− ·05	+ ·04	− ·02	48·94	58 19·71	23	− ·03
	465	15 00 48·93	− ·05	+ ·02	− ·04	+ ·04	− ·02	48·88	15 00 19·55	·33	+ ·07
	201	12 07·05	− ·06	+ ·02	− ·04	+ ·06	− ·02	07·01	11 37·71	·30	+ ·04
	202	21 21·04	− ·06	+ ·01	− ·05	+ ·07	− ·02	20 99	20 51·70	·29	+ ·03

$a = +^s\cdot049 \qquad c = -^s\cdot037$

Chronometer correction at $14^h\ 35^m = -29^s\cdot260 \pm {}^s\cdot015$

TRANSIT OBSERVATIONS.

Station: FANNING ISLAND. Date, April 15th, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·11	s.		h. m. s.	m. s.	s.
E	149	10 15 20·14	+ ·09	− ·29	− ·53	− ·06	− ·02	19·33	10 16 35·07	+1 15·74	+ ·13
	574	20 10·45	+ ·09	+ ·13	− ·41	− ·05	− ·02	10·19	21 25·93	·74	+ ·13
	427	23 12 72	+ ·10	− ·51	− ·71	− ·04	− ·02	11·54	24 27·50	·96	− ·09
	ρ Leonis	26 28·63	+ ·09	− ·04	− ·40	− ·03	− ·02	28·23	27 41·18	·95	− ·08
	576	35 14·47	+ ·09	+ ·03	− ·40	− ·02	− ·02	14·15	36 30·05	·90	− ·03
W	ι Antliæ	50 57·83	− ·02	+ ·29	+ ·49	+ ·01	− ·02	58·58	52 14·54	·96	− ·09
	d Leonis	54 18·96	− ·02	·00	+ ·40	+ ·02	− ·02	19·34	55 35·10	·76	+ ·11
	434	58 46·73	− ·02	− ·02	+ ·40	+ ·02	− ·02	47·09	11 00 02·82	·73	+ ·14
	578	11 05 38·98	− ·02	+ ·17	+ ·43	+ ·04	− ·02	39·58	06 55·48	·90	− ·03
	156	07 42·83	− ·02	− ·11	+ ·42	+ ·04	− ·02	43·14	08 59·04	·90	− ·03
	579	13 15·15	− ·02	+ ·11	+ ·41	+ ·05	− ·02	15·68	14 31·64	·96	− ·09

$a = +^{s}\cdot355$ $c = -^{s}\cdot396$

Chronometer correction at $10^{h}\ 45^{m} = +1^{m}\ 15^{s}\cdot865 \pm {}^{s}\cdot021$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	τ Leonis	11 21 42·72	− ·03	·00	+ ·41	− ·07	− ·02	43·01	11 22 59·06	+1 16·05	− ·04
	581	26 59·65	− ·03	+ ·33	+ ·48	− ·06	− ·02	60·35	28 16·38	16·03	− ·02
	438	30 44·82	− ·03	+ ·03	+ ·41	− ·05	− ·02	45·16	32 01·07	15·91	+ ·10
	164	42 52·49	− ·03	− ·10	+ ·43	− ·03	− ·02	52·74	44 08·82	16·08	− ·07
	B Centauri	45 03·70	− ·03	+ ·52	+ ·58	− ·03	− ·03	04·71	46 20·76	16·05	− ·04
	π Virginis	54 40 03	− ·03	− ·03	+ ·41	− ·01	− ·01	40·36	55 56·30	15·94	+ ·07
E	582	12 03 55·05	− ·05	+ ·23	− ·44	+ ·01	− ·02	54·78	12 05 10·63	15·85	+ ·16
	170	13 43·35	− ·05	+ ·03	− ·41	+ ·02	− ·02	42·92	14 58·82	15·90	+ ·11
	584	23 37·44	− ·05	+ ·17	− ·43	+ ·04	− ·02	37·15	24 53 14	15·99	+ ·02
	585	28 04·13	− ·05	+ ·24	− ·44	+ ·05	− ·02	03·91	29 20·04	16·13	− ·12
	172	35 31·18	− ·05	+ ·04	− ·41	+ ·06	− ·02	30·80	36 46·96	16·16	− ·15
	31 Comæ	45 45·34	− ·05	− ·23	− ·46	+ ·08	− ·02	44·66	47 00·65	15·99	+ ·02

$a = +^{s}\cdot495$ $c = -^{s}\cdot410$

Chronometer correction at $12^{h}\ 00^{m} = +1^{m}\ 16^{s}\cdot005 \pm {}^{s}\cdot023$

TRANSIT OBSERVATIONS.

Station: FANNING ISLAND. Date, April 16th, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r=+·19	s.		h. m. s.	m. s.	s.
E	γ Cancri........	8 36 22 44	−·05	+·04	+·19	−·14	−·02	22·46	8 37 41·85	+1 19 39	+·07
	α Mali........	38 23·60	−·05	−·10	+·21	−·13	·02	23·51	39 43·03	·52	− 06
	127.	39 31·65	−·06	+·07	+·20	−·13	−·02	31·71	40 51·19	·48	−·02
	131............	51 53·09	−·07	+·02	+·18	−·09	−·02	53·11	53 12·43	·32	+·14
	132............	53 02·62	−·07	+·12	+·24	−·09	−·03	02·79	54 22·32	·53	−·07
	133.	55 42·30	−·08	+·14	+·26	−·08	−·03	42·51	57 01·99	·48	−·02
W	κ Cancri.. . . .	9 01 11·94	−·02	+·02	−·18	−·06	−·02	11·68	9 02 31·18	·50	−·04
	142.	39 03·13	−·02	+·05	−·19	+·06	−·02	03·01	40 22·49	·48	−·02
	143.	42 48·51	− 03	+·23	−·35	+·07	−·06	48 37	44 07·81	·44	+·02
	572............	45 03·23	−·02	−·02	−·18	+·08	−·02	03·07	46 22·49	·42	+·04
	μ Leonis... ...	45 57·31	−·02	+·06	−·20	+·08	−·02	57·21	47 16·62	·41	+·05
	423............	53 47·70	−·02	+·01	−·18	+·10	−·02	47·59	55 07·03	·44	+·02
	145.	10 00 45·00	−·02	+·03	−·19	+·14	−·02	44·94	10 02 04·49	·55	−·09

$a = -{}^{s}\cdot 142$ $c = +{}^{s}\cdot 177$

Chronometer correction at $9^{h}\ 20^{m} = +1^{m}\ 19^{s}\cdot 456 \pm {}^{s}\cdot 014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	576......... ..	10 35 10·67	−·05	−·02	−·25	−·08	−·02	10·25	10 36 30·05	+1 19·80	−·03
	431.	39 10·76	−·05	+·14	−·29	−·06	−·02	10·48	40 30·30	·82	−·05
	μ Argûs........	41 19·68	−·05	−·31	−·38	−·06	−·02	18·86	42 38·63	·77	·00
	577............	43 33·14	−·05	−·09	−·26	−·05	−·03	32·66	44 52·42	·76	+·01
	ι Antliæ........	50 55·29	−·05	−·21	−·31	−·03	−·02	54·67	52 14·54	·87	−·10
	d Leonis.......	54 15·84	−·05	·00	−·25	−·02	−.03	15·49	55 35·10	·61	+·16
E	155....	11 02 54 44	−·01	+·24	+·35	+·01	−·02	55·01	11 04 14·80	·79	−·02
	578....	05 35·52	·00	−·13	+·27	+·02	−·03	35·65	06 55·47	·82	−·05
	156............	07 38·92	·00	+·09	+·26	+·02	−·02	39·27	08 59·07	·80	−·03
	579....	13 11·73	·00	−·09	+·25	+·04	−·02	11·91	14 31·63	·72	+·05
	160.......... .	14 50·23	·00	+·01	+·25	+·04	−·02	50·51	16 10·15	·64	+ 13
	τ Leonis.......	21 38·87	·00	·00	+·25	+·06	−·02	39·16	22 59·06	·90	−·13
	438............	30 41·03	·00	−·02	+·25	+·09	−·02	41·33	32 01·06	·73	+·04

$a = -{}^{s}\cdot 261$ $c = +{}^{s}\cdot 246$

Chronometer correction at $11^{h}\ 00^{m} = +1^{m}\ 19^{s}\cdot 770 \pm {}^{s}\cdot 017$

TRANSIT OBSERVATIONS.

Station : Fanning Island. Date, April 18th, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·22	s.		h. m. s.	m. s.	s.
E	129.	8 47 51·09	+ ·03	− ·01	+ ·30	− ·27	− ·02	51·12	8 50 17·40	+2 26 28	− ·20
	133.	54 35·90	+ ·04	− ·29	+ 43	− ·24	− ·03	35·81	57 01·94	·13	− ·05
	κ Cancri	9 00 05·05	+ ·03	− ·03	+ ·30	− ·22	− ·02	05·11	9 02 31·15	·04	+ ·04
	134.	06 54·40	+ ·03	+ ·01	+ ·30	− ·20	− ·02	54·52	09 20·58	·06	+ ·02
	417.	11 09·68	+ ·03	− ·67	+ ·31	− ·18	− ·02	09·75	13 35·65	25·90	+ ·18
W	ρ Leonis	10 25 18·42	+ ·01	− ·09	− ·30	+ ·09	− ·02	18·11	10 27 44·11	26·03	+ ·05
	434.	57 36·96	+ ·01	− ·05	− ·30	+ ·21	− ·02	36·81	11 00 02·80	25·99	+ ·09
	155.	11 01 49·68	·00	− ·81	− ·42	+ ·22	− ·03	48·64	04 14·77	26·13	− ·05
	578.	04 29·01	− ·01	+ ·42	− ·32	+ ·23	− ·02	29·31	06 55·46	·15	− ·07
	157.	06 45·21	− ·02	− ·20	− ·31	+ ·24	− ·02	44·90	09 11·00	·10	− ·02

$a_1 = +^{s}\cdot280 \qquad a_2 = +^{s}\cdot875 \qquad c = +^{s}\cdot296$

Chronometer correction at $10^{h}\ 00^{m} = +2^{m}\ 26^{s}\cdot081 \pm {}^{s}\cdot026$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	579.	11 12 05·21	− ·02	+ ·26	− ·30	− ·14	− ·02	04·99	11 14 31·62	+2 26·63	− ·15
	160.	13 44 17	− ·03	− ·03	− 29	− ·13	− ·02	43·67	16 10·13	·46	+ ·02
	164.	41 42·97	− ·03	− ·16	− ·30	− ·03	− ·02	42·43	44 08·81	·38	+ ·10
	166.	46 21·27	− ·03	−1 07	− ·50	− ·01	− ·04	19·62	48 46·10	·48	·00
E	167.	11 57 51 58	+ ·05	− ·07	+ ·29	+ ·03	− ·02	51·86	12 00 18·23	·37	+ ·11
	582.	12 02 43·31	+ ·04	+ ·38	+ ·31	+ ·04	− ·02	44·06	05 10·62	·56	− ·08
	169.	08 14·06	+ ·05	−1·23	+ ·54	+ ·07	− ·04	13·45	10 40·02	·57	− ·09
	170.	12 31·77	+ ·05	+ ·06	+ ·29	+ ·08	− ·02	32·23	14 58·81	·58	− ·10
	585.	26 52·71	+ ·04	+ ·40	+ ·31	+ ·13	− ·02	53·57	29 20·03	·46	+ ·02
	ρ Virginis	34 34·02	+ ·05	− ·10	+ ·30	+ ·16	− ·02	34·41	37 00·73	·32	+ ·16

$a = +^{s}\cdot819 \qquad c = +^{s}\cdot290$

Chronometer correction at $11^{h}\ 50^{m} = +2^{m}\ 26^{s}\cdot481 \pm {}^{s}\cdot025$

TRANSIT OBSERVATIONS.

Station: FANNING ISLAND. Date, April 23rd, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·17	s.		h. m. s.	s.	s.
E	λ Argûs.......	9 03 40·30	+ ·06	+ ·52	+ ·37	− ·07	− ·03	41·15	9 04 27·23	+ 46·08	+ ·08
	134.............	08 34·04	+ ·04	+ ·01	+ ·27	− ·06	− ·02	34·28	09 20·50	·22	− ·06
	417....... ...	12 49 36	+ ·04	− ·14	+ ·28	− ·04	− ·02	49·48	13 35·57	·09	+ ·07
	136.............	14 24·25	+ ·04	− ·33	+ ·33	− ·04	− ·03	24·22	15 10·34	·12	+ ·04
	h Mali.....	16 26·56	+ ·03	+ ·28	+ ·30	− 04	− ·02	27·11	17 13·34	·23	− ·07
W	ψ Argûs.........	26 08·21	− ·02	+ ·48	− ·35	− ·01	− ·03	08·28	26 54·42	·14	+ ·02
	419.............	27 33·17	− ·03	− .36	− ·33	− ·01	− ·03	32·41	28 18·54	·13	+ ·03
	κ Hydræ.........	34 54·94	− ·05	+ ·16	− ·28	+ ·01	− ·02	54·76	35 40·96	·20	− ·04
	572........	45 36·49	− ·06	+ ·07	− ·27	+ ·04	− ·02	36·25	46 22·39	·14	+ ·02
	422........	51 01·00	− ·07	− ·42	− ·36	+ ·06	− ·03	00·18	51 46·41	·23	− ·07
	423.............	54 21·13	− ·09	− 04	− ·27	+ ·08	− ·02	20·79	55 06·94	·15	+ ·01

$a = +^{s}\cdot523$ $c = +^{s}\cdot267$

Chronometer correction at $9^{h}\ 30^{m} = +46^{s}\cdot157 \pm {}^{s}\cdot012$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	427........	10 23 42·45	− ·10	− ·92	− ·40	− ·08	− ·04	40·91	10 24 27·29	+46·38	·00
	ρ Leonis... ...	26 58·18	− ·07	− ·06	− ·22	− ·07	− ·02	57·74	27 44·08	·34	+ ·04
	576..	35 43·92	− .07	+ ·06	− ·22	− ·04	− ·02	43·63	36 29·97	·34	+ ·04
	μ Argûs.........	41 51·76	− ·07	+ ·77	− ·33	− ·02	− ·03	52·08	42 38·48	·40	− ·02
	d Leonis.........	54 48·92	− ·07	− ·01	− ·22	+ ·01	− ·02	48·61	55 35·03	·42	− ·04
E	578..	11 06 08·52	− ·05	+ ·31	+ ·24	+ ·04	− ·02	09 04	11 06 55·41	·37	+ ·01
	157........	08 24 48	− ·06	− ·15	+ ·23	+ ·06	− ·02	24·54	09 10·97	·43	− ·05
	579........	13 44·79	− ·05	+ ·20	+ ·23	+ ·07	− ·02	45·22	14 31·58	·36	+ ·02
	160.............	15 23·56	− ·06	− ·03	+ ·22	+ ·07	− ·02	23·74	16 10·09	·35	+ ·03
	τ Leonis.........	22 12·33	− ·06	+ ·01	+ ·22	+ ·08	− ·02	12·56	22 59·00	·44	− ·06
	581....	27 29·22	− ·05	+ ·43	+ ·26	+ ·11	− ·02	29·95	28 16·31	·36	+ ·02

$a = +^{s}\cdot640$ $c = +^{s}\cdot220$

Chronometer correction at $10^{h}\ 50^{m} = +46^{s}\cdot382 \pm {}^{s}\cdot008$

TRANSIT OBSERVATIONS.

Station : FANNING ISLAND. Date, April 26th, 1903 Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·16	s.		h. m. s.	s.	s.
E	*h* Mali.........	9 16 14·08	− ·10	+ ·25	+ ·20	− ·14	− ·02	14·27	9 17 13·28	+59·01	+ ·02
	140..............	25 25·34	− ·10	− ·56	+ ·29	− ·12	− ·03	24·82	26 23·92	59·10	− ·07
	419........ ..	27 19·78	− ·11	− ·31	+ ·23	− ·12	− ·03	19·44	28 18·49	59·05	− ·02
	142..	39 23·43	− ·12	− ·17	+ ·20	− ·08	− ·02	23·24	40 22·33	59·09	− ·06
	572.......	45 23·30	− ·10	+ ·06	+ ·18	− ·07	− ·02	23·35	46 22·35	59·00	+ ·03
	μ Leonis.........	46 17·71	− ·10	− ·20	+ ·20	− ·06	− ·02	17·53	47 16·46	58·93	+ ·10
W	423..............	54 08·16	− ·09	− ·04	− ·18	− ·04	− ·02	07·79	55 06·91	59·12	− ·09
	145...	10 01 05·81	− ·09	− ·11	− ·19	− ·03	− ·02	05·37	10 02 04·34	58·97	+ ·06
	573..	04 54·41	− ·09	+ ·13	− ·18	− ·02	− ·02	54·23	05 53·28	59·05	− ·02
	q Velorum.......	09 42·70	− ·09	+ ·44	− ·24	·00	− ·03	42·78	10 41·86	59·08	− ·05
	149.............	15 36·46	− ·09	− ·38	− ·24	+ ·01	− ·03	35·73	16 34·86	59·13	− ·10
	434..............	59 03·91	− ·03	− ·03	− ·18	+ ·13	− ·02	03·78	11 00 02·73	58·95	+ ·08
	155.	11 03 16·29	− ·03	− ·43	− ·25	+ ·14	− ·03	15·69	04 14·64	58·95	+ ·08

$a = +^{s}\cdot459$ $c = +^{s}\cdot180$

Chronometer correction at $10^{h}\ 10^{m} = +59^{s}\cdot034 \pm {}^{s}\cdot015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	157....	11 08 12·13	− ·02	− ·13	− ·24	− ·08	− ·02	11·64	11 09 10·94	+59·30	− ·02
	579..	13 32·42	− ·02	+ ·19	− ·24	− ·07	− ·02	32·26	14 31·55	·29	− ·01
	160..............	15 11·08	− ·02	− ·02	− ·23	− ·06	− ·02	10·73	16 10·06	·33	− ·05
	τ Leonis......	22 00·06	− ·01	+ ·01	− ·23	− ·04	− ·02	59·77	22 58·97	·20	+ ·08
	581......	27 16·87	− ·01	+ ·39	− ·27	− ·04	− ·02	16·92	28 16·28	·36	− ·08
	438..	31 01·96	− ·01	+ ·04	− ·23	− ·03	− ·02	01·71	32 00·99	·28	·00
E	163..............	39 58·79	+ ·02	− ·61	+ ·35	·00	− ·03	58·52	40 57·85	·33	− ·05
	B Centauri......	45 20·42	+ ·02	+ ·60	+ ·33	+ ·02	− ·03	21·36	46 20·56	·20	+ ·08
	π Virginis.......	54 56·83	+ ·02	− ·03	+ ·23	+ ·04	− ·02	57·07	55 56·26	·19	+ ·09
	167..	59 18·71	+ ·01	− ·05	+ ·23	+ ·05	− ·02	18·93	12 00 18·19	·26	+ ·02
	169......	12 09 40·96	+ ·02	− ·87	+ ·43	+ ·08	− ·04	40·58	10 39·89	·31	− ·03
	170............ .	13 59·14	+ ·01	+ ·04	+ ·23	+ ·09	− ·02	59·49	14 58·78	·29	− ·01

$a = +^{s}\cdot579$ $c = +^{s}\ 231$

Chronometer correction at $11^{h}\ 40^{m} = +59^{s}\cdot278 \pm {}^{s}\cdot012$

TRANSIT OBSERVATIONS.

Station : FANNING ISLAND. Date, June 2nd, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·10	s.		h. m. s.	s.	s.
E	179	13 30 01·77	− ·05	+ ·03	+ ·10	− ·08	− ·02	01·75	13 29 47·28	−14·47	+ ·05
	m Virginis	36 47·98	− ·05	+ ·10	+ ·10	− ·07	− ·02	48·04	36 33·68	·36	− ·06
	180	42 55·97	− ·05	− ·12	+ ·10	− ·05	− ·02	55·83	42 41·29	·54	+ ·12
	588	44 52·88	− ·05	+ ·18	+ ·10	− ·05	− ·02	53·04	44 38·65	·39	− ·03
	182	50 20·75	− ·05	− ·13	+ ·10	− ·04	− ·02	20·61	50 06·12	·49	+ ·07
	457	57 03·43	− ·05	− ·22	+ ·11	− ·03	− ·02	03·22	56 48·75	·47	+ ·05
W	192	14 27 56·08	− ·14	− ·25	− ·11	+ ·02	− ·02	55·58	14 27 41·19	·39	− ·03
	196	38 14·07	− ·13	+ ·08	− ·10	+ ·04	− ·02	13·94	37 59·48	·46	+ ·04
	590	45 48·10	− ·13	+ ·17	− ·10	+ ·05	− ·02	48·07	45 33·53	·54	+ ·12
	463	51 55·52	− ·14	− ·09	− ·10	+ ·06	− ·02	55·23	51 40·93	·30	− ·12
	199	58 34·74	− ·14	− ·38	− ·14	+ ·07	− ·03	34·12	58 19·78	·34	− ·08
	465	15 00 34·34	− ·14	− ·21	− ·11	+ ·08	− ·02	33·94	15 00 19·69	·25	− ·17

$a = +^{s}\cdot476 \qquad c = +^{s}\cdot096$

Chronometer correction at $14^{h}\ 15^{m} = -14^{s}\cdot419 \pm {}^{s}\cdot020$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	592	15 06 58·87	− ·13	+ ·33	− ·12	− ·07	− ·02	58·86	15 06 44·48	−14·38	+ ·05
	466	10 39·26	− ·13	− ·02	− ·11	− ·06	− ·02	38·92	10 24·63	·29	− ·04
	201	11 53·05	− ·13	− ·48	− ·13	− ·06	− ·02	52·23	11 37·88	·35	+ ·02
	γ Lupi	28 58·23	− ·13	+ ·74	− ·14	− ·03	− ·03	58·64	28 44·37	·27	− ·06
	593	30 23·27	− ·13	+ ·25	− ·11	− ·03	− ·02	23·23	30 08·90	·33	·00
E	221	16 06 00·21	− ·07	− ·75	+ ·15	+ ·03	− ·03	59·54	16 05 45·29	·25	− ·08
	222	09 32·69	− ·06	+ ·10	+ ·11	+ ·03	− ·02	32·85	09 18·51	·34	+ ·01
	223	13 28·28	− ·06	+ ·12	+ ·11	+ ·04	− ·02	28·47	13 14·11	·36	+ ·03
	225	17 55·46	− ·06	− ·22	+ ·12	+ ·05	− ·02	55·33	17 41·01	·32	− ·01
	473	21 13·35	− ·06	− ·14	+ ·11	+ ·06	− ·02	13·30	20 58·96	·34	+ ·01
	λ Ophiuchi	26 18·25	− ·06	+ ·02	+ ·11	+ ·06	− ·02	18·36	26·04 02	34	+ ·01
	230	31 16·01	− ·06	− ·68	+ ·15	+ ·07	− ·03	15·46	31 01·09	·37	+ ·04

$a = +^{s}\cdot796 \qquad c = +^{s}\cdot109$

Chronometer correction at $15^{h}\ 48^{m} = -14^{s}\cdot330 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station: FANNING ISLAND. Date, June 3rd, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·10	s.		h. m. s.	s.	s.
E	179.	13 29 59·75	+ ·01	+ ·05	+ ·12	− ·07	− ·02	59·84	13 29 47·27	−12·57	+ ·09
	m Virginis	36 46·04	+ ·01	+ ·14	+ ·12	− ·06	− ·02	46·23	36 33·67	·56	+ ·08
	180.	42 53·82	+ ·01	− 16	+ ·13	− ·05	− ·02	53·73	42 41·29	·44	− ·04
	588.	44 50·78	+ ·01	+ ·25	+ ·13	− ·04	− ·02	51·11	44 38·65	·46	− ·02
	182	50 18·68	+ ·01	− ·18	+ ·13	− ·03	− ·02	18·59	50 06·12	·47	− ·01
	457.	57 01·46	+ ·01	− ·30	+ ·14	− ·02	− ·02	01·27	56 48·74	·53	+ ·05
	π Hydræ.	14 01 05·62	+ ·01	+ ·36	+ ·14	− ·01	− ·02	06·10	14 00 53·74	·36	− 12
W	186.	11 10·77	− ·04	+ ·10	− ·12	·00	− ·02	10·69	10 58·15	·54	+ ·06
	188.	12 57·15	− ·05	− ·64	− ·18	·00	− ·03	56·25	12 43·84	·41	− ·07
	191.	23 27·39	− ·04	+ ·06	− ·12	+ ·02	− ·02	27·29	23 14·78	·51	+ ·03
	192.	27 54·11	− ·05	− ·34	− ·14	+ ·03	− ·02	53·59	27 41·19	·40	− ·08
	196.	38 11·95	− ·04	+ ·10	− 12	+ ·05	− ·02	11·92	37 59·47	·45	− ·03
	ϵ^2 Boötis.	41 00·34	− ·05	− ·29	− ·13	+.05	− ·02	59·90	40 47·34	·56	+ ·08
	463.	51 53·68	− ·05	− ·12	− ·13	+ ·07	− ·02	53·43	51 40·92	.51	+ ·03

$a = +^{s}\cdot649 \qquad c = +^{s}\cdot121$

Chronometer correction at $14^h\ 10^m = -12^s\cdot484 \pm {}^s\cdot013$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	199.	14 58 32·77	− ·05	− ·52	− ·05	− ·04	− ·03	32·08	14 58 19·78	−12·30	− ·08
	465.	15 00 32·58	− ·05	− ·30	− ·05	− ·03	− ·02	32·13	15 00 19·68	·45	+ ·07
	592.	06 56·74	− ·04	+ ·28	− ·04	− ·02	− ·02	56·90	06 44·48	·42	+ ·04
	201.	11 50·80	− ·05	− ·39	− ·05	− ·01	− ·03	50·27	11 37·87	·40	+ ·02
	o^2 Libræ.	17 52·30	− ·04	+ ·22	− ·04	·00	− ·02	52·42	17 40·08	·34	− ·04
E	468.	21 32·36	+ ·02	− ·14	+ ·04	·00	− ·02	32·26	21 19·94	·32	− ·06
	469.	34 35·88	+ ·02	− ·53	+ ·05	+ ·02	− ·03	35·41	34 22·99	·42	+ ·04
	210.	35 58·65	+ ·02	− ·45	+ ·05	+ ·03	− ·03	58·27	35 45·90	·37	− ·01
	211.	38 55·19	+ ·02	− ·22	+ ·05	+ ·03	− ·02	55·05	38 42·62	·43	+ ·05
	213.	41 57·59	+ ·02	− ·14	+ ·04	+ ·04	− ·02	57·53	41 45·18	·35	− ·03
	215.	44 37·40	+ ·02	− ·17	+ ·05	+ ·04	− ·02	37·32	44 24·92	·40	+ ·02

$a = +^{s}\cdot656 \qquad c = +^{s}\cdot043$

Chronometer correction at $15^h\ 19^m = -12^s\cdot377 \pm {}^s\cdot011$

TRANSIT OBSERVATIONS.

Station : Fanning Island. Date, June 8th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·10	s.		h. m. s.	s.	s.
E	182	13 50 10·01	+ ·02	– ·10	+ ·02	– ·07	– ·02	09·86	13 50 06·08	– 03·78	– ·09
	457	56 52·72	+ ·02	– ·17	+ ·02	– ·06	– ·02	52·51	56 48·70	·81	– ·06
	458	14 06 04·80	+ ·03	– ·15	+ ·02	– ·04	– ·02	04·64	14 05 60·65	·99	+ 12
	186	11 01·97	+ ·03	+ ·06	+ ·02	– ·03	– ·02	02·03	10 58·13	90	+ ·03
	188	12 48·09	+ ·03	– ·36	+ ·02	– ·03	– ·03	47·72	12 43·78	·94	+ ·07
	194	36 16·26	+ ·03	– ·08	+ ·02	+ ·01	– ·02	16·22	36 12·40	·82	– ·05
W	463	51 44·77	– ·01	– ·07	– ·02	+ ·03	– ·02	44·68	51 40·92	·76	– ·11
	199	58 23·92	– ·01	– ·29	– ·02	+ ·05	– ·02	23·63	58 19·75	·88	+ ·01
	465	15 00 23·64	– ·01	– 17	– ·02	+ ·05	– ·03	23·46	15 00 19·67	·79	– ·08
	592	06 48·14	– ·01	+ ·15	– ·02	+ ·06	– ·02	48·30	06 44·50	·80	– ·07
	466	10 28·54	·00	– ·01	– ·02	+ ·07	– ·02	28·56	10 24·62	·94	+ ·07
	201	11 42·12	·00	– ·22	– ·02	+ ·07	– ·03	41·92	11 37·86	04·06	+ ·19
	o^2 Libræ	17 43·75	·00	+ ·12	– ·02	+ ·08	– ·02	43·91	17 40·07	03·84	– ·03

$a = +^{s}\cdot368$ $c = +^{s}\cdot015$

Chronometer correction at $14^{h}\ 30^{m} = -3^{s}\cdot866 \pm {}^{s}\cdot021$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	202	15 20 55·97	+ ·06	– ·34	– ·03	– ·06	– ·03	55·57	15 20 51·87	– 03·70	– ·01
	ζ^1 Libræ	22 53·75	+ ·06	+ ·18	– ·03	– ·06	– ·02	53·88	22 50·11	·77	+ ·06
	206	27 33·16	+ ·06	– ·39	– ·03	– ·04	– ·03	32·73	27 29·04	·69	– ·02
	207	28 25·19	+ ·06	– ·39	– ·03	– ·04	– ·02	24·77	28 21·15	·62	– ·09
	593	30 12·60	+ ·06	+ ·16	– ·03	– ·03	– ·02	12·74	30 08·93	·81	+ ·10
	469	34 27·07	+ ·06	– ·39	– ·03	– ·03	– ·02	26·66	34 23·00	·66	– ·05
	213	41 49·02	+ ·06	– ·10	– ·03	– ·02	– ·02	48·91	41 45·19	·72	+ ·01
E	σ Scorpii	16 15 24·13	+ ·10	+ ·26	+ 03	+ ·04	– 02	24·54	16 15 20·87	·67	– ·04
	225	17 44·88	+ ·09	– ·14	+ ·03	+ ·04	– ·02	44·88	17 41·05	·83	+ ·12
	473	21 02·62	+ ·09	– ·09	+ ·03	+ ·05	– ·02	02·68	20 58·95	·73	+ ·02
	227	26 07·70	+ ·09	+ ·01	+ ·03	+ ·06	– ·02	07·87	26 04·06	·81	+ ·10
	τ Scorpii	29 57·09	+ ·10	+ ·29	+ ·03	+ ·06	– ·02	57·55	29 54·05	·50	– ·21
	597	31 55·40	+ ·09	+ ·12	+ ·03	+ ·07	– ·02	55·69	31 52·00	·69	– ·02

$a = +^{s}\cdot488$ $c = +^{s}\cdot026$

Chronometer correction at $15^{h}\ 50^{m} = -3^{s}\cdot706 \pm {}^{s}\cdot018$

TRANSIT OBSERVATIONS.

Station: Fanning Island. Date, June 9th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·06	s.		h. m. s.	s.	s.
E	458	14 06 03·32	+ ·07	− ·21	+ ·10	− ·05	− ·02	03·21	14 06 00·64	− 02·57	− ·02
	188	12 46·74	+ ·08	− ·51	+ ·12	− ·04	− ·03	46·36	12 43·76	·60	+ ·01
	192	27 43·81	+ ·12	− ·27	+ ·10	− ·03	− ·02	43·71	27 41·15	·56	− ·03
	194	36 14·99	+ ·12	− ·12	+ ·09	− ·02	− ·02	15·04	36 12·40	·64	+ ·05
	463	51 43·41	+ ·12	− ·10	+ ·09	− ·01	− ·02	43·49	51 40·92	·57	− ·02
W	592	15 06 46·84	+ ·06	+ ·22	·09	+ ·01	− ·02	47·02	15 06 44·50	·52	− ·07
	466	10 27·30	+ ·10	− ·01	− ·09	+ ·01	− ·02	27·29	10 24·62	·67	+ ·08
	201	11 40·85	+ ·10	− ·31	− ·10	+ ·01	− ·03	40·52	11 37·85	·67	+ ·08
	202	20 54·79	+ ·11	− ·36	− ·11	+ ·02	− ·03	54·42	20 51·87	·55	− ·04
	205	23 54·89	+ ·11	− ·26	− ·10	+ ·02	− ·02	54·64	23 52·15	·49	− ·10
	215	44 27·74	+ ·12	− ·14	− ·09	+ ·04	− ·02	27·65	44 24·93	·72	+ ·13
	218	52 03·57	+ ·12	− ·11	− ·09	+ ·05	− ·02	03·52	52 00·96	·56	− ·03

$a = +^{s}{\cdot}518 \quad c = +^{s}{\cdot}088$

Chronometer correction at $15^{h}\ 00^{m} = -2^{s}{\cdot}589 \pm^{s}{\cdot}015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
						s. r = + ·07					
W	219	15 53 39·59	+ ·13	− ·24	− ·06	− ·03	− ·02	39·37	15 53 36·75	− 02·62	+ ·13
	595	59 53·07	+ ·13	+ ·23	− ·05	− ·03	− ·02	53·33	59 50·89	·44	− ·05
	221	16 05 48·14	+ ·14	− ·51	− ·07	− ·01	− ·03	47·66	16 05 45·26	·40	− ·09
	222	09 21·00	+ ·13	+ ·07	− ·05	− ·01	− ·02	21·12	09 18·55	·57	+ ·08
	σ Scorpii	15 23·02	+ ·13	+ ·29	− ·05	·00	− ·02	23·37	15 20·87	·50	+ ·01
	225	17 43·55	+ ·13	− ·15	− ·05	·00	− ·02	43·46	17 41·05	·41	− ·08
E	231	37 42·82	+ ·16	− ·30	+ ·06	+ ·02	− ·02	42·74	37 40·34	·40	− ·09
	232	39 39·51	+ ·16	− ·40	+ ·06	+ ·02	− ·03	39·32	39 36·79	·53	+ ·04
	ε Scorpii	43 58·25	+ ·15	+ ·41	+ ·06	+ ·03	− ·03	58·87	43 56·45	·42	− ·07
	478	47 44·99	+ ·16	− ·11	+ ·05	+ ·03	− ·02	45·10	47 42·54	·56	+ ·07
	233	53 09·66	+ ·15	− ·05	+ ·05	+ ·04	− ·02	09·83	53 07·31	·52	+ ·03

$a = +^{s}{\cdot}545 \quad c = +^{s}{\cdot}050$

Chronometer correction at $16^{h}\ 20^{m} = -2^{s}{\cdot}487 \pm^{s}{\cdot}019$

TRANSIT OBSERVATIONS.

Station : Fanning Island. Date, June 10th, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
		h. m. s.	s.	s.	s.	s. r = + ·07	s.		h. m. s.	s.	s.
E	458............	14 06 01·86	+ ·07	− ·20	+ ·09	− ·06	− ·02	01·74	14 06 00·63	−01·11	+ ·10
	185............	07 46·62	+ ·06	+ ·11	+ ·08	− ·06	− ·02	46·79	07 45·80	00·99	− ·02
	186............	10 59·06	+ ·07	+ ·08	+ ·08	− ·05	− ·02	59·22	10 58·10	01·12	+ ·11
	188............	12 45.06	+ ·08	− ·48	+ ·12	− ·05	− ·03	44·70	12 43·75	00·95	− ·06
	192............	27 42·33	+ ·07	− ·26	+ ·09	− ·04	− ·02	42·17	27 41·14	01·03	+ ·02
	194............	36 13·32	+ ·07	− ·11	+ ·08	− ·02	− ·02	13·32	36 12·40	00·92	− ·09
	196............	38 00·22	+ ·07	+ ·08	+ ·08	− ·02	− ·02	00·41	37 59·46	00·95	− ·06
W	212............	15 39 33·11	+ ·01	− ·02	− ·08	+ ·05	− ·02	33·05	15 39 32·03	01·02	+ ·01
	213............	41 46·31	+ ·01	− ·10	− ·08	+ ·05	− ·02	46·17	41 45·19	00·98	− ·03
	215............	44 26·15	+ ·01	− ·13	− ·08	+ ·05	− ·02	25·98	44 24·93	01·05	+ ·04
	216............	46 02·54	+ ·01	·00	− ·08	+ ·05	− ·02	02·50	46 01·50	01·00	− ·01
	218............	52 02·12	+ ·01	− ·11	− ·08	+ ·06	− ·02	01·98	52 00·96	01·02	+ ·01

$a = +^{s}·491 \qquad c = +^{s}·080$

Chronometer correction at $15^{h}\ 00^{m} = -1^{s}·011 \pm {}^{s}·013$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
W	595............	15 59 51·69	+ ·01	+ ·33	− ·09	− ·03	− ·02	51·89	15 59 50·89	−01·00	+ ·10
	223............	16 13 15·17	·00	+ ·12	− ·08	− ·02	− ·02	15·17	16 13 14·16	01·01	+ ·11
	σ Scorpii.......	15 21·41	·00	+ ·42	− ·09	− ·01	− ·02	21·71	15 20·88	00·83	− ·07
	225............	17 42·27	− ·01	− ·22	− ·09	− ·01	− ·02	41·92	17 41·05	00·87	− ·03
	596............	23 31·49	− ·02	+ ·44	− ·09	− ·01	− ·02	31·79	23 30·92	00·87	− ·03
	228............	26 06·80	− ·02	− ·26	− ·09	·00	− ·02	06·41	26 05·58	00·83	− ·07
E	597............	31 52·57	+ ·05	+ ·20	+ ·08	·00	− ·02	52·88	31 52·01	00·87	− ·03
	231............	37 41·58	+ ·06	− ·43	+ ·10	+ ·01	− ·02	41·30	37 40·35	00·95	+ ·05
	478............	47 43·46	+ ·06	− ·16	+ ·09	+ ·02	− ·02	43·45	47 42·54	00·91	+ ·01
	233............	53 08·10	+ ·06	− ·08	+ ·08	+ ·02	− ·02	08·16	53 07·32	00·84	− ·06
	234............	56 38·44	+ ·07	− ·42	+ ·10	+ ·02	− ·02	38·19	56 37·31	00·88	− ·02

$a = +^{s}·787 \qquad c = +^{s}·083$

Chronometer correction at $16^{h}\ 30^{m} = -0^{s}·896 \pm {}^{s}·014$

TRANSIT OBSERVATIONS.

Station : Fanning Island. Date, June 15th, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·015	s.		h. m. s.	s.	s.
E	457	13 56 42·37	− ·05	− ·30	+ ·04	− ·02	− ·02	42 02	13 56 48·62	+06·60	+ ·09
	π Hydræ	14 00 46·73	− ·05	+ ·36	+ ·04	− ·02	− ·02	47·04	14 00 53·67	·63	+ ·06
	185	07 38·99	− ·05	+ ·16	+ ·04	− ·02	·02	39·10	07 45·77	·67	+ ·02
	188	12 37·61	− ·02	− ·64	+ ·06	− ·02	− ·03	36·96	12 43·67	·71	− ·02
	192	27 34·76	+ ·01	− ·34	+ ·05	− ·01	− ·02	34·45	27 41·10	·65	+ ·04
	196	37 52·49	+ ·03	+ ·10	+ ·04	− ·01	− ·02	52 63	37 59·44	·81	− ·12
	ϵ^2 Boötis	40 40·75	+ ·03	− ·29	+ ·04	− ·01	− ·02	40·50	40 47·29	·79	− ·10
W	463	51 34·32	− ·02	− ·12	− ·04	00	− ·02	34·12	51 40·89	·77	− ·08
	199	58 13·62	− ·02	− ·51	− ·05	·00	− ·03	13·01	58 19·68	·67	+ ·02
	465	15 00 13·32	− ·02	− ·29	− ·04	·00	− ·02	12·95	15 00 19·63	·68	+ ·01
	222	16 09 11·84	− ·02	+ ·08	− ·04	·00	− ·02	11·84	16 09 18·57	·73	− ·04
	223	13 07·57	− ·02	+ ·10	− ·04	+ ·01	− ·02	07·60	13 14·18	·58	+ ·11
	σ Scorpii	15 13·89	− ·02	+ ·35	− ·04	+ ·02	− ·02	14·18	15 20·90	·72	− ·03
	225	17 34·65	− ·02	− ·18	− ·04	+ ·02	− ·02	34·41	17 41·05	·64	+ ·05

$a = +^{s}\cdot648$ $c = +^{s}\cdot039$

Chronometer correction at $15^{h}\ 10^{m} = +6^{s}\cdot689 \pm^{s}\cdot015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	228	16 25 59·25	+ ·08	− ·24	− ·09	− ·01	− ·02	58·97	16 26 05·59	+06·62	+ ·10
	τ Scorpii	29 47·01	+ ·07	+ ·44	− ·10	− ·01	− ·02	47·39	29 54·10	·71	+ ·01
	597	31 45·31	+ ·06	+ ·18	− ·09	− ·01	− ·02	45·43	31 52·03	·60	+ ·12
	231	37 34·04	+ ·07	− ·40	− ·10	− ·01	− ·02	33·58	37 40·36	·78	− ·06
	232	39 30 70	+ ·07	− ·54	− ·11	− ·01	− ·03	30·08	39 36·79	·71	+ ·01
	ε Scorpii	43 49·26	+ ·06	+ ·55	− ·10	·00	− ·03	49·74	43 56·50	·76	− ·04
	30 Ophiuchi	55 52·82	+ ·06	+ ·10	− ·09	·00	− ·02	52·87	55 59·73	·86	− ·14
E	237	17 10 09·54	+ ·09	− ·14	+ ·09	·00	− ·02	09·56	17 10 16·20	·64	+ ·08
	239	11 36·32	+ ·09	− ·50	+ ·11	·00	− ·03	35·99	11 42·76	·77	− ·05
	σ Ophiuchi	21 38·06	+ 09	·00	+ ·09	+ ·01	− ·02	38·23	21 44·99	·76	− ·04
	241	30 21·96	+ ·09	− ·11	+ ·09	+ ·01	− ·02	22·02	30 28·68	·66	+ ·06
	600	31 57·97	+ ·09	+ ·25	+ ·09	+ 01	− ·02	58·39	32 05·10	·71	+ ·01
	245	38 36·79	+ ·09	− ·01	+ ·09	+ ·01	− ·02	36·95	38 43·70	·75	− ·03

$a = +^{s}\cdot735$ $c = +^{s}\cdot085$

Chronometer correction at $17^{h}\ 00^{m} = +6^{s}\cdot719 \pm^{s}\cdot015$

TRANSIT OBSERVATIONS.

Station : FANNING ISLAND. Date. June 21st, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·03	s.		h. m. s.	s.	s.
E	463............	14 51 26·16	+ ·05	− ·08	+ ·02	− ·01	− ·02	26·12	14 51 40·85	+14·73	+ ·06
	465........	15 00 05·62	+ ·05	− ·20	+ ·02	− ·01	− ·02	04·86	15 00 19·59	·73	+ ·06
	592............	06 29·57	+ ·05	+ ·18	+ ·02	− ·01	− ·02	29·79	06 44·47	·68	+ ·11
	466............	10 09·63	+ ·05	− ·01	+ ·02	− ·01	− ·02	09·66	10 24·59	·93	− ·14
	201..........	11 23·21	+ ·05	− ·26	+ ·02	·00	− ·03	22·99	11 37·76	·77	+ ·02
	o^2 Libræ.....	17 24·99	+ ·05	+ ·14	+ ·02	·00	− ·02	25·18	17 40·06	·88	− ·09
	202.........	20 37·30	+ ·05	− ·30	+ ·02	·00	− ·03	37·04	20 51·77	·73	+ ·06
	ζ^1 Libræ.......	22 35·01	+ ·05	+ ·16	+ ·02	·00	− ·02	35·22	22 50·10	·88	− ·09
W	593...........	29 54·14	+ ·02	+ ·14	− ·02	·00	− ·02	54·26	30 08·92	·66	+ ·13
	469.............	34 08·44	+ ·03	− ·34	− ·02	+ ·01	− ·03	08·09	34 22·92	·83	− ·04
	211...........	38 27·91	+ ·03	− ·19	− ·02	+ ·01	− ·02	27·72	38 42·59	·87	− ·08
	213...........	41 30·47	+ ·02	− ·09	− ·02	+ ·01	− ·02	30·37	41 45·17	·80	− ·01
	594............	54 24·03	+ ·03	+ ·21	− ·02	+ ·02	− ·02	24·25	54 39·04	·79	·00

$a = +^{s}\cdot434$ $c = +^{s}\cdot015$

Chronometer correction at $15^h\ 20^m = +14^s\cdot792 \pm {}^s\cdot017$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	595...........	15 59 35·92	+ ·02	+ ·18	− ·03	− ·02	− ·02	36·05	15 59 50·92	+14·87	− ·04
	221..........	16 05 30·75	+ ·02	− ·39	− ·03	− ·02	− ·03	30·30	16 05 45·23	·93	− ·10
	222............	09 03·75	+ ·03	+ ·05	− ·03	− ·02	− ·02	03·76	09 18·58	·82	+ ·01
	223..........	12 59·41	+ ·03	+ ·06	− ·03	− ·02	− ·02	59·43	13 14·19	·76	+ ·07
	σ Scorpii.....	15 05·82	+ ·05	+ ·23	− ·03	− ·01	− ·02	06·04	15 20·91	·87	− ·04
	225............	17 26·50	+ ·06	− ·12	− ·03	− ·01	− ·02	26·38	17 41·06	·68	+ ·15
E	232..........	39 22·19	+ ·08	− ·31	+ ·04	·00	− ·03	21·97	39 36·79	·82	+ ·01
	479..........	17 00 40·71	+ ·08	− ·07	+ ·03	+ ·01	− ·02	40·74	17 00 55·59	·85	− ·02
	480...........	04 25·01	+ ·08	− ·33	+ ·04	+ ·01	− ·03	24·78	04 39·54	·76	+ ·07
	239...........	11 28·15	+ ·07	− ·29	+ ·04	+ ·02	− ·03	27·96	11 42·77	·81	+ ·02
	599............	15 51·48	+ ·07	+ ·22	+ ·03	+ ·02	− ·02	51·80	16 06·57	·77	+ ·06
	σ Ophiuchi....	21 29·98	+ ·07	·00	+ ·03	+ ·02	− ·02	30·08	21 45·06	·98	− ·15
	600........	31 50·03	+ ·07	+ ·14	+ ·03	+ ·02	− ·02	50·27	32 05·15	·88	− ·05

$a = +^{s}\cdot420$ $c = +^{s}\cdot030$

Chronometer correction at $16^h\ 40^m = +14^s\cdot832 \pm {}^s\cdot016$

TRANSIT OBSERVATIONS.

Station : FANNING ISLAND. Date, June 23rd, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·06	s.		h. m. s.	s.	s.
E	192........ ...	14 27 23·72	+ ·05	– 26	– ·05	– ·09	– ·02	23·35	14 27 41·01	+17·66	+ ·11
	ϵ^2 Boötis..	40 29·74	+ ·04	– ·22	– ·05	– ·08	– ·02	29·41	40 47·22	·81	– ·04
	590.	45 15·56	+ ·04	+ ·17	– ·04	– ·07	– ·02	15·64	45 33·46	82	– ·05
	.25........ ...	16 17 23·45	+ ·04	– ·14	– ·04	+ ·02	– ·02	23·31	16 17 41·06	·75	+ ·02
	473.	20 41·38	+ ·05	– ·09	– ·04	+ ·02	– ·02	41·30	20 59·12	·82	– ·05
	596.	23 12·91	+ ·04	+ ·28	– ·04	+ ·02	– ·02	13·19	23 30 97	·78	– ·01
W	τ Scorpii........	29 36·03	·00	+ ·30	+ ·05	+ ·03	– ·02	36·39	29 54·13	·74	+ ·03
	597.	31 34·25	·00	+ ·12	+ ·04	+ ·03	– ·02	34·42	31 52·06	·64	+ ·13
	231.	37 22·69	+ ·01	– ·27	+ ·05.	+ ·04	– ·02	22·50	37 40·35	·85	– ·08
	232..	39 19·22	+ ·02	– ·37	+ ·05	+ ·04	– ·03	18·93	39 36·78	·85	– ·08
	ϵ Scorpii.........	43 38·20	+ ·02	+ ·37	+ ·05	+ ·04	– ·03	38·65	43 56·54	·89	– ·12
	233.	52 49·73	+ ·02	– ·05	+ ·04	+ ·05	– ·02	49·77	53 07·38	·61	+ ·16

$a = +^{s}\cdot 501 \qquad c = -^{s}\cdot 041$

Chronometer correction at $16^{h}\ 00^{m} = +17^{s}\cdot 767 \pm {}^{s}\cdot 019$

TRANSIT OBSERVATIONS.

Station: Fanning Island. Date, June 24th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·08	s.		h. m. s.	s.	s.
W	205	15 23 32·84	+ ·02	− ·22	− ·09	+ ·04	− ·02	32·57	15 23 52·07	+19·50	+ ·03
	206	27 09·74	+ ·02	− ·35	− ·11	+ ·03	− ·03	09·30	27 28·91	·61	− ·08
	593	29 49·39	+ ·02	+ ·14	− ·08	+ ·03	− ·02	49·48	30 08·91	·43	+ ·10
	469	34 03 83	+ ·02	− ·34	− ·11	+ ·02	− ·03	03·39	34 22 89	·50	+ ·03
	211	38 23·24	+ ·02	− ·18	− ·09	+ ·02	− ·02	22·99	38 42·59	·60	− ·07
E	218	51 41·44	+ ·09	− ·09	+ ·09	·00	− ·02	41·51	52 00·93	·42	+ ·11
	595	59 31·04	+ ·09	+ ·18	+ ·09	− ·01	− ·02	31·37	59 50·92	·55	− ·02
	222	16 08 58·79	+ ·09	+ ·06	+ ·08	− ·02	− ·02	58·98	16 09 18·57	·59	− ·06
	σ Scorpii	15 00·98	+ ·09	+ ·23	+ ·09	− ·03	− ·02	01·34	15 20·92	·58	− ·05
	225	17 21·55	+ ·09	− ·12	+ ·09	− ·03	− ·02	21·56	17 41·06	·50	+ ·03

$a = +^{s}\cdot430 \qquad c = +^{s}\cdot082$

Chronometer correction at $15^{h}\ 50^{m} = +19^{s}\cdot530 \pm {}^{s}\cdot018$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
E	473	16 20 39·49	+ ·67	− ·09	+ ·14	+ ·05	− ·02	39·64	16 20 59·11	+19·47	− ·04
	τ Scorpii	29 34·17	+ ·06	+ ·29	+ ·16	+ ·04	− ·02	34·70	29 54·13	·43	·00
	597	31 32·39	+ ·05	+ ·12	+ ·14	+ ·04	− ·02	32·72	31 52·06	·34	+ ·09
	232	39 17·45	+ ·07	− ·36	+ ·18	+ ·03	− ·03	17·34	39 36·78	·44	− ·01
	ε Scorpii	43 36·49	+ ·07	+ ·36	+ ·17	+ ·02	− ·03	37·08	43 56·54	·46	− ·03
	478	47 23·09	+ ·07	− ·10	+ ·15	+ ·02	− ·02	23·21	47 42·59	·38	+ ·05
	233	52 47·73	+ ·07	− ·05	+ ·14	+ ·01	− ·02	47·88	53 07·38	·50	− ·07
W	234	56 18·39	+ ·03	− ·26	− ·16	+ ·01	− ·02	17·99	56 37·33	·34	+ ·09
	599	17 15 47·23	+ ·02	+ ·26	− ·15	− ·02	− ·02	47·32	17 16 06·59	·27	+ ·16
	σ Ophiuchi	21 25·67	+ ·03	·00	− ·14	− ·03	− ·02	25 51	21 45·05	·54	− ·11
	241	30 09·56	+ ·02	− ·07	− ·14	− ·04	− ·02	09·31	30 28·73	·42	+ ·01
	600	31 45·69	+ ·02	+ ·16	− ·15	− ·04	− ·02	45·66	32 05·18	·52	− ·09
	245	38 24·42	+ ·03	·00	− ·14	− ·05	− ·02	24·24	38 43·77	·53	− ·10

$a = +^{s}\cdot485 \qquad c = +^{s}\cdot140$

Chronometer correction at $17^{h}\ 00^{m} = +19^{s}\cdot433 \pm {}^{s}\cdot017$

TRANSIT OBSERVATIONS.

Station: Suva. Date, June 3rd, 1903. Observer: Otto Klotz.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·15	s.		h. m. s.	m. s.	s.
E	β Chamæleontis	12 16 25·58	− ·19	−10·62	− 96	+ ·11	− ·10	13·82	12 12 45·92	−3 27·90	− ·02
	δ^2 Corvi.......	28 20·92	·08	+ ·10	− ·20	+ ·08	− ·02	20·80	24 52·88	·92	·00
	ρ Virginis	40 27·45	− ·07	+1·16	− ·19	+ ·05	− ·02	28·38	36 60·46	·92	·00
	35 Virginis.....	46 24·41	− ·07	+ ·90	− ·19	+ ·04	− ·02	25·07	42 57·10	·97	+ ·05
	31 Comæ......	50 26·52	− ·06	+1·85	− ·21	+ ·03	− ·02	28·11	46 60·31	·80	− ·12
	δ Virginis ...	54 12·39	− ·07	+ ·90	− ·19	+ ·02	− ·02	13·63	50 45·11	·92	·00
	ϵ Virginis.....	13 00 49·94	− ·07	+1·19	− ·19	·00	− ·02	50·85	57 22·94	·91	− ·01
W	γ Hydræ.. ...	17 09·59	·17	− ·21	+ ·20	− ·04	− ·02	09·35	13 13 41·45	·90	− ·02
	ι Centauri.....	18 40·28	− ·19	− ·90	+ ·23	− ·04	− ·02	39 36	15 11·47	·89	− 03
	α Virgin s.	23 35·05	− ·16	+ ·31	+ ·19	− ·05	− ·02	35·32	20 07·36	·96	+ ·04
	ζ Virginis.	33 14·67	− ·15	+ ·74	+ ·19	− ·08	− ·02	15·35	29 47·32	28·03	+ ·11
	ϵ Centauri.....	37 18·29	− ·21	−2·16	+ ·30	− ·09	− ·03	16·10	33 48·30	27·80	− ·12
	m Virginis.....	40 01·37	− ·16	+ ·40	+ ·19	− ·10	− ·02	01·68	36 33·67	28·01	+ ·09
	τ Boötis.......	46 07·89	− ·14	+1·47	+ ·20	− ·11	− ·02	09·29	42 41·33	27·96	+ ·04

$a = -2^{s}\cdot376$ $c = -{}^{s}\cdot188$

Chronometer correction at $13^{h}\ 1^{m} = -3^{m}\ 27^{s}\cdot921 \pm {}^{s}\cdot013$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, June 4th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·17	s.		h. m. s.	m. s.	s.
E	ε Virginis. . . .	13 00 51·52	− ·01	+2·50	− ·21	+ ·10	− ·02	53·88	12 57 22·93	−3 30·95	− ·06
	θ Virginis.	08 27·89	− ·01	+1·15	− ·21	+ ·09	− ·02	28·89	13 04 57·87	31·02	+ ·01
	γ Hydræ.	17 13·06	− ·01	− ·45	− ·22	+ ·06	− ·02	12·42	13 41·44	30·98	− ·03
	ι Centauri.	18 44·67	− ·01	−1·90	− ·26	+ ·05	− ·02	42·53	15 11·46	31·07	+ ·06
	ζ Virginis.	33 16·93	− ·01	+1·55	− ·21	+ ·01	− ·02	18·25	29 47·31	30·94	− ·07
	ε Centauri.	37 24·30	− ·01	−4·54	− ·33	·00	− ·03	19·39	33 48·28	31·11	+ ·10
	m Virginis.	40 04·03	− ·01	+ ·85	− ·21	− ·01	− ·02	04·63	36 33·66	30·97	− ·04
W	τ Boötis	46 09·17	·00	+3·10	+ ·22	− ·03	− ·02	12·44	42 41·32	31·12	+ ·11
	ζ Centauri.	53 07·07	·00	−3·50	+ ·30	− ·05	− ·03	03·79	49 32·87	30·92	− ·09
	τ Virginis.	14 00 14·20	·00	+1·70	+ ·21	− ·07	− ·02	16·02	56 44·98	31·04	+ ·03
	π Hydræ.	04 25·35	·00	·75	+ ·23	− ·08	− ·02	24·73	14 00 53·74	30·99	− ·02
	κ Virginis.	11 16·10	·00	+ ·75	+ ·21	− ·10	− ·02	16·94	07 45·85	31·09	+ ·08
	α Boötis.	14 44·06	·00	+3·25	+ ·22	− ·10	− ·02	47·41	11 16·43	30·98	− ·03

$a = +5^s{\cdot}011 \quad c = -{}^s{\cdot}209$

Chronometer correction at $13^h\ 37^m = -3^m\ 31^s{\cdot}014 \pm {}^s{\cdot}014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	β Libræ.	15 15 20·36	+ ·03	+ ·80	+ ·18	+ ·13	− ·02	21·48	15 11 49·99	−3 31·49	+ ·13
	ζ¹ Libræ.	26 21·09	+ ·03	+ ·15	+ ·19	+ ·09	− ·02	21·53	22 50·10	·43	+ ·07
	γ Lupi.	32 17·85	+ ·03	2·56	+ ·23	+ ·08	− ·03	15·60	28 44·37	·23	− ·13
	α Coronæ.	34 04·39	+ ·02	+3·97	+ ·20	+ ·07	·02	08·63	30 37·31	·32	− ·04
	α Serpentis. . . .	43 01·08	+ ·02	+2·11	+ ·18	+ ·05	·02	03·42	39 32·05	·37	+ ·01
	μ Serpentis. . . .	48 06·12	+ ·02	+1·41	+ ·18	+ ·03	− ·02	07·74	44 36·24	·50	+ ·14
	β Triang. Aust.	50 20·18	+ ·04	−7·73	+ ·39	+ ·03	− ·04	12·87	46 41·56	·31	− ·05
E	δ Scorpii.	58 10·82	+ ·09	− ·40	− ·19	+ ·01	− ·02	10·31	54 39·02	·29	− ·07
	β¹ Scorpii	16 03 22·51	+ ·09	− ·15	− ·19	− ·01	− ·02	22·23	59 50·87	·36	·00
	γ² Normæ	16 14·88	+ ·11	−4·07	− ·28	− ·03	·03	10·58	16 12 39·19	·39	+ ·03
	γ Herculis.	21 09·28	+ ·07	+3·26	− ·19	− ·06	− ·02	12·34	17 41·05	·29	− ·07
	α Scorpii.	27 03·17	+ ·09	− ·80	− ·20	− ·08	− ·02	02·16	23 30·90	·26	− ·10
	λ Ophiuchi . . .	29 33.83	+ ·08	+1·76	− ·18	− ·08	− ·02	35·39	26 04·01	·38	+ ·02
	α Triang. Aust.	42 13·38	+ ·15	−10·75	− ·49	− ·12	− ·06	02·11	38 30·67	·44	+ ·08

$a = -5^s{\cdot}022 \quad c = -{}^s{\cdot}178$

Chronometer correction at $16^h\ 00^m = -3^m\ 31^s{\cdot}361 \pm {}^s{\cdot}014$

TRANSIT OBSERVATIONS.

Station: Suva. Date, June 9th, 1903. Observer: Otto Klotz.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·12	s.		h. m. s.	m. s.	s.
E	γ Crucis.......	12 29 34·71	+ ·06	+ ·75	− ·34	− ·09	− ·04	35·23	12 25 50·20	−3 45·03	+ ·06
	β Corvi........	33 04·73	+ ·06	− ·06	− 21	+ ·08	− ·02	04 70	29 19·71	44·99	+ ·02
	ρ Virginis.....	40 45·83	+ ·06	− ·32	− ·19	+ ·07	− ·02	45·43	37 00·40	45·03	+ ·06
	β Crucis.......	45 50·97	+ ·13	− ·85	− ·37	+ ·06	− ·04	51·60	42 06·70	44·90	− ·07
	δ Virginis.....	54 30·24	+ ·11	− ·25	− ·19	+ ·04	− ·02	29·93	50 45·06	44·87	− ·10
	ε Virginis.....	13 01 08·23	+ ·12	− ·33	− ·19	+ ·03	− ·02	07·84	57 22·89	44 95	− ·02
	θ Virginis.....	08 43 04	− ·15	− ·15	− ·19	+ ·01	− ·02	42 84	13 04 57·83	45·01	− ·04
W	γ Hydræ......	17 26·05	− ·11	+ ·08	− ·21	− ·01	− ·02	26·42	13 41·40	45·02	− ·05
	α Virginis.....	23 52·21	− ·10	− ·11	− ·19	− ·02	− ·02	52·35	20 07·32	45·03	+ ·06
	ζ Virginis.....	33 32 36	− ·10	− ·27	− ·19	− ·04	− 02	32·32	29 47·28	45·04	− ·07
	ε Centauri.....	37 32 08	− ·13	− ·78	− ·30	·05	− ·03	33·21	33 48·21	45·00	− ·03
	τ Virginis.....	14 00 30·06	− ·09	− ·29	− ·19	− ·09	− ·02	29 94	56 44·95	44·99	− ·02
	π Hydræ......	04 38·31	+ ·11	+ ·13	− ·21	− ·10	− ·02	28·64	14 00 53·72	44·92	− ·05
	κ Virginis.....	11 30·74	+ ·10	− ·13	− ·19	− ·12	− ·02	30·76	07 45·83	44·93	− ·04

$a_2 = -^s·855$ $a_1 = -^s\ 663$ $c = -^s\ 190$

Chronometer correction at $13^h\ 14^m = -3^m\ 44^s·971 \pm {}^s·014$

W	β Libræ	15 15 35·10	− ·11	− ·12	− ·14	+ ·19	− ·02	35·40	15 11 50·00	−3 45·40	− ·01
	ζ¹ Libræ	26 35·25	+ ·11	− ·02	+ ·14	+ ·17	− ·02	35·63	22 50·11	·52	− ·13
	γ Lupi........	32 28·86	+ ·14	+ ·39	+ ·18	+ ·16	− ·03	29·70	28 44·39	·31	− ·08
	β¹ Scorpii......	16 03 35·85	+ ·12	+ ·02	+ ·15	+ ·09	− ·02	36·21	59 50·90	·31	− ·08
	δ Ophiuchi....	13 03·79	+ ·11	− ·19	+ ·14	+ ·07	− ·02	03·90	16 09 18·56	·34	− ·05
	γ² Normæ.....	16 23·66	+ ·14	+ ·63	+ ·21	+ ·07	− ·03	24·68	12 39 24	·44	+ ·05
E	λ Scorpii.......	17 30 50·00	− ·41	− ·32	− ·17	− ·08	− ·03	50·45	17 27 05·06	·39	·00
	η Pavonis.....	40 02·93	+ ·56	−1·31	− ·32	− ·10	− ·05	04·33	36 18·95	·38	− ·01
	β Ophiuchi....	42 29·33	+ ·30	− ·30	− ·14	− ·10	− ·02	29·07	38 43·66	·41	+ 02
	μ Herculis.....	46 28·40	+ ·28	− ·63	− ·15	− ·11	− 02	27·77	42 42·38	·39	·00
	89 Herculis....	55 19·10	+ ·28	− ·60	− ·15	− ·13	− ·02	18·48	51 33·10	·38	− ·01
	ν Ophiuchi....	57 29·69	+ ·35	− ·12	− ·14	− ·14	− ·02	29·62	53 44·19	·43	+ ·04

$a = +^s·777$ $c = -^s\ 140$

Chronometer correction at $16^h\ 50^m = -3^m\ 45^s·392 \pm {}^s·013$

TRANSIT OBSERVATIONS.

Station: Suva. Date, June 10th, 1903. Observer: Otto Klotz.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·15	s.		h. m. s.	m. s.	s.
E	β Chamæleontis	12 16 30·44	+ ·40	+ 2·76	− 1·02	+ ·11	− ·10	32·59	12 12 45·31	− 3 47·28	− ·02
	β Corvi	33 06·89	+ ·17	+ ·06	− ·22	+ ·07	− ·02	06·95	29 19·70	·25	− ·01
	ρ Virginis	40 48·00	+ ·14	− ·30	− ·20	+ ·05	− ·02	47·67	37 00·39	·28	+ ·02
	35 Virginis	46 44·55	+ ·15	− ·23	− ·20	+ ·04	− ·02	44·29	42 57·03	·26	·00
	31 Comæ	50 48·14	+ ·13	− ·48	− ·23	+ ·02	− ·02	47·56	46 60·23	·33	+ ·07
	δ Virginis	54 32·51	+ ·15	− ·23	− ·20	+ ·01	− ·02	32·22	50 45 04	·18	·08
	ε Virginis	13 01 10·47	+ ·14	− ·31	− ·20	·00	− ·02	10·08	57 22·88	·20	− ·06
W	θ Virginis	08 44 98	+ ·16	− ·14	+ ·20	− ·02	− ·02	45·16	13 04 57·82	·34	+ ·08
	γ Hydræ	17 28·27	+ ·17	+ ·06	+ ·21	− ·04	− ·02	28·65	13 41·39	·26	·00
	ι Centauri	18 57·96	+ ·19	+ ·23	+ 25	− ·05	− 02	58.56	15 11·40	·16	− 10
	α Virginis	23 54·42	+ ·16	− ·08	+ ·20	− ·06	− ·02	54·62	20 07·31	·31	+ ·05
	ζ Virginis. ...	33 34·55	+ ·15	− ·19	+ ·20	− ·08	− ·02	34·61	29 47·27	·34	+ ·08
	m Virginis	40 20·74	+ ·16	− ·10	+ ·20	− ·10	− ·02	20·88	36 33·63	·25	− ·01
	τ Boötis	46 28·69	+ ·14	− ·38	+ ·20	− ·11	− ·02	28·52	42 41·27	·25	− ·01

$a = +^{s}\cdot618 \qquad c = -^{s}\cdot198$

Chronometer correction at $13^{h}\ 00^{m} = -3^{m}\ 47^{s}\cdot263 \pm {}^{s}\cdot011$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ρ Boötis.	14 31 29 05	+ ·05	− ·74	+ ·27	+ ·10	− ·03	28·70	14 27 41·16	− 3 47·54	− ·02
	ε² Boötis	44 35·12	+ ·06	− ·56	+ ·24	+ ·07	− ·02	34·91	40 47·33	·58	+ 02
	α Libræ	49 20·86	+ ·07	− ·03	+ ·22	+ ·06	− ·02	21·16	45 33·55	·61	− ·05
	ξ² Libræ	55 20·46	+ ·07	− ·09	+ ·21	+ ·04	− ·02	20·67	51 33 03	·64	− ·08
	20 Libræ	15 02 13·71	+ ·08	+ ·09	+ ·23	+ ·03	− ·02	14·12	58 26·67	·45	− ·11
E	β Libræ	15 37·57	+ ·29	− ·11	− 21	− ·01	− ·02	37·51	15 11 50·00	·51	− ·05
	α Coronæ	34 25·49	+ ·23	− ·55	− ·23	− ·05	− ·02	24·87	30 37·30	·57	+ ·01
	α Serpentis	43 19·95	+ ·26	− ·29	− ·21	− ·07	− ·02	19 62	39 32·07	·55	− ·01
	μ Serpentis	48 24·01	+ ·28	− ·19	− ·21	− ·09	− ·02	23·78	44 36·27	·51	− ·05
	ε Serpentis. ..	49 49·42	+ ·28	− ·16	− ·21	− ·09	− ·02	49·22	46 01·53	·69	+ ·13
	γ Serpentis	55 48·97	+ ·25	− ·40	− 22	− ·10	− ·02	48·48	51 60·95	·53	− ·03

$a = +^{s}\cdot692 \qquad c = -^{s}\cdot209$

Chronometer correction at $15^{h}\ 13^{m} = -3^{m}\ 47^{s}\cdot561 \pm {}^{s}\cdot020$

TRANSIT OBSERVATIONS.

Station: SUVA. Date, June 11th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = −.14	s.		h. m. s.	m. s.	s.
E	β Chamæleontis	12 16 33·49	−·03	+2·79	−1·24	+·15	−·10	35·06	12 12 45·22	−3 49·84	+·06
	δ² Corvi........	28 42·66	+·17	−·02	−·25	+·12	−·02	42·66	24 52·79	·87	+·09
	ε Virginis.....	13 01 13·06	+·15	−·31	−·25	+·05	−·02	12·68	57 22·87	·81	+·03
	α Virginis.....	23 57·23	+·17	−·08	−·25	+·02	−·02	57·07	13 20 07·31	·76	−·02
	ε Centauri....	37 37·50	+·22	+·57	−·39	−·03	−·03	37·84	33 48·18	·66	−·12
	m Virginis....	40 23·57	+·17	−·11	−·24	−·04	−·02	23·33	36 33·62	·71	−·07
	τ Boötis. ...	46 31·57	+·14	−·39	−·25	−·06	−·02	30·99	42 41·27	·72	−·06
W	ζ Centauri.....	53 21·72	+·10	+·44	+·35	−·07	−·03	22·51	49 32·80	·71	−·07
	τ Virginis.....	14 00 34·80	+·08	−·21	+·24	−·09	−·02	34·80	56 44·94	·86	+·08
	θ Centauri.....	04 50·80	+·09	+·24	+·30	−·10	−·02	51·31	14 01 01·54	·77	−·01
	κ Virginis.....	11 35·56	+·08	−·09	+·24	−·12	−·02	35·65	07 45·82	·83	+·05
	α Boötis.......	15 06·38	+·07	−·41	+·26	−·13	−·02	06·15	11 16·39	·76	−·02
	f Boötis.......	25 49·02	+·07	−·41	+·26	−·15	−·02	48·77	21 58·90	·87	+·09

$a = +^{s}\cdot624$ $c = -^{s}\cdot242$

Chronometer correction at $13^{h}\ 21^{m} = -3^{m}\ 49^{s}\cdot782 \pm {}^{s}\cdot015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ξ² Libræ.....	14 55 22·72	+·25	−·09	+·19	+·12	−·02	23·17	14 51 33·03	−3 50·14	+·05
	20 Libræ.......	15 02 16·04	+·27	+·09	+·21	+·10	−·02	16·69	58 26·67	02	−·07
	ψ Boötis.......	04 09·83	+·20	−·58	+·21	+·10	−·02	09·74	15 00 19·69	·05	−·04
	ι¹ Libræ.......	10 34·00	+·26	+·01	+·20	+·08	−·02	34·53	06 44·50	·0	−·06
	o² Libræ......	21 29·82	+·26	−·04	+·20	+·06	−·02	30·28	17 40·08	·23	+·11
	ζ¹ Libræ.......	26 39·74	+·26	−·02	−·20	+·05	−·02	40·21	22 50·13	·00 8	−·01
E	α Coronæ......	34 27·83	+·32	−·57	−·21	+·03	−·02	27·38	30 37·30	·08	−·01
	α Serpentis....	43 22·28	+·38	−·30	−·19	·00	−·02	22·15	39 32·07	·08	−·01
	β Triang. Aust.	50 30·38	+·66	+1·11	−·42	−·01	−·04	31·68	46 41·59	·09	·00
	β¹ Scorpii......	16 03 40·84	+·43	+·02	−·20	−·04	−·02	41·03	59 50·91	·12	+·03
	δ Ophiuchi.....	13 08·77	+·40	−·18	−·19	−·06	−·02	08·72	16 09 18·60	·12	+·03
	λ Ophiuchi.....	29 54·35	+·39	−·25	−·19	−·10	−·02	54·18	26 04·08	·10	+·01
	ζ Ophiuchi.....	35 42·15	+·41	−·10	−·19	−·12	−·02	42·13	31 52·04	·09	·00

$a = +^{s}\cdot721$ $c = -^{s}\cdot191$

Chronometer correction at $15^{h}\ 45^{m} = -3^{m}\ 50^{s}\cdot090 \pm {}^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, June 16th, 1903. Observer : OTTO KLOTZ

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·10	s.		h. m. s.	m. s.	s.
E	κ Virginis.	14 11 48·37	+ ·04	− ·08	− ·17	+ ·05	− ·02	48·19	14 07 45·82	−4 02·37	− ·09
	α Boötis.......	15 19·27	+ ·07	− ·36	− ·18	+ ·05	− ·02	18·83	11 16·35	·48	+ ·02
	f Boötis.......	26 01·82	+ ·08	− ·36	− ·18	+ ·03	− ·02	01·37	21 58·88	·49	+ ·03
	ρ Boötis	31 44·25	+ ·07	− ·60	− ·22	+ ·02	− ·03	43·49	27 41·11	·38	− ·08
	η Centauri.....	33 26·55	+ ·10	+ ·41	− ·23	+ ·02	− ·03	26·82	29 24·40	·42	− ·04
	α Circini.	38 47·14	+ ·18	+ ·94	− ·39	+ ·01	− ·05	47·83	34 45·34	·49	+ ·03
	ϵ^2 Boötis	44 50·39	+ ·09	− ·45	− ·19	·00	− ·02	49·82	40 47·28	·54	+ ·08
W	α Libræ.	49 35·88	− ·01	− ·02	+ ·17	− ·01	− ·02	35·99	45 33·53	·46	·00
	ξ^2 Libræ.	55 35·51	− ·01	− ·07	+ ·17	− ·02	− ·02	35·56	51 33·02	·54	+ ·08
	20 Libræ	15 02 28·83	− ·01	+ ·07	+ ·18	− ·03	− ·02	29·02	58 26·65	·37	− ·09
	ψ Boötis	04 22·43	− ·01	− ·45	+ ·19	− ·04	− ·02	22·10	15 00 19·66	·44	− ·02
	γ Triang. Aust.	13 58·45	− ·02	+1·21	+ ·48	− ·05	− ·06	60·01	09 57·58	·43	− ·03
	β Libræ.	15 52·56	− ·01	− ·09	+ ·17	− ·05	− ·02	52·56	11 49·99	·57	+ ·11

$a = +^{s}\cdot560$ $c = -^{s}\cdot170$

Chronometer correction at $14^{h}\ 43^{m} = -4^{m}\ 02^{s}\cdot461 \pm ^{s}\cdot014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
W	α Serpentis....	15 43 34·77	+ ·03	− ·26	+ ·20	+ ·06	− ·02	34·78	15 39 32·07	−4 02·71	+ ·11
	μ Serpentis. ...	48 38·86	+ ·03	− ·17	+ ·20	+ ·06	− ·02	38·96	44 36·28	·68	+ ·08
	β Triang. Aust.	50 42·63	+ ·05	+ ·95	+ ·43	+ ·05	− ·04	44·07	46 41·57	·50	− ·10
	γ Serpentis. . .	56 03·70	+ ·03	− ·36	+ ·20	+ ·04	− ·02	03·59	52 00·95	·64	+ ·04
	δ Scorpii.......	58 41·37	+ ·03	+ ·05	+ ·21	+ ·04	− ·02	41·68	54 39·07	·61	+ ·01
	β^1 Scorpii.......	16 03 53·35	+ ·03	+ ·02	+ ·21	+ ·03	− ·02	53 62	59 50·92	·70	+ ·10
	δ Ophiuchi.....	13 21·09	+ ·03	− ·15	+ ·20	+ ·01	− ·02	21·16	16 09 18·61	·55	− ·05
E	γ Herculis.	21 44·09	+ ·26	− ·40	− ·21	·00	− ·02	43·72	17 41·08	·64	+ ·04
	α Scorpii.......	27 33·33	+ ·34	+ ·10	− ·22	− ·01	− ·02	33·52	23 30·99	·53	− ·07
	α Triang. Aust.	42 32·29	+ ·54	+1·32	− ·54	− ·03	− ·06	33·52	38 30·82	·70	+ ·10
	ε Scorpii	47 58·81	+ ·36	+ ·20	− ·24	− ·04	− ·02	59·07	43 56·50	·57	− ·03
	κ Ophiuchi.....	57 10·32	+ ·25	− ·38	− ·20	− ·06	− ·02	09·91	53 07·40	·51	− ·09
	30 Ophiuchi....	17 00 02·40	+ ·30	− 16	− ·20	− ·06	− ·02	02·26	55 59·73	·53	− ·07

$a = +^{s}\cdot617$ $c = -^{s}\cdot195$

Chronometer correction at $16^{h}\ 22^{m} = -4^{m}\ 02^{s}\cdot605 \pm ^{s}\cdot016$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, June 22nd, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·10	s.		h. m. s.	m. s.	s.
E	γ Hydræ	13 17 57·62	+ ·04	+ ·04	− ·20	+ ·08	− ·02	57·56	13 13 41·27	− 4 16·29	+ ·04
	ι Centauri	19 27·45	+ ·04	+ ·21	− ·23	+ ·07	− ·02	27·52	15 11·25	·27	+ ·02
	α Virginis.....	24 23·69	+ ·04	− ·07	− ·19	+ ·06	− ·02	23·51	20 07·20	·31	+ ·06
	ζ Virginis.....	34 03·73	+ ·04	− ·17	− ·19	− ·05	− ·02	03·44	29 47·16	·28	+ ·03
	ε Centauri	38 03·97	+ ·05	+ ·49	− ·30	− ·04	− ·03	04·22	33 47·99	·23	− ·02
	τ Boötis	46 57·90	+ ·03	− ·34	− ·20	− ·03	− ·02	57·40	42 41·16	·24	− ·01
	η Boötis	54 22·70	+ ·03	− ·35	− ·20	+ ·02	− ·02	22·18	50 06·01	·17	− ·08
W	β Centauri	14 01 18·23	− ·08	+ ·71	+ ·38	·00	− ·04	19·20	57 02·99	·21	− ·04
	π Hydræ	05 09·64	− ·06	− ·08	+ ·21	·00	− ·02	09·85	14 00 53·62	·23	− ·02
	κ Virginis.....	12 02·02	− ·06	− ·08	+ ·19	− ·02	− ·02	02·03	07 45·76	·27	+ ·02
	f Boötis.......	26 15·36	− ·05	− ·35	− ·20	− ·04	− ·02	15·10	21 58·83	·27	+ ·02
	ρ Boötis	31 57·69	− ·04	− ·58	− ·24	− ·05	− ·03	57·23	27 41·04	·19	− ·06
	ε² Boötis..	45 03·83	− ·04	− ·44	+ ·21	− ·07	− ·02	03·47	40 47·22	·25	·00
	α Libræ	49 49·81	− ·06	− ·02	− ·20	− ·08	− ·02	49·83	45 33·49	·34	+ ·09

$a = +^{s}\cdot542 \qquad c = -^{s}\cdot189$

Chronometer correction at $14^{h}\ 03^{m} = -4^{m}\ 16^{s}\cdot254 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, June 24th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·12	s.		h. m. s.	m. s.	s.
E	31 Comæ.	12 51 21·14	+ ·12	− ·50	·21	+ ·07	− ·02	20·60	12 46 60·04	−4 20·56	+ ·06
	δ Virginis....	55 05·62	+ ·14	− ·24	− ·19	+ ·06	− ·02	05·37	50 44·90	·47	− ·03
	ε Virginis.....	13 01 43·57	+ ·13	− ·32	− ·19	+ ·05	− ·02	43·22	57 22·73	·49	− ·01
	θ Virginis.....	09 18·34	+ ·14	− ·15	− ·19	+ ·04	− ·02	18·16	13 04 57·69	·47	− ·03
	γ Hydræ......	18 01·68	+ ·16	+ ·06	− ·20	+ .02	− ·02	01·70	13 41·25	·45	− ·05
	ι Centauri	19 31·63	+ ·17	+ ·24	− ·23	+ ·02	− ·02	31·81	15 11·22	·59	+ ·09
	α Virginis ...	24 27·80	+ ·15	− ·08	− ·19	+ ·01	− ·02	27·67	20 07·18	·49	− ·01
W	ζ Virginis. ..	34 07·77	− ·01	− ·20	+ ·19	− ·01	− ·02	07·72	29 47 15	·57	+ ·07
	ε Centauri	38 07·58	− ·01	+ ·59	+ ·30	− ·02	− ·03	08·41	33 47·95	·46	− ·04
	m Virginis ..	40 53·99	− ·01	− ·11	+ ·19	− ·02	− ·02	54·02	36 33·52	·50	·00
	τ Boötis.......	47 01·84	− ·01	− ·40	+ 20	− ·04	− ·02	01·57	42 41·13	44	− ·06
	ζ Centauri	53 52·51	− ·01	+ ·45	+ ·27	− ·05	− ·03	53·14	49 32·62	·52	− ·02
	τ Virginis	14 01 05 49	− ·01	− ·22	+ ·19	− ·06	− ·02	05·37	56 44·85	·52	+ ·02
	π Hydræ... ..	05 13·85	− ·01	+ ·10	+ ·21	− ·07	− ·02	14·06	14 00 53·60	·46	− ·04

$a = +^{s}\cdot643$ $c = -^{s}\cdot187$

Chronometer correction at $13^{h}\ 28^{m} = -\ 4^{m}\ 20^{s}\ 501 \pm {}^{s}\cdot009$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	α Boötis.... ..	14 15 37·02	+ ·03	− ·33	+ ·20	+ ·09	− ·02	36·99	14 11 16·27	−4 20·72	+ ·03
	f Boötis.......	26 19·60	+ ·03	− ·33	+ ·20	+ ·07	− ·02	19 55	21 58·81	·74	+ ·05
	ρ Boötis.	32 01·86	+ 02	− ·54	+ ·24	+ ·06	− ·03	01·61	27 41·02	·59	− ·10
	α Circini	39 04·56	+ ·05	+ ·85	+ ·44	+ ·04	− ·02	05·92	34 45·19	·73	+ ·04
	ε² Boötis.......	45 07·99	+ ·02	− ·41	+ ·21	+ ·03	− ·02	07·82	40 47·21	·61	− ·08
	α Libræ.... ...	49 53·98	+ ·03	− 02	+ ·20	+ ·02	− ·02	54·19	45 33·49	·70	+ ·01
E	ξ² Libræ.	55 53·79	+ ·21	− ·07	− ·19	+ ·01	− ·02	53·73	51 32·98	.75	+ ·06
	20 Libræ.	15 02 47·26	+ ·23	+ ·07	− ·21	·00	− ·02	47·33	58 26·62	·71	+ ·02
	ψ Boötis.......	04 40·81	+ ·17	− ·41	− ·21	− ·01	− ·02	40·33	15 00 19·60	·73	+ ·04
	ι¹ Libræ.	11 05 13	+ ·22	+ ·01	− ·20	− ·02	− ·02	05·12	06 44·47	·65	− ·04
	β Libræ.	16 10·83	+ ·21	− ·08	− ·19	− ·03	− ·02	10·72	11 49·96	·76	+ ·07
	β Triang. Aust.	51 01·57	+ ·34	+ ·78	− ·42	− ·10	− ·04	02·13	46 41·53	·60	− ·09

$a = +^{s}\cdot506$ $c = -^{s}\cdot189$

Chronometer correction at $15^{h}\ 00^{m} = -\ 4^{m}\ 20^{s}.691 \pm {}^{s}\cdot013$

TRANSIT OBSERVATIONS.

Station: SUVA. Date, June 25th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·12	s.		h. m. s.	m. s.	s.
E	ζ Virginis.....	13 34 10·27	+ ·07	− ·14	− ·16	+ ·08	− ·02	10·10	13 29 47·14	−4 22·96	+ ·01
	ε Centauri.. ..	38 10·63	+ ·10	+ ·41	− ·26	+ ·07	− ·03	10·92	33 47·93	·99	+ ·04
	m Virginis.....	40 56·54	+ ·07	− ·07	− ·16	+ ·06	− ·02	56·42	36 33·51	·91	− ·04
	τ Boötis........	47 04·50	+ ·06	− ·27	− ·17	+ ·05	− ·02	04·15	42 41·13	23·02	+ ·07
	ζ Centauri.....	53 55·34	+ ·09	+ ·32	− ·23	+ ·04	− ·03	55·53	49 32·61	22·92	− ·03
	τ Virginis.... .	14 01 08·03	+ ·07	− ·15	− ·16	+ ·02	− ·02	07·79	56 44·84	·95	·00
	π Hydræ	05 16·54	+ ·08	+ ·08	− ·18	+ ·01	− ·02	16·51	14 00 53·59	·92	− ·03
W	κ Virginis.....	12 08·63	− ·03	− ·08	+ ·16	·00	− ·02	08·66	07 45·72	·94	− ·01
	α Boötis.......	15 39·41	− ·02	− ·30	+ ·17	− ·01	− ·02	39·23	11 16·27	·96	+ ·01
	f Boötis... ...	26 21·99	− ·02	− ·30	+ ·17	− ·03	− ·02	21·79	21 58·80	·99	+ ·04
	ρ Boötis.......	32 04·29	− ·02	− ·47	+ ·20	− ·04	− ·03	03·93	27 41·01	·92	− ·03
	ϵ^2 Boötis... ...	45 10·45	− ·02	− ·37	+ ·18	− ·07	− ·02	10·15	40 47·19	·96	+ ·01
	α Libræ.	49 56·41	− ·03	− ·02	+ ·17	− ·07	− ·02	56·44	45 33·48	·96	+ ·01

$a = +^{s}{\cdot}456 \qquad c = -^{s}{\cdot}159$

Chronometer correction at $14^{h}\ 12^{m} = -4^{m}\ 22^{s}{\cdot}952 \pm {}^{s}{\cdot}008$

W	ξ^2 Libræ	14 55 55·93	− ·01	− ·07	+ ·20	+ ·11	− ·02	56·14	14 51 32·98	−4 23·16	·00
	20 Libræ	15 02 49·38	− ·01	+ ·07	+ ·21	+ ·10	− ·02	49·73	58 26·61	·12	− ·04
	ψ Boötis......	04 42·85	− ·01	− ·44	+ ·22	+ ·10	− ·02	42·70	15 00 19·59	·11	− ·05
	ι^1 Libræ	11 07·36	− ·01	+ ·01	+ ·20	+ ·08	− ·02	07·62	06 44·46	·16	·00
	β Libræ	16 13·02	− ·01	− ·09	+ ·19	+ ·07	− ·02	13·16	11 49·95	·21	+ ·05
	ζ^1 Libræ	27 13·08	− ·01	− ·02	+ ·20	+ ·05	− ·02	13·28	22 50·09	·19	+ ·03
E	β Triang. Aust.	51 03·96	+ ·28	+ ·84	− ·43	·00	− ·04	04·61	46 41·51	·10	− ·06
	δ Scorpii......	59 02·26	+ ·19	+ ·05	− ·21	− ·01	− ·02	02·26	54 39·07	·19	+ ·03
	β^1 Scorpii......	16 04 14·25	+ ·19	+ ·02	− ·20	− ·02	− ·02	14·22	59 50·93	·29	+ ·13
	α Scorpii......	27 54·12	+ ·19	+ ·09	− ·21	− ·07	− ·02	54·10	16 23 31·01	·09	− ·07
	λ Ophiuchi....	30 27·57	+ ·17	− ·19	− ·19	− ·08	− ·02	27·26	26 04·10	·16	·00
	ζ Ophiuchi....	36 15·50	+ ·18	− ·08	− ·20	− ·09	− ·02	15·29	31 52·08	·21	+ ·05
	ε Scorpii......	48 19·63	+ ·20	+ ·18	− ·23	− ·11	− ·02	19·65	43 56·54	·11	− ·05

$a = +^{s}{\cdot}548 \qquad c = -^{s}{\cdot}192$

Chronometer correction at $15^{h}\ 52^{m} = -4^{m}\ 23^{s}{\cdot}162 \pm {}^{s}{\cdot}013$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, August 11th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·094	s.		h. m. s.	s.	s.
E	η Ophiuchi	17 05 13·94	+ ·14	− ·02	− ·23	+ ·06	− ·02	13·87	17 04 51·94	−21·93	+ ·07
	δ Herculis......	11 27·55	+ ·11	− ·37	− ·24	+ ·05	− ·02	27·08	11 05·23	·85	− ·01
	β Aræ..........	17 40·55	+ ·19	+ ·52	− ·39	+ ·04	− ·04	40·87	17 18·98	·89	+ ·03
	σ Ophiuchi.. ..	22 07·02	+ ·12	− ·19	− ·22	+ ·04	− ·02	06·75	21 44·87	·88	+ ·02
	λ Scorpii.......	27 26·89	+ ·16	+ ·20	− ·28	+ ·03	− ·03	26 97	27 05·09	·88	+ ·02
	α Ophiuchi.	30 50·82	+ ·11	− ·25	− ·23	+ ·02	− ·02	50·45	30 28·60	85	− ·01
	η Pavonis .	36 40·09	+ ·13	+ ·83	·52	+ ·01	− ·05	40·49	36 18·69	80	− ·06
W	89 Herculis.....	51 55·03	− ·04	− ·38	+ ·25	− ·01	− ·02	54·83	51 33·04	·79	− ·07
	ν Ophiuchi.	54 06·18	− ·05	− ·07	+ ·22	− ·02	− ·02	06·24	53 44·35	·89	− ·03
	γ^2 Sagittarii	59 59·96	− ·06	+ ·12	+ ·26	− ·03	− ·02	60·23	59 38·27	·96	+ ·10
	72 Ophiuchi.....	18 03 09·90	− ·04	− ·23	+ ·22	− ·03	− ·02	09·80	18 02 47·93	·87	+ ·01
	μ Sagittarii.....	08 23·00	− ·05	+ ·02	+ ·23	− ·04	− ·03	23·13	08 01·21	·92	+ ·06
	η Serpentis.	16 42·33	− ·04	− ·13	+ ·22	− ·05	− ·03	42·30	16 20·53	·77	− 09
	α Telescopii	20 12·60	− ·06	+ ·33	+ ·32	− ·06	− ·02	13·11	19 51·30	·81	− ·05

$a = +^{s}\cdot489$ $c = -^{s}\cdot222$

Chronometer correction at $17^{h}\ 43^{m} = -21^{s}\cdot863 \pm {}^{s}\cdot011$

TRANSIT OBSERVATIONS.

Station: SUVA. Date, August 14th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·08	s.		h. m. s.	s.	s.
E	ε Herculis....	16 57 03·70	09	− ·49	− ·21	+ ·07	− ·02	02·96	16 56 36·85	−26·11	− ·06
	δ Herculis......	17 11 32·00	− ·09	·42	·20	+ ·06	− ·02	31·33	17 11 05·18	·15	− ·02
	β Aræ	17 44·96	− ·16	+ ·59	− ·31	− ·05	− ·04	45·09	17 18·91	·18	+ ·01
W	η Serpentis.....	18 16 46·95	− ·15	− ·15	+ ·18	− ·03	− ·02	46·78	18 16 20·50	·28	+ ·11
	α Telescopii....	20 17·07	− ·20	+ ·38	+ ·26	− ·04	− ·03	17·44	19 51·26	·18	+ ·01
	λ Sagittarii ...	22 28·87	− ·17	+ ·08	+ ·20	− ·04	− ·02	28·92	22 02·65	·27	+ ·10
	α Lyræ	34 08·70	− ·11	− 60	+ ·23	− ·05	− ·03	08·14	33 42·01	·13	− ·04
	ʒ Aquilæ.......	37 27·35	− ·16	− ·09	+ ·18	− ·06	− ·02	27·24	37 01·08	·16	− ·01
	λ Pavonis ...	43 44·96	− ·25	− ·84	+ ·38	− ·07	− ·04	45·82	43 19·72	·10	− ·07
	σ Sagittarii	49 44·95	− ·18	− ·09	+ 20	− ·07	− ·02	44·97	49 18 72	·25	+ ·08

$a = +^{s}{\cdot}560 \qquad c = -^{s}{\cdot}178$

Chronometer correction at $17^{h}\ 53^{m} = -26^{s}{\cdot}173 \pm {}^{s}{\cdot}017$.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
W	γ Aquilæ.......	19 42 08·67	+ ·04	− ·28	+ ·16	+ 08	− ·02	08·65	19 41 42·14	−26·51	+ ·07
	α Aquilæ.	46 32·77	+ ·03	− ·34	+ ·16	+ ·07	− ·02	32·67	46 06·34	·33	− ·11
	ι Sagittarii.....	49 04·35	+ ·05	+ ·30	+ ·22	+ ·07	− ·03	04·96	48 38·45	·51	+ ·07
	α Pavonis ..	20 18 29·08	+ ·06	+ ·65	+ ·30	+ ·03	− ·04	30·08	20 18 03·69	·39	− ·05
	ρ Capricorni ...	23 49·66	+ ·04	·00	+ ·17	+ ·02	− ·02	49·87	23 23·33	·54	+ ·10
	ε Delphini	29 04·57	+ ·04	− ·28	+ ·16	+ ·01	− ·02	04·48	28 38·09	·39	− ·05
	α Delphini	35 37·89	+ ·03	− ·32	+ ·17	+ ·01	− ·02	37·76	35 11·33	·43	− ·01
E	ε Aquarii . ..	42 55·53	+ ·31	− ·08	− ·16	·00	− ·02	55·58	42 29·03	55	+ 11
	μ Aquarii	47 55·26	+ ·31	− ·08	− ·16	− ·01	− ·02	55·30	47 28·85	·45	+ ·01
	ι Piscis Aust...	55 50·52	+ ·36	+ ·17	− ·19	− ·02	− ·02	50 82	55 24·46	·36	− ·08
	α Equulei	21 11 28·57	+ ·29	− ·22	− ·16	− ·04	− ·02	28·42	21 11 01·95	·47	+ ·03
	ζ Capricorni....	21 37·75	+ ·34	+ ·05	− ·18	− ·05	− ·02	37·89	21 11·45	·44	·00
	ε Pegasi.......	39 55·37	+ ·28	− ·27	− ·16	− ·08	− ·02	55·12	39 28·75	·37	− ·07

$a = +^{s}{\cdot}564 \qquad c = -^{s}{\cdot}161$

Chronometer correction at $20^{h}\ 40^{m} = -26^{s}{\cdot}441 \pm {}^{s}{\cdot}015$.

TRANSIT OBSERVATIONS.

Station : SUVA. Date, August 17th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = - ·08	s.		h. m. s.	s.	s.
E	η Serpentis......	18 16 52·06	+ ·06	- ·13	- ·18	+ ·07	- ·02	51·86	18 16 20·47	- 31·39	+ ·09
	α Lyræ.........	34 13·97	+ ·04	- ·54	- ·21	+ ·04	- ·03	13·27	33 41·97	·30	·00
	2 Aquilæ.. . . .	37 32·47	+ ·06	- ·08	- ·18	+ ·04	- ·02	32·29	37 01·06	·23	- ·07
	λ Pavonis	43 50·44	+ ·08	+ ·76	- ·38	+ ·03	- ·04	50·89	43 19·65	·24	- ·06
	σ Sagittarii.....	49 50·13	+ ·06	+ ·08	- ·20	+ ·02	- ·02	50·07	49 18·70	·37	+ ·07
W	π Sagittarii.....	19 04 34·59	- ·16	+ ·03	+ ·19	·00	- ·02	34·63	19 04 03·32	·31	·01
	α Aquilæ.	46 37·88	- ·12	- ·31	+ ·18	- ·05	·02	37·56	46 06·33	·23	- ·07
	ι Sagittarii. .	49 09·45	- ·18	+ ·27	+ ·24	- ·06	- ·03	09·69	48 38 41	·28	- ·02
	β Aquilæ.	51 07·76	- ·14	- ·21	+ ·18	- ·06	- ·02	07·51	50 36·20	·31	+ ·01
	c Sagittarii.....	57 16·77	- ·17	+ 10	+ ·20	- 07	- ·02	16·81	56 45·49	·32	+ ·02

$a = +^{s}\cdot 509 \qquad c = -^{s}\cdot 175$

Chronometer correction at $19^{h}\ 06^{m} = -31^{s}\cdot 299 \pm {}^{s}\cdot 013$.

W	θ Aquilæ.......	20 06 52·97	- ·14	- ·15	+ ·23	+ ·09	- ·02	52·98	20 06 21·41	- 31·57	+ ·11
	α¹ Capricorni....	12 51·19	- ·15	- ·05	+ ·23	+ ·08	- ·02	51·28	12 19·86	·42	- ·04
	α² Capricorni....	13 15·37	- ·15	- ·05	+ ·23	+ ·08	- ·02	15·46	12 43·92	·54	- ·08
	α Pavonis	18 34·19	- ·22	+ ·60	+ ·41	+ ·08	- ·04	35·02	18 03·69	·33	- ·13
	ρ Capricorni ...	23 54·79	- ·16	·00	+ ·24	+ ·07	- ·02	54·92	23 23·34	·58	+ ·12
	α Indi..........	31 20·06	- ·20	+ ·38	+ ·33	+ ·06	- ·03	20·60	30 49 14	·46	·00
E	β Aquarii.... .	21 27 02·36	+ ·06	- ·11	- ·23	- ·02	- ·02	02 04	21 26 30·68	·36	- ·10
	γ Gruis	48 38·71	+ ·08	+ ·22	- ·29	- ·04	- ·03	38·65	48 07·19	·46	·00
	α Aquarii..	22 01 23·37	+ ·06	- ·16	- ·23	- ·06	- ·02	22·96	22 00 51·56	·40	- ·06
	ι Pegasi	03 05·41	+ ·05	- ·39	- ·25	- ·07	- ·02	04·73	02 33·29	·41	- ·02
	α Toucani	12 27·38	+ ·10	+ ·73	- ·46	- ·08	- ·04	27·63	11 56·08	·55	+ ·09
	γ Aquarii.......	17 14·00	+ ·06	- ·15	- ·23	- ·08	- ·02	13·58	16 42·19	·39	- ·07
	σ Aquarii.... .	26 06·06	+ ·07	- ·06	- ·23	- ·09	- ·02	05·73	25 34 27	·46	·00

$a = +^{s}\cdot 524 \qquad c = -^{s}\cdot 225$

Chronometer correction at $21^{h}\ 15^{m} = -31^{s}\cdot 461 \pm {}^{s}\cdot 017$.

TRANSIT OBSERVATIONS.

Station: SUVA. Date, August 19th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·09	s.		h. m. s.	s.	s.
E	72 Ophiuchi	18 03 22·47	+ ·02	− ·22	− ·18	+ ·12	− ·02	22·19	18 02 47·87	− 34·32	·00
	η Serpentis	16 55·09	+ ·03	− ·12	− ·18	+ ·10	− ·02	54·90	16 29·45	·45	− ·13
	α Telescopii	20 25 32	+ ·03	+ ·32	− ·26	+ ·09	− ·03	25·47	19 51·19	·28	− ·04
	λ Sagittarii	22 36·93	+ ·03	+ ·07	− ·20	+ ·09	− ·02	36·90	22 02·60	·30	− ·02
	α Lyræ	34 16·88	+ ·02	− ·51	− ·23	+ ·07	− ·03	16·20	33 41·94	·26	− ·06
	σ Sagittarii	49 53·05	+ ·03	+ ·08	− ·20	+ ·05	− ·02	52·99	49 18·68	·31	− ·01
W	ι Sagittarii	19 49 12·55	− ·17	+ ·26	+ ·24	− ·04	− ·03	12·81	19 48 38·43	·38	+ ·06
	c Sagittarii	57 19·85	− ·16	+ ·09	+ ·20	− ·05	− ·02	19·91	56 45·49	·42	+ ·10
	ε Delphini	20 29 12 70	− ·13	− ·23	+ ·18	− ·10	− ·02	12·40	20 28 38·09	·31	− ·01
	α Indi	31 23·01	− ·18	+ ·35	+ ·26	− ·10	− ·03	23·31	30 49·14	·17	− ·15
	α Delphini	35 45·94	− ·12	− ·27	+ ·19	− ·11	− ·02	45·61	35 11·33	·28	− ·04
	ε Aquarii	43 03·55	− ·14	− ·07	+ ·18	− ·12	− ·02	03·38	42 29·04	·34	+ ·02

$a = +^{s}\cdot476$ $c = -^{s}\cdot179$

Chronometer correction at $19^{h}\ 23^{m} = -34^{s}\cdot317 \pm {}^{s}\cdot017$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	θ Capricorni	21 01 07·86	− ·13	− ·01	+ ·21	+ ·09	− ·02	08·00	21 00 33·34	− 34·66	+ ·11
	ζ Cygni	09 26·76	− ·09	− ·43	+ ·23	+ ·08	− ·02	26·53	08 51·99	·54	− ·01
	β Aquarii	27 05·18	− ·12	− ·11	+ ·20	+ ·05	− ·02	05·18	26 30·69	·49	− ·06
	ξ Aquarii	33 13·31	− ·12	− ·09	+ ·20	+ ·04	− ·02	13·32	32 38·84	·48	− ·07
	γ Capricorni	35 21·11	− ·13	− ·01	+ ·21	+ ·04	− ·02	21·20	34 46·63	·57	+ ·02
	ε Pegasi	40 03·43	− ·11	− ·24	+ ·20	+ ·03	− ·02	03·29	39 28·78	·51	− ·04
	δ Capricorni	42 19·34	− ·13	− ·02	+ ·21	+ ·03	− ·02	19·41	41 44·83	·58	+ ·03
E	σ Aquarii	22 26 08·98	+ ·21	− ·06	− ·21	− ·04	− ·02	08·86	22 25 34·29	·57	+ ·02
	β Gruis	37 30·69	+ ·27	+ ·37	− ·30	− ·06	− ·03	30·94	36 56·42	·52	− ·03
	η Pegasi	39 06·08	+ ·16	− ·43	− ·23	− ·06	− ·02	05·50	38 30·97	·53	− ·02
	λ Aquarii	48 11·33	+ ·20	− ·09	− ·20	− ·07	− ·02	11·15	47 36·63	·52	− ·03
	δ Aquarii	50 08·22	+ ·21	− ·02	− ·21	− ·07	− ·02	08·11	49 33·54	·57	+ ·02
	α Piscis Aust	52 55·47	+ ·23	+ ·12	− ·24	− ·08	− ·02	55·48	52 20·95	·53	− ·02
	α Pegasi	23 00 34·20	+ ·18	− ·29	− ·21	− ·09	− ·02	33·77	59 59·19	·58	+ ·03

$a = +^{s}\cdot505$ $c = -^{s}\cdot203$

Chronometer correction at $22^{h}\ 00^{m} = -34^{s}\cdot551 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, August 21st, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·11	s.		h. m. s.	s.	s.
E	γ^2 Sagittarii....	18 00 15·49	+ ·28	+ ·15	− ·26	+ ·07	− ·02	15·71	17 59 38·15	−37·56	+ ·09
	72 Ophiuchi.....	03 25·51	+ ·22	− ·28	− ·22	+ ·07	− ·02	25·28	18 02 47·84	·44	− ·03
	μ Sagittarii....	08 38·47	+ ·27	+ ·02	− ·24	+ ·06	− ·02	38·56	08 01·11	·45	− ·02
	η Serpentis....	16 57·98	+ ·24	− ·16	− ·22	+ ·04	− ·02	57·86	16 20·43	·43	− ·04
	α Telescopii. ..	20 28·19	+ ·32	+ ·40	− ·32	+ ·04	− ·03	28·60	19 51·15	·45	− ·02
	λ Sagittarii.. .	22 39·89	+ ·28	+ ·08	− ·24	+ ·03	− ·02	40·02	22 02·57	·45	− ·02
W	α Lyræ.... . .	34 19·76	+ ·01	− ·64	+ ·28	+ ·01	− ·03	19·39	33 41·90	·49	+ ·02
	2 Aquilæ....	37 38·34	+ ·01	− ·10	+ ·22	+ ·01	− ·02	38·46	37 01·02	·44	− ·03
	λ Pavonis.....	43 55·68	+ ·02	+ ·92	+ ·47	− ·01	− ·04	57·04	43 19·57	·47	·00
	σ Sagittarii....	49 55·88	+ ·01	+ ·10	+ ·25	− ·02	− ·02	56·20	49 18·66	·54	+ ·07
	ϵ Aquilæ......	55 53·73	+ ·01	− ·34	+ ·23	− ·03	− ·02	53·58	55 16·17	·41	− ·06
	ζ Aquilæ...	19 01 37·69	+ ·01	− ·14	+ ·22	− ·04	− ·02	37·72	19 01 00·11	·61	+ ·14
	π Sagittarii....	04 40·44	+ ·01	+ ·03	+ ·24	− ·04	− ·02	40·66	04 03·28	·38	− ·09
	δ Aquilæ......	21 17·23	+ ·01	− ·22	+ ·22	− ·07	− ·02	17·15	20 39·69	·46	− ·01

$a = +^{s}\cdot601$ $c = -^{s}\cdot220$

Chronometer correction at $18^h\ 40^m = -37^s\cdot470 \pm {}^s\cdot013$.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	β Aquilæ.......	19 51 13·64	+ ·09	− ·21	+ ·25	+ ·07	− ·02	13·82	19 50 36·18	−37·64	+ ·01
	c Sagittarii	57 22·56	+ ·11	+ ·10	+ ·28	+ ·06	− ·02	23·09	56 45·48	·61	− ·02
	θ Aquilæ........	20 06 58·88	+ ·10	− ·15	+ ·25	+ ·04	− ·02	59·10	20 06 21·40	·70	+ ·07
	α^1 Capricorni....	12 57·22	+ ·10	− ·05	+ ·25	+ ·03	− ·02	57·53	12 19·85	·68	+ ·05
	α^2 Capricorni. ..	13 21·29	+ ·10	− ·05	+ ·25	+ ·03	− ·02	21·60	12 43·92	·68	+ ·05
	α Pavonis......	18 40·03	+ ·14	+ ·59	+ ·46	+ ·02	− ·04	41·20	18 03·67	·53	− ·10
	ρ Capricorni....	24 00·67	+ ·11	·00	+ ·26	+ ·01	− ·02	01·03	23 23·33	·70	+ ·07
E	ϵ Delphini.	29 15·97	+ ·35	− ·25	− ·25	·00	− ·02	15·80	28 38·08	·72	+ ·09
	α Indi.	31 26·38	+ ·51	+ ·37	− ·40	·00	− ·03	26·83	30 49·13	·70	+ ·07
	α Delphini.	35 49·13	+ ·34	− ·29	− ·26	− ·01	− ·02	48·89	35 11·33	·56	− ·07
	ϵ Aquarii	43 06·72	+ ·37	− ·08	− ·25	− ·02	− ·02	06·72	42 29·04	·68	+ ·05
	ι Piscis Aust....	56 01·85	+ ·45	+ ·15	− ·30	− ·05	− ·02	02·08	55 24·48	·60	− ·03
	θ Capricorni ...	21 01 10·81	+ ·41	− ·01	− ·26	− ·06	− ·02	10·87	21 00 33·34	·53	− ·10
	ζ Cygni	09 29·99	+ ·30	− ·44	− ·29	− ·07	− ·02	29·47	08 51·99	·48	− ·15

$a = +^{s}\cdot513$ $c = -^{s}\cdot252$

Chronometer correction at $20^h\ 30^m = -37^s\cdot630 \pm {}^s\cdot015$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, August 22nd, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·11	s.		h. m. s.	s.	s.
E	β Aræ	17 17 57·21	+ ·07	+ ·51	− ·38	+ ·28	− ·04	57·65	17 17 18·71	−38·94	− ·05
	σ Ophiuchi . ..	22 23·68	+ ·05	− ·19	− ·22	+ 27	− ·02	23·57	21 44·72	·85	− ·04
	λ Scorpii	27 43·60	+ ·07	+ ·19	− ·28	+ ·26	− ·03	43·81	27 04·91	·90	− ·01
	α Ophiuchi	31 07·52	− ·05	− ·25	− ·22	+ ·25	− ·02	07·33	30 28 44	·89	·00
	η Pavonis.... ..	36 56·59	+ ·09	− ·82	− ·51	+ ·24	·05	57·18	36 18·33	85	− ·04
	β Ophiuchi . ..	39 22·58	− ·05	− ·19	− ·22	+ ·24	− ·02	22·44	38 43·54	·90	+ ·01
W	γ Capricorni ...	21 35 25·56	·00	− ·01	+ ·23	− ·19	− ·02	25·57	21 34 46·64	·93	+ ·04
	ε Pegasi........	40 07·83	·00	− ·23	+ ·22	− ·20	− ·02	07·60	39 28·79	·81	− ·08
	δ Capricorni....	42 23·82	·00	− ·01	+ ·23	− ·21	− ·02	23·81	41 44·84	·97	− ·08
	γ Gruis	48 45·98	·09	+ ·20	+ ·28	− ·22	− 03	46·21	48 07·23	·98	+ ·09
	α Gruis.........	22 02 49·75	·00	+ ·35	+ ·32	− ·24	− ·03	50·15	22 02 11·36	·79	− ·10
	γ Aquarii.....	17 21·35	·00	− ·14	+ ·22	− 27	− ·02	21·14	16 42·23	·91	+ ·02

$a = +^{s}\cdot485 \qquad c = -^{s}\cdot217$

Chronometer correction at $19^{h}\ 49^{m} = -38^{s}\ 894 \pm {}^{s}\cdot012$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	η Aquarii.... .	22 31 04·96	− ·02	− ·16	+ ·21	+ ·08	− ·03	05 04	22 30 25·77	−39·27	·00
	β Gruis....	37 35·02	− 02	+ ·39	+ ·31	+ ·07	− ·03	35·74	36 56·46	·28	+ ·01
	α Pegasi..	23 00 38·60	− ·01	− ·30	+ ·21	− ·03	− ·02	38·51	59 59·23	·28	+ 01
	γ Piscium	12 50·81	− ·02	− 19	+ ·21	+ ·01	− ·02	50·80	23 12 11·62	18	− ·09
	τ Pegasi..	16 33·17	− ·02	− ·33	+ ·23	·00	− ·02	33·03	15 53·72	·31	+ ·04
E	κ Piscium	22 40 36	− ·28	− ·17	− ·21	− ·01	− ·02	40·23	22 00·96	·27	·00
	ι Piscium	35 40·48	+ ·28	− ·21	− ·21	− ·04	− ·02	40·28	35 01·00	28	+ ·01
	δ Sculptoris. ...	44 34·79	+ 34	+ ·11	− ·24	− ·05	− ·02	34·93	43 55·65	·28	+ ·01
	φ Pegasi..	48 16·29	+ ·25	− ·34	− ·22	− ·06	− ·02	15·90	47 36·65	·25	− ·02
	ω Piscium	55 02·63	+ ·28	− ·22	− ·21	− ·07	− 02	02·39	54 23·12	·27	·00
	2 Ceti........ .	59 28·67	+ ·32	− ·01	− ·22	− ·08	− ·02	28·66	58 49·40	·26	− ·01

$a = +^{s}\cdot536 \qquad c = -^{s}\cdot210$

Chronometer correction at $23^{h}\ 15^{m} = -39^{s}\cdot266 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station ; SUVA. Date, August 23rd, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·10	s.		h. m. s.	s.	s.
E	θ Capricorni....	21 01 13·85	+ ·17	− ·01	− ·24	+ ·06	− ·02	13·81	21 00 33·34	40·47	+ ·01
	ζ Cygni........	09 32·98	+ ·12	− ·46	− ·26	+ ·05	− ·02	32·41	08 51·98	·43	− ·03
	α Equulei	11 42·71	+ ·15	− ·21	− ·23	+ ·05	− ·02	42·45	11 01·98	·47	+ ·01
	θ^1 Microscopii...	15 17·84	− ·18	+ ·29	− ·30	+ ·04	− 03	18·02	14 37·47	·55	+ ·09
	ζ Capricorni ..	21 51·96	+ ·17	+ ·05	− ·25	+ ·03	− ·02	51·94	21 11·49	·45	− ·01
	β Aquarii	27 11·30	+ ·16	− ·12	− ·23	+ ·02	− ·02	11·11	26 30·70	41	− ·05
	γ Capricorni....	35 27·15	+ ·17	− ·01	− ·23	+ ·01	− ·02	27·07	34 46·65	·42	− ·04
W	ε Pegasi.	40 09·45	− ·12	− ·26	+ ·23	·00	− ·02	09·28	39 28·79	·49	+ ·03
	δ Capricorni....	42 25·27	− ·14	− ·02	+ ·24	− ·01	− ·02	25·32	41 44·84	·48	+ ·02
	γ Gruis.	48 17·39	− ·16	+ ·23	+ ·29	− ·02	− ·03	47 70	48 07·25	·45	− ·01
	20Pegasi... ...	57 05·98	− ·12	− ·29	+ ·24	− ·03	− ·02	05·76	56 25·30	·46	·00
	α Aquarii	22 01 32·14	− ·13	− ·16	+ ·23	− ·04	− ·02	32·02	22 00 51·60	·42	− ·04
	α Toucani .. .	12 35·66	− ·20	+ ·76	+ ·47	− ·05	− ·04	36·60	11 56·17	·43	− ·03
	γ Aquarii	17 22·94	− ·14	− ·15	+ ·23	− ·06	− ·02	22·80	16 42 24	·56	+ ·10

$a = +^{s}\cdot543 \qquad c = -^{s}\cdot227$

Chronometer correction at $21^h\ 39^m = -40^s\cdot461 - ^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station : SUVA. Date, August 25th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·10	s.		h. m. s.	s.	s.
E	α Toucani.......	22 12 37 26	+ ·45	+ ·60	− ·50	+ ·12	− ·04	37 89	22 11 56·19	− 41·70	+ 03
	η Aquarii	31 07·54	+ ·29	− ·13	− ·24	+ ·09	− ·02	07·53	30 25·79	·74	+ ·07
	ζ Pegasi	37 22·77	+ ·27	− ·21	− ·25	+ ·08	− ·02	22·64	36 40·96	·68	+ ·01
	η Pegasi	39 13·00	+ ·23	− ·37	− ·28	+ ·08	− ·02	12·64	38 31·02	·62	− ·05
	ε Gruis	43 26·92	+ ·40	+ ·38	− ·39	+ ·07	− ·03	27·35	42 45·72	·63	− ·04
	λ Aquarii.	48 18 37	+ ·30	− ·07	− ·24	+ ·06	− ·02	18·40	47 36·70	70	+ ·03
	δ Aquarii.	50 15·17	+ ·31	− ·01	− ·25	+ ·06	− ·02	15·26	49 33·60	·66	− ·01
W	ω Piscium ...	23 55 04 89	− 01	− 18	+ ·24	− ·05	− ·02	04·87	23 54 23·17	·70	+ ·03
	2 Ceti	59 30·93	− 01	·00	+ ·25	− ·06	− ·02	31·09	58 49 45	·64	− 03
	α Andromedæ..	24 04 08·03	·00	− ·36	+ ·27	− ·06	− ·02	07 86	24 03 26·07	·79	+ ·12
	γ Pegasi... ...	08 59·61	− ·01	− ·24	+ ·25	− ·07	− ·02	59 52	08 17·86	·66	− ·01
	α Phœnicis......	22 13·57	− 01	+ ·24	+ ·33	− ·09	− ·03	14·01	21 32 48	·53	− ·14
	δ Andromedæ..	34 53·98	− ·01	− ·33	+ ·28	− ·11	− 02	53·79	34 12·10	·69	+ ·02
	β Ceti....... .	39 27 81	− ·01	·00	+ ·2	− ·12	− ·02	27·90	38 46·24	·66	− ·01

$a = +^{s}\cdot431 \qquad c = -^{s}\cdot243$

Chronometer correction at $23^h\ 25^m = -41^s\cdot674 - ^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station: SUVA. Date, August 27th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·06	s.		h. m. s.	s.	s.
E	μ Herculis	17 43 25·39	+ ·08	− ·47	− ·27	+ ·03	− ·02	24·74	17 42 41·98	−42·76	− ·06
	89 Herculis	52 16·19	+ ·08	− ·45	− ·27	+ ·02	− ·02	15·55	51 32·79	·76	− ·06
	ν Ophiuchi......	54 27·22	+ ·10	− ·09	− ·24	+ ·02	− ·02	26·99	53 44·15	·84	+ ·02
	γ² Sagittarii.....	18 00 20·99	+ ·11	+ ·15	− ·28	+ ·01	− ·02	20·96	59 38·05	·91	+ ·09
	72 Ophiuchi......	03 31·02	+ ·09	− ·28	− ·24	+ ·01	− ·02	30·58	18 02 47·75	·83	+ ·01
	μ Sagittarii....	08 44·00	+ ·10	+ ·02	− ·26	+ ·01	− ·02	43·85	08 01·03	·82	·00
W	η Serpentis..	17 03·33	− ·22	− ·15	+ ·24	·00	− ·02	03·18	16 20·35	·83	+ ·01
	α Telescopii	20 33·42	− ·29	+ ·39	+ ·35	− ·01	− ·03	33·83	19 51·05	·78	− ·04
	λ Sagittarii	22 45·31	− ·25	+ ·08	+ ·27	− ·01	− ·02	45·38	22 02·49	·89	+ ·07
	α Lyræ	34 25·19	− ·16	− ·63	+ ·31	− ·02	− ·03	24·66	33 41·79	·87	+ ·05
	2 Aquilæ. ...	37 43·86	− ·23	− ·09	+ ·24	− ·02	− ·02	43·74	37 00·95	·79	− ·03
	λ Pavonis	44 01·22	− ·36	+ ·88	+ ·52	− ·03	− ·04	02·19	43 19·41	·78	− ·04

$a = -^{s}\cdot 586$ $c = -^{s}\cdot 242$

Chronometer correction at $18^{h}\ 13^{m} = -42^{s}\cdot 821 \pm^{s}\cdot 011$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ε Aquilæ...	18 55 59·22	− ·18	− ·32	+ ·28	+ ·04	− ·02	59·02	18 55 16·09	−42·93	+ ·03
	ζ Aquilæ......	19 01 43·20	− ·18	− ·31	+ ·28	+ ·04	− ·02	43·01	19 01 00·05	·96	+ ·06
	ψ Sagittarii	10 22·01	− ·23	+ ·08	+ ·30	+ ·03	− ·02	22·17	09 39·21	·96	+ ·06
	ω Aquilæ. ...	14 01·93	− ·19	− ·28	+ ·27	+ ·03	− ·02	01·74	13 18·84	·90	·00
	B.A.C. 6632....	20 47·84	− ·29	− ·58	+ ·46	+ ·02	− ·04	48·57	20 05·72	·85	− ·05
	α Vulpeculæ ...	25 26·31	− ·16	− ·42	+ ·29	+ ·01	− ·02	26·01	24 43·11	·90	·00
	μ Aquilæ..	30 07·26	− ·19	− ·25	+ ·27	+ ·01	− ·02	07·08	29 24·22	·86	− ·04
E	c¹ Sagittarii.....	35 56·55	+ ·19	− ·02	− ·28	·00	− ·02	56·42	35 13·47	·95	+ ·05
	γ Aquilæ.......	42 25·35	+ ·17	− ·28	− ·27	·00	− ·02	24·95	41 42·06	·89	− ·01
	α Aquilæ....	46 49·53	+ ·15	− ·34	− ·27	− ·01	− ·02	49·04	46 06·26	·78	− ·12
	ι Sagittarii.. ..	49 21·16	+ ·23	+ ·31	− ·36	− ·01	− ·03	21·30	48 38·36	·94	+ ·04
	β Aquilæ.......	51 19·40	+ ·16	− ·23	− ·27	− ·01	− ·02	19·03	50 36·15	·88	− ·02
	c Sagittarii.....	57 28·37	+ ·20	+ ·11	− ·30	− ·02	− ·02	28·34	56 45·45	·89	− ·01
	ρ Capricorni ...	20 24 06·36	+ ·19	·00	− ·28	− ·04	− ·02	06·21	20 23 23·31	·90	·00

$a = +^{s}\cdot 565$ $c = -^{s}\cdot 267$

Chronometer correction at $19^{h}\ 40^{m} = -42^{s}\cdot 899 \pm^{s}\cdot 010$

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, August 14th, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·29	s.		h. m. s.	m. s.	s.
E	λ Scorpii	17 28 04·15	+ ·06	+ ·09	+ ·08	+ ·06	− ·02	04·42	17 27 05·04	−59 38	+ ·03
	241	31 28·00	+ ·04	− ·35	+ ·07	+ ·04	− ·02	27 78	30 28·52	·26	− ·09
	600	33 04·37	+ ·05	− ·12	+ ·07	+ ·04	− ·02	04·39	32 05·04	·35	·00
	η Pavonis	37 16·96	+ ·10	+ ·70	+ ·16	+ ·02	− ·04	17·90	36 18·60	·30	− ·05
	245	39 43·20	+ ·04	− ·28	+ ·07	·00	− ·02	43·01	38 43·61	·40	+ ·05
	246	43 41·99	+ ·03	− ·49	+ ·05	− ·02	− ·02	41·57	42 42·17	·40	+ ·05
W	250	54 43·83	+ ·02	− ·17	− ·08	− ·07	− ·02	43·52	53 44·27	·25	− ·10
	253	56 49·81	+ ·02	− ·27	− ·07	− ·07	− ·02	49·40	55 50·09	·31	− ·04
	601	18 00 37·85	+ ·02	+ ·02	− ·08	− ·09	− ·02	37·70	59 38·22	·48	+ ·13
	254	03 47·74	+ ·02	− ·33	− ·07	− ·11	·02	47·23	18 02 47·88	·35	·00

$a = +^{s}\cdot518$ $c = +^{s}\cdot067$

Chronometer correction at $17^{h}\ 40^{m} = -59^{s}\cdot348 \pm {}^{s}\cdot019$

W	603	18 50 18·47	+ ·04	·03	− ·05	+ ·29	− ·02	18·70	18 49 18·69	-1 00 01	+ ·03
	270	19 02 00·35	+ ·03	− ·39	− ·05	+ ·23	− ·02	00·15	19 01 00·14	00·01	+ ·03
	604	05 03·28	+ ·04	− ·08	− ·05	+ ·22	− ·02	03 39	04 03·30	00·09	+ ·11
	ψ Sagittarii	10 39·16	+ ·04	− ·04	− ·05	+ ·19	− ·02	39·28	09 39·32	0 59·96	− ·02
	e^1 Sagittarii	36 13·53	+ ·04	− ·12	− ·05	+ ·07	− ·02	13·45	35 13 55	59·90	− ·08
	ι Sagittarii	49 38·21	+ ·05	+ ·17	− ·06	+ ·05	− ·02	38·40	48 38·45	59·95	− ·03
	283	51 36·45	+ ·03	− ·32	− ·05	− ·01	− ·02	36·08	50 36·18	59·90	− ·08
E	607	20 13 44·13	+ ·08	− ·25	+ ·05	− ·11	− ·02	43·88	20 12 43·91	59·97	− ·01
	608	16 37·41	+ ·09	− ·22	+ ·05	− ·13	− ·02	37·18	15 37·32	59·86	− ·12
	α Pavonis	19 02·84	+ ·14	+ ·75	+ ·08	− ·14	− ·03	03·64	18 03·69	59·95	− ·03
	609	24 23·61	+ ·09	− ·18	+ ·05	− ·16	− ·02	23·39	23 23·33	1 00·06	+ ·08
	290	29 38·66	+ ·07	− ·58	+ ·05	− ·19	− ·02	37·99	28 38 06	0 59·93	− ·05
	297	43 29·45	+ ·07	− ·29	+ ·05	− ·25	− ·02	29·01	42 28·93	1 00·08	+ ·10
	μ Aquarii	48 29·32	+ ·07	− ·30	+ ·05	− ·28	− ·02	28·84	47 28·85	0 59·99	+ ·01

$a_1 = +^{s}\cdot557$ $a_2 = +^{s}\cdot875$ $c = +^{s}\cdot045$

Chronometer correction at $19^{h}\ 50^{m} = -59^{s}\cdot976 \pm {}^{s}.016$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, August 17th, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r= − ·18	s.		h. m. s.	m. s.	s.
W	σ Ophiuchi.....	17 23 07·82	− ·01	+ ·40	− ·12	+ ·08	− ·02	08·15	17 21 44·78	−1 23·37	·00
	η Pavonis.....	37 43·12	− ·03	−1 00	− ·29	+ ·04	− ·04	41 80	36 18·47	·33	− ·04
	245.............	40 06·66	− ·01	+ ·40	− ·12	+ ·03	− ·02	06·94	38 43·57	·37	·00
	246.............	44 05 07	·01	+ ·69	− ·14	+ ·02	·02	05 61	42 42·13	·48	+ ·11
	250.............	55 07·47	− ·01	+ ·24	− ·12	− ·01	− ·02	07·55	53 44·24	·31	− ·06
	253.............	57 13·21	− ·01	− ·39	− ·12	− ·02	− ·02	13·43	55 50.06	·37	·00
E	601.............	18 01 01·47	+ ·07	− ·02	+ ·14	− ·03	− ·02	01·61	59 38·19	·42	+ ·05
	254.............	04 10·57	+ ·05	+ ·46	+ ·12	− ·04	− ·02	11·14	18 02 47.86	·28	− ·09
	255.............	05 10·60	+ ·03	+ ·70	+ ·14	− ·04	− ·02	11·41	03 48·08	·33	− ·04
	ε Sagittarii.....	19 11.25	+ ·05	− ·09	+ ·15	− ·09	− ·02	11·25	17 47·84	·41	+ ·04

$a = -{}^{s}\cdot733 \qquad c = +{}^{s}\cdot122$

Chronometer correction at $17^{h}\ 50^{m} = -1^{m}23^{s}\cdot368 \pm {}^{s}\cdot016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
E	λ Pavonis.....	18 44 43·46	+ ·07	− ·59	+ ·34	+ ·09	− ·04	43·33	18 43 19.64	−1 23·69	+ ·09
	603.............	50 41·90	+ ·04	+ ·03	+ ·17	+ ·07	− ·02	42·19	49 18·67	·52	− ·08
	267.............	56 39·13	+ ·03	+ ·36	+ ·16	+ ·06	− ·02	39·72	55 16·19	·53	− ·07
	270.............	19 02 23·22	+ ·03	+ ·35	+ ·16	+ ·04	− ·02	23·78	19 00 60·13	·65	+ ·05
	604.............	05 26·70	+ ·03	+ ·08	+ ·17	+ ·03	− ·02	26·99	03 63·27	·72	+ ·12
	ψ Sagittarii....	11 02·54	+ ·03	+ ·04	+ ·17	+ ·01	− ·02	02·77	09 39·30	·47	− ·13
	495.............	14 41·98	+ ·03	+ ·33	+ ·16	·00	− ·02	42·48	13 18·89	·59	− ·01
W	B. A. C. 6632...	21 30·12	− ·02	− ·37	− ·27	− ·02	− ·03	29 41	20 05·85	·56	− ·04
	α Vulpeculæ...	26 06·61	− ·01	+ ·44	− ·17	− ·03	− ·02	06·82	24 43·24	·58	− ·02
	605.............	32 15·74	− ·02	+ ·04	− ·17	− ·05	− ·02	15·52	30 51·99	·53	− ·07
	e^1 Sagittarii.....	36 37·32	− ·02	+ ·11	− ·16	− ·06	− ·02	37·17	35 13·52	·65	+ ·05
	277.............	43 05·67	− ·02	+ ·33	− ·16	− ·08	− ·02	05·72	41 42·09	.63	+ ·03
	279.............	44 30·54	− ·02	+ ·39	− ·16	− ·09	− ·02	30 64	43 06·92	·72	+ ·12

$a = -{}^{s}\cdot501 \qquad c = +{}^{s}\cdot156$

Chronometer correction at $19^{h}\ 15^{m} = -1^{m}23^{s}\cdot601 \pm {}^{s}\cdot018$

TRANSIT OBSERVATIONS.

Station : Norfolk Island. Date, August 19th, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·34	s.		h. m. s.	m. s.	s.
E	β Aræ..........	17 18 57·58	− ·02	+ ·35	+ ·16	+ ·17	− ·03	58·21	17 17 18·79	-1 39·42	− ·07
	σ Ophiuchi....	23 24·21	·00	− ·25	+ ·09	+ ·15	− ·02	24·18	21 44·77	·41	− ·08
	λ Scorpii.......	28 44·09	·00	+ ·08	+ ·11	+ ·12	− ·02	44·38	27 04·97	·41	− ·08
	η Pavonis......	37 57·14	+ ·02	+ ·61	+ ·21	+ ·07	− ·04	58·01	36 18·44	·57	+ ·08
	245..........	40 23·25	+ ·01	− ·25	+ ·09	+ ·06	− ·02	23·14	38 43·55	·59	+ ·10
	246..........	44 21·98	+ ·01	− ·42	+ ·10	+ ·03	− ·02	21·68	42 42·10	·58	+ ·09
W	250..........	55 24·08	− ·05	− ·15	− ·09	− ·03	− ·02	23·74	53 44·22	·52	+ ·03
	253..........	57 29·92	− ·05	− ·24	− ·09	− ·04	− ·02	29·48	55 50·03	·45	− ·04
	254..........	18 04 27·83	− ·04	− ·28	− ·09	− ·08	− ·02	27·32	18 02 47·83	·49	·00
	255..........	05 28·20	− ·04	− ·43	− ·10	− ·09	− ·02	27·52	03 48·05	·47	− ·02
	602..........	09 40·89	− ·05	− ·07	− ·10	− ·12	− ·02	40·53	08 01·09	·44	− ·05
	α Telescopii....	21 30·98	− ·06	+ ·19	− ·13	− ·18	− ·03	30·77	19 51·19	·58	+ ·09

$a = +^{s}\cdot450$ $c = +^{s}\cdot089$

Chronometer correction at $17^{h}\ 50^{m} = -1^{m}\ 39^{s}\cdot494 \pm {}^{s}\cdot016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	603..........	18 50 58·76	− ·03	− ·02	− ·10	+ ·23	− ·02	58·82	18 49 18·66	-1 40·16	+ ·10
	267..........	56 56·48	− ·02	− ·30	− ·09	+ ·19	− ·02	56·24	55 16·18	·06	·00
	270..........	19 02 40·41	− ·02	− ·29	− ·09	+ ·16	− ·02	40·15	19 01 00·10	·05	− ·01
	ψ Sagittarii.....	11 19·41	− ·03	− ·03	− ·09	+ ·11	− ·02	19·35	09 39·29	·06	·00
	B.A.C. 6632...	21 45·68	− ·04	+ ·31	− ·15	+ ·05	− ·03	45·82	20 05·85	39·97	− ·09
	α Vulpeculæ....	26 23·80	− ·02	− ·37	− ·09	+ ·02	− ·02	23·32	24 43·24	40·08	+ ·02
E	c^1 Sagittarii.....	36 53·57	+ ·02	− ·09	+ ·09	− ·04	− ·02	53·53	35 13·53	40·00	− ·06
	277..........	43 22·31	+ ·02	− ·27	+ ·09	− ·08	− ·02	22·05	41 42·08	39·97	− ·09
	279..........	44 47·24	+ ·02	− ·32	+ ·09	− ·09	− ·02	46·92	43 06·91	40·01	− ·05
	ι Sagittarii.....	50 18·46	+ ·02	+ ·13	+ ·11	− ·12	− ·02	18·58	48 38·43	·15	+ ·09
	283..........	52 16·51	+ ·01	− ·24	+ ·09	− ·13	− ·02	16·22	50 36·16	·06	·00
	286..........	56 10·27	·00	− ·33	+ ·09	− ·15	− ·02	09·86	54 29·79	·07	+ ·01
	287..........	20 08 01·84	·00	− ·20	+ ·09	− ·22	− ·02	01·49	20 06 21·34	·15	+ ·09

$a = +^{s}\cdot418$ $c = +^{s}\cdot085$

Chronometer correction at $19^{h}\ 30^{m} = -1^{m}\ 40^{s}\cdot060 \pm {}^{s}\cdot015$

TRANSIT OBSERVATIONS.

Station : Norfolk Island. Date, August 21st, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·47	s.	.	h. m. s.	m. s.	s.
E	286	19 56 25·51	+ ·03	− ·47	+ ·04	+ ·28	− ·02	25·37	19 54 29·78	-1 55·59	+ ·12
	c Sagittarii	58 40·58	+ ·04	− ·01	+ ·05	+ ·26	− ·02	40·90	56 45·48	·42	− ·05
	287	20 08 16·94	+ ·04	− ·28	+ ·04	+ ·17	− ·02	16·89	20 06 21·34	·55	+ ·06
	607	14 39·35	+ ·04	− ·17	+ ·04	+ ·13	− ·02	39 37	12 43·90	·47	·00
	608	17 32.73	+ ·04	− ·15	+ ·04	+ ·10	− ·03	32·73	15 37·31	·42	− ·05
	α Pavonis	19 58·42	+ ·06	+ ·51	+ ·07	+ ·09	− ·03	59·12	17 63·67	·45	− ·02
	609	25 18·70	+ ·05	− ·12	+ ·04	+ ·04	− ·02	18·69	23 23·33	·36	− ·11
W	297	44 24·92	− ·01	− ·20	− ·04	− ·11	− ·02	24·54	42 29·00	·54	+ ·07
	μ Aquarii	49 24·73	·00	− ·20	− ·04	− ·15	− ·02	24·32	47 28·87	·45	− ·02
	507	52 25·14	·00	− ·56	− ·05	− ·17	− ·02	24·34	50 28·96	·38	− ·09
	θ Capricorni	21 02 29·29	+ ·02	− ·12	− ·04	− ·26	− ·02	28·87	21 00 33·34	·53	+ ·06
	611	06 18·24	+ ·03	− ·18	− ·04	− ·29	− ·02	17·74	04 22·18	·56	+ ·09
	303	10 48·23	+ ·03	− ·58	− ·05	− ·31	− ·02	47·30	08 51·96	·34	− ·13

$a = +^{s}\cdot591 \qquad c = +^{s}\cdot040$

Chronometer correction at $20^{h}\ 30^{m} = -1^{m}\ 55^{s}\cdot468 \pm {}^{s}\cdot022$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	304	21 12 58 05	+ ·06	− ·17	− 23	+ ·22	− ·02	57·91	21 11 01·93	-1 55·98	− ·08
	θ¹ Microscopii	16 33·57	+ ·10	+ ·08	− ·30	+ ·19	− ·02	33 62	14 37·47	56·15	+ ·09
	307	28 26·88	+ ·07	− ·12	− ·23	+ ·11	− ·02	26·69	26 30·63	·06	·00
	ξ Aquarii	34 35·12	+ ·07	− ·11	− ·23	+ ·05	− ·02	34·88	32 38·85	·03	− ·03
E	615	43 40·64	+ ·14	− ·67	+ ·24	− ·02	− ·02	40·91	41 44·80	·11	+ ·05
	γ Gruis	50 02·83	+ ·14	+ ·06	+ ·29	− ·08	− ·02	03·22	48 07·22	·00	− ·06
	311	22 02 47·70	+ ·09	− ·14	+ ·23	− ·17	− ·02	47·69	22 00 51·55	·14	+ ·08
	α Gruis	04 07·00	+ ·11	+ ·14	+ ·34	− ·19	− ·03	07·37	02 11·35	·02	− ·04

$a = +^{s}\cdot298 \qquad c = +^{s}\cdot229$

Chronometer correction at $21^{h}\ 40^{m} = -1^{m}\ 56^{s}\cdot062 \pm {}^{s}\cdot020$

TRANSIT OBSERVATIONS.

Station : Norfolk Island. Date, August 22nd, 1903. Observer, F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
		h. m. s.	s.	s.	s.	s. r = − ·28	s.		h. m. s.	m. s.	s.
E	241.	17 32 30·23	+ ·05	− ·26	+ ·19	+ ·13	− ·02	30·32	17 30 28·40	−2 01·92	+ ·05
	600..........	34 06·50	+ ·07	− ·09	+ ·20	+ ·12	− ·02	06·78	32 04·94	·84	− ·03
	η Pavonis.......	38 18·98	+ ·13	+ ·51	+ ·44	+ ·10	− ·04	20·12	36 18·33	·79	− ·08
	245..........	40 45·29	+ ·06	− ·21	+ ·19	+ ·09	− ·02	45·40	38 43·51	·89	+ ·02
	246.	44 44·03	+ ·04	− ·35	+ 21	+ ·07	− ·02	43·98	42 42·04	·94	+ ·07
	250..........	55 45·96	+ ·07	− ·12	+ ·19	+ ·02	− ·02	46·10	53 44·17	·93	+ ·06
	253.	57 51·80	+ ·06	− ·20	+ ·19	+ ·01	− ·02	51·84	55 49·99	·85	− ·02
W	601.	18 01 40·22	+ ·05	+ 01	− ·22	·00	− ·02	40 04	59 38·12	·92	+ ·05
	257	18 22·60	+ ·04	− ·17	− ·19	− ·09	− ·02	22·17	18 16 20·38	·79	− ·08
	α Telescopii.....	21 53·13	+ ·07	+ ·16	− ·27	− ·10	− ·03	52·96	19 51·13	·83	− ·04
	2 Aquilæ.......	39 03·27	+ ·05	− ·13	− ·19	− ·19	− ·02	02·79	37 01·02	·77	− 10
	263.	43 34·53	+ ·04	− ·30	− ·20	− ·20	− ·02	33·85	41 32·04	·81	− ·06
	λ Pavonis	45 21·63	+ ·09	+ ·44	− ·41	− ·21	− ·04	21·50	43 19·54	·96	+ ·09

$a = +^{s}\cdot376$ $c = +^{s}\cdot189$

Chronometer correction at 18h 00m = − 2m 01s·866 ± s·013

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction	v.
W	604.........	19 06 05·59	+ ·04	− ·07	− ·07	+ ·16	− ·02	05·63	19 04 03.24	−2 02·39	+ ·05
	ψ Sagittarii.....	11 41·51	+ ·05	− ·03	− ·07	+ ·14	− ·02	41·58	09 39·26	·32	− ·02
	495.............	15 21·44	+ ·05	− ·31	− ·06	+ ·12	− ·02	21·22	13 18·85	·37	+ ·03
	B.A.C. 6632....	22 07·73	+ ·11	+ ·35	− ·11	+ ·08	− ·03	08·13	20 05·80	·33	− ·01
	α Vulpeculæ....	26 45·88	+ ·05	− ·42	− ·07	+ ·07	− ·02	45·49	24 43·20	·29	− 05
	275............	28 54·31	+ ·04	− ·45	− ·07	+ ·06	− ·02	53 87	26 51·57	·30	− ·04
	605.............	32 54·32	+ ·08	− ·04	− ·07	+ ·04	− ·02	54·31	30 51·96	·35	+ ·01
E	277.............	43 44·54	+ ·12	− ·31	+ ·06	− ·01	− ·02	44·38	41 42·06	·32	− ·02
	ι Sagittarii......	50 40·37	+ ·20	+ ·15	+ ·08	− ·05	− 02	40·73	48 38·40	·33	− ·01
	283.	52 38·65	+ ·14	− ·27	+ ·06	− ·06	− ·02	38·50	50 36·14	·36	+ ·02
	286.	56 32·41	+ ·12	− ·37	+ ·07	− ·07	− ·02	32·14	54 29·77	·37	+ ·03
	c Sagittarii......	58 47·55	+ ·21	− ·01	+ ·07	− ·09	− ·02	47·71	56 45·48	·23	− ·11
	287............	20 08 23·89	+ ·18	− ·22	+ ·06	− ·14	− ·02	23·75	20 06 21·34	·41	+ ·07

$a = +^{s}\cdot474$ $c = +^{s}\cdot062$

Chronometer correction at 19h 40m = − 2m 02s·338 ± s·010

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, August 23rd, 1903. Observer, F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·30	s.		h. m. s.	m. s.	s.
E	λ Scorpii	17 29 13·89	− ·09	+ ·08	+ ·11	+ ·16	− ·02	14·13	17 27 04·89	−2 09·24	+ ·02
	241	32 37·78	− ·06	− ·33	+ ·09	+ ·14	− ·02	37·60	30 28·39	·21	− ·01
	600	34 14·04	− ·07	− ·12	+ ·09	− ·13	− ·02	14·05	32 04·92	·13	− ·09
	η Pavonis	38 26·53	− ·14	− ·67	+ ·20	+ ·11	− ·04	27·33	36 18·29	·04	− ·18
	245	40 52·85	− ·06	− ·27	+ ·09	− ·10	− ·02	52·69	38 43·49	20	− ·02
	246	44 51·51	− ·04	− ·46	+ ·10	+ ·08	− ·02	51 17	42 42·02	·15	− ·07
	253	57 59·42	− ·06	− ·26	+ ·09	+ ·01	− ·02	59 18	55 49·98	·20	− ·02
W	601	18 01 47·70	− ·10	+ ·01	− ·10	− ·01	− ·02	47·48	59 38·10	·38	+ ·16
	254	04 57·55	− ·06	− ·31	− ·09	− ·02	− ·02	57·05	18 02 47·77	·28	+ 06
	602	10 10·49	− ·09	− ·07	− ·09	− ·05	− ·02	10·17	08 01·03	·14	− ·08
	257	18 30·05	− ·07	− ·22	− ·09	− ·10	− ·02	29·55	16 20·37	·18	− ·04
	ε Sagittarii	19 57·43	− ·10	+ ·06	− ·11	− ·10	− ·02	57·16	17 47·77	·39	+ ·17
	α Telescopii	22 00·66	− ·11	+ ·21	− ·13	− ·11	− ·03	00·49	19 51·12	·37	+ ·15
	λ Sagittarii	24 12·08	− ·09	− ·03	− ·10	− ·12	− ·02	11·72	22 02·55	·17	− ·05

$a = +^{s}\cdot490$ $c = +^{s}\cdot088$

Chronometer correction at $18^{h}\ 00^{m} = -2^{m}\ 09^{s}\cdot220 \pm {}^{s}\cdot022$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, August 25th, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·35	s.		h. m. s.	m. s.	s.
E	η Pavonis . . .	17 38 42·21	+·04	+ ·54	+ ·04	+ ·36	− ·04	43·15	17 36 18·21	−2 24·94	− ·01
	245.	41 08·21	+ ·02	− ·22	+ ·02	+ ·35	− ·02	08·36	38 43·46	·90	− ·05
	246.	45 07·06	+ ·01	− ·37	+ .02	+ ·30	− ·02	07·00	42 41·98	25·02	+ ·07
	250.	56 08·95	+ ·02	− ·13	+ ·02	+ ·26	− ·02	09·10	53 44·13	24·97	+ ·02
	254.	18 05 12·66	+ ·01	− ·25	+ ·02	+ ·20	− ·02	12·62	18 02 47·75	·87	− ·08
W	602.	10 25·82	+ ·03	− ·06	− ·02	+ ·17	− ·02	25·92	08 01·00	·92	− ·03
	ϵ Sagittarii.	20 12·57	+ ·03	+ ·05	− ·02	+ ·12	− ·02	12·73	17 47·74	·99	− ·04
	283.	19 53 01·75	+ ·02	− ·23	− ·02	− ·43	− ·02	01·07	19 50 36·12	·95	·00
	286.	56 55·50	+ ·02	− ·31	− ·02	− ·44	− ·02	54·73	54 29·74	·99	+ ·04
	c Sagittarii.	59 10·86	+ ·03	− 01	− ·02	− ·46	− ·02	10·38	56 45·45	·93	− ·02

$a = +^{s}\cdot398 \qquad c = +^{s}\cdot016$

Chronometer correction at $18^{h}\ 40^{m} = -2^{m}\ 24^{s}\cdot954 \pm {}^{s}\cdot011$

W	287	20 08 47·07	+ ·02	− ·19	− ·03	+ ·19	− ·02	47·04	20 06 21·32	−2 25·72	+ ·08
	607.	15 09·52	+ ·03	− ·11	− ·03	+ ·15	− ·02	09·54	12 43·88	·66	+ ·02
	608	18 02·79	+ ·03	− ·10	− ·03	+ ·13	− ·02	02·80	15 37·20	·60	− ·04
	α Pavonis	20 28 81	+ ·05	+ ·34	− ·05	+ ·12	− ·03	29·24	18 03·63	·61	− ·03
	290.	31 03·92	+ ·02	− ·26	− ·03	+ ·05	− ·02	03·68	28 38·03	·65	+ ·01
	292.	35 29·27	+ ·02	− ·28	− ·03	+ ·02	− ·02	28·98	33 03·33	·65	+ ·01
E	297.	44 54·74	+ 08	− .13	+ ·03	− ·03	− ·02	54·67	42 28·99	·68	+ ·04
	μ Aquarii.	49 54·55	+ ·08	− ·13	+ ·03	− ·05	·02	54·46	47 28·86	·60	− ·04
	507.	52 54·96	+ ·05	− ·37	+ ·03	− ·07	− ·02	54·58	50 28·94	·64	·00
	ɪ Piscis Aust. . . .	57 50·11	+ ·09	+ ·03	+ ·03	− ·10	− 02	50·14	55 24·47	·67	+ ·03
	θ Capricorni. . . .	21 02 58·98	+ ·08	− ·08	+ ·03	− ·13	− ·02	58·86	21 00 33·34	·52	− ·12
	611.	06 47·98	+ ·08	− ·12	+ ·03	− ·14	− ·02	47·81	04 22·18	·63	− ·01
	304.	13 27·91	+ ·07	− ·22	+ ·03	− ·19	− ·02	27·58	11 01·93	·65	− ·01
	θ^{1} Microscopii. .	17 03·23	+ ·10	+ ·11	+ ·04	− ·22	− ·02	03·24	14 37·48	·76	+ ·12

$a = +^{s}\cdot394 \qquad c = +^{s}\cdot027$

Chronometer correction at $20^{h}\ 40^{m} = -2^{m}\ 25^{s}\cdot645 \pm {}^{s}\cdot013$

TRANSIT OBSERVATIONS.

Station: Norfolk Island. Date, August 27th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·30	s.		h. m. s.	m. s.	s.
E	λ Sagittarii	18 24 42·76	−·08	−·04	+·03	+·18	−·02	42·83	18 22 02·49	-2 40·34	·00
	2 Aquilæ	39 41·44	−·07	−·17	+·03	+·10	−·02	41·31	37 00·95	·36	+·02
	263	44 12·66	−·05	−·41	+·03	+·08	−·02	12·29	41 31·97	·32	−·02
	λ Pavonis	45 59·20	−·13	+·60	+·06	+·07	−·04	59·76	43 19·41	·35	+·01
	603	51 58·96	−·08	−·01	+·03	+·04	−·02	58·92	49 18·56	·36	+·02
W	267	57 56·87	−·07	−·36	−·03	+·01	−·02	56·40	55 16·09	·31	−·03
	270	19 03 40·96	−·07	−·35	−·03	−·02	−·02	40·47	19 01 00·05	·42	+·08
	ψ Sagittarii	12 19·68	−·10	−·04	−·03	−·06	−·02	19·43	09 39·21	·22	−·12
	495	15 59·64	−·07	−·33	−·03	−·08	−·02	59·11	13 18·80	·31	−·03
	B.A.C. 6632	22 46·06	−·14	+·37	−·05	−·12	−·03	46·09	20 05·72	·37	+·03
	α Vulpeculæ	27 24·20	−·06	−·45	−·03	−·13	−·02	23·51	24 43·14	·37	+·03

$a = +^{s}\cdot506 \qquad c = +^{s}\cdot028$

Chronometer correction at $19^{h}\ 00^{m} = -2^{m}\ 40^{s}\cdot339 \pm {}^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station: Norfolk Island. Date, September 29th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·30	s.		h. m. s.	s.	s.
E	615	21 41 52·68	+·04	−·06	−·15	+·19	−·02	52·68	21 41 44·68	−08·00	−·06
	616	22 01 23·49	+·01	−·07	−·14	+·09	−·02	23·36	22 01 15·38	07·98	−·08
	312	02 41·66	·00	−·26	−·15	+·09	−·02	41·32	02 33·23	08·09	+·03
	314	05 30·07	+·01	−·16	−·14	+·07	−·02	29·83	05 21·82	08·01	−·05
	α Toucani	12 04·12	+·01	+·31	−·29	+·04	−·04	04·15	11 56·00	08·15	+·09
	317	16 50·51	+·01	−·13	−·14	+·02	−·02	50·25	16 42·21	08·04	−·02
	π Aquarii	20 31·25	+·01	−·14	−·14	·00	−·02	30·96	20 22·86	08·10	+·04
W	σ Aquarii	25 42·45	−·03	−·09	+·14	−·03	−·02	42·42	25 34·38	08·04	−·02
	320	30 33·94	−·03	−·14	+·14	−·05	−·02	33·84	30 25·79	08·05	−·01
	β Gruis	37 04·34	−·04	+·14	+·21	−·08	−·03	04·54	36 56·52	08·02	−·04
	323	42 03·54	−·02	−·25	+·15	−·11	−·02	03·29	41 55·16	08·13	+·07
	μ Pegasi	45 31·34	−·02	−·25	+·15	−·13	−·02	31·07	45 22·96	08·11	+·05

$a = +^{s}\cdot289 \qquad c = -^{s}\cdot140$

Chronometer correction at $22^{h}\ 20^{m} = -8^{s}\cdot059 \pm {}^{s}\cdot014$.

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, October 1st, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·25	s.		h. m. s.	s.	s.
E	θ Capricorni....	21 00 59·77	+ ·19	− ·09	− ·08	+ ·13	− ·02	59·90	21 00 33·05	−26·85	− ·04
	611.......	04 48·73	+ ·17	− ·12	− ·08	+ ·11	− ·02	48·79	04 21·91	·88	− ·01
	304............	11 28 69	+ ·15	− ·23	− ·08	+ ·08	− ·02	28·59	11 01·66	·93	+ ·04
	θ¹ Microscopii...	15 03·87	+ ·23	+ ·12	− ·11	+ ·06	− ·02	04·15	14 37·14	27·01	+ ·12
	ι Capricorni ...	17 20·99	+ ·19	− ·09	− ·08	+ ·05	− ·02	21·04	16 54·14	26·90	+ ·01
	γ Pavonis	18 56·81	+ ·35	+ ·60	− ·19	+ ·05	− ·04	57·58	18 30·74	·84	− ·05
	612.............	21 37·97	+ ·19	− ·05	− ·09	+ ·04	− ·02	38·04	21 11·20	·84	− ·05
W	307..	26 57·28	+ ·08	− ·16	+ ·08	+ ·02	− ·02	57·28	26 30·43	·85	− ·04
	ξ Aquarii	33 05·44	+ ·08	− ·15	+ ·08	− ·01	− ·02	05·42	32 38·67	·75	− ·14
	ε Pegasi..	39 55·71	+ ·06	− ·26	+ ·08	− ·04	− ·02	55·53	39 28·61	·92	+ ·03
	615............	42 11·60	+ ·09	− ·09	+ ·08	− ·05	− ·02	11·61	41 44·65	·96	+ ·07
	γ Gruis	48 33·81	+ ·11	+ ·08	+ ·10	− ·08	− ·02	34·00	48 07·07	·93	+ ·04

$a = +^{s}\cdot412$ $c = -^{s}\cdot079$

Chronometer correction at $21^{h}\ 30^{m} = -26^{s}\cdot889 \pm {}^{s}\cdot015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
E	616.......	22 01 42·55	+ ·13	− ·14	− ·08	+ ·20	− ·02	42·64	22 01 15·36	−27·28	+ ·06
	α Toucani	12 22·23	+ ·23	+ ·57	− ·16	+ ·15	− ·04	22·98	11 55·95	·03	− ·19
	317.	17 09·61	+ ·12	− ·24	− ·08	+ ·13	− ·02	09·52	16 42·19	·33	+ ·11
	π Aquarii.....	20 50·21	+ ·12	− ·26	− ·08	+ ·12	− ·02	50·09	20 22·84	·25	+ ·03
	β Gruis	37 23·49	+ ·19	+ ·25	− ·11	+ ·05	− ·03	23·84	36 56·50	·34	+ ·12
	323....	42 22·69	+ ·09	− ·45	− ·08	+ ·03	− ·02	22·26	41 55·15	·11	− ·11
W	μ Pegasi	45 50·39	+ ·03	− ·46	+ ·08	+ ·02	− ·02	50·04	45 22·94	·10	− 12
	326.	48 04·01	+ ·05	− ·19	+ ·08	+ ·01	− ·02	03·94	47 36·73	·21	− ·01
	618.	50 00·88	+ ·05	− ·12	+ ·08	·00	− ·02	00·87	49 33·65	·22	·00
	329..	23 00 26·93	+ ·03	− ·37	+ ·08	− ·04	− ·02	26·61	59 59·34	·27	+ ·05
	621.......... ...	38 12·53	+ ·02	− ·13	+ ·08	− ·19	− ·02	12·29	23 37 45·06	·23	+ ·01
	i¹ Aquarii......	39 41·32	+ ·02	− ·10	+ ·08	− ·20	− ·02	41·10	39 13·81	·29	+ ·07

$a = +^{s}\cdot527$ $c = -^{s}\cdot076$

Chronometer correction at $22^{h}\ 50^{m} = -27^{s}\cdot219 \pm {}^{s}\cdot021$

TRANSIT OBSERVATIONS.

Station: Norfolk Island. Date, October 2nd, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·35	s.		h. m. s.	s.	s.
E	616....	22 01 50·88	·00	− ·11	− ·10	+ ·16	− ·02	50·81	22 01 15·35	−35·46	+ ·07
	312.	03 08·93	·00	− ·38	− ·10	+ ·16	− ·02	08·59	02 33·20	·39	·00
	314.	05 57·51	·00	− ·24	− ·09	+ ·14	− ·02	57·30	05 21·80	·50	+ ·11
	α Toucani	12 30·94	·00	+ ·46	− ·19	+ ·11	− ·04	31·28	11 55·93	·35	− ·04
	317.....	17 17·71	·00	− ·20	− ·09	− ·08	− ·02	17·48	16 42·18	·30	− ·09
	π Aquarii	20 58·49	00	− ·21	− ·09	+ ·05	− ·02	58·22	20 22·84	·38	− ·01
W	β Gruis.........	37 31·68	− ·06	+ ·20	+ ·14	− ·04	− ·03	31·89	36 56·49	·40	+ ·01
	323......	42 30·89	·03	− ·37	+ ·10	− ·07	− ·02	30·50	41 55·14	·36	− ·03
	326.....	48 12·42	− ·04	− ·15	− ·09	− ·10	− ·02	12.20	47 36·72	·48	+ ·09
	618.....	50 09·19	− 04	− ·10	− ·10	− ·12	− ·02	09·01	49 33·64	·37	− ·02
	329.....	23 00 35·11	− ·03	− ·30	+ ·10	− ·18	− ·02	34·68	59 59·33	·35	− ·04
	620....	04 55·60	− ·04	− 06	+ ·10	− ·20	− ·02	55·38	23 04 20·02	·36	− ·03

$a = +^{s}{\cdot}425 \quad c = -^{s}{\cdot}094$

Chronometer correction at $22^{h}\ 30^{m} = -35^{s}{\cdot}388 \pm ^{s}{\cdot}013$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, October 3rd, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·38	s.		h. m. s.	s.	s.
W	θ^1 Microscopii ..	21 15 18·76	− ·02	+ ·12	+ ·15	+ ·22	− ·02	19·21	21 14 37·11	− 42·10	+ ·19
	ι Capricorni....	17 35·88	− ·01	− ·09	+ ·12	+ ·21	− ·02	36·09	16 54·11	41·98	+ ·07
	γ Pavonis.	19 11·59	− ·02	+ ·62	+ ·27	+ ·20	− ·04	12·62	18 30·67	·95	+ ·04
	612............	21 52·92	− ·01	− ·05	+ ·12	+ ·18	·02	53·14	21 11·18	·96	+ ·05
	307........... .	27 12·26	− ·01	− ·16	+ ·11	+ 15	− ·02	12·33	26 30·41	·92	+ ·01
	ξ Aquarii..	33 20·56	− ·01	− ·15	+ ·11	+ ·11	− ·02	20·60	32 38·65	·95	+ ·04
E	616.	22 01 57·48	+ ·05	− ·11	− ·11	− ·07	− ·02	57·22	22 01 15·34	·88	− ·03
	312.....	03 15·61	+ ·03	− ·38	− ·12	− ·08	− ·02	15·04	02 33·19	·85	− ·06
	314......	06 04·04	+ ·04	− ·24	− ·11	− ·10	− ·02	03 61	05 21·79	·82	− ·09
	α Toucani	12 37·53	+ ·09	+ ·46	− ·23	− ·14	− ·04	37·67	11 55·91	·76	− ·15
	317.............	17 24·55	+ ·04	− ·19	− ·11	− ·17	− ·02	24·10	16 42·18	·92	+ ·01
	π Aquarii	21 05·24	+ ·04	− ·21	− ·11	− ·20	− ·02	04·74	20 22·83	·91	·00

$a = +^{s}\cdot423 \qquad c = -^{s}\cdot111$

Chronometer correction at $21^{h}50^{m} = -41^{s}\cdot915 \pm {}^{s}\cdot018$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
E	σ Aquarii ...	22 26 16·59	+ ·06	− ·13	− ·08	+ ·28	− ·02	16·70	22 25 34·32	− 42·38	− ·02
	320.	31 08·22	+ ·06	− ·19	− ·08	+ ·25	− ·02	08·24	30 25·76	·48	+ ·08
	β Gruis	37 38·45	+ ·09	+ ·19	− ·11	+ ·21	− ·03	38·80	36 56·48	·32	− ·08
	323........... .	42 37·80	+ ·04	− ·35	− ·08	+ ·18	− ·02	37·57	41 55·13	·44	+ ·04
	μ Pegasi........	46 05·49	+ ·04	− ·36	− ·08	+ ·15	− ·02	05·22	45 22·93	·29	− ·11
	ϕ Aquarii.	23 10 04·12	+ ·06	− ·16	− ·08	·00	− ·02	03·92	23 09 21·47	·45	+ ·05
	γ Toucani.......	12 32·45	+ ·11	+ ·39	− ·15	− ·01	− ·04	32·75	11 50·29	·46	+ ·06
W	534.............	22 43·89	− ·02	− ·20	+ ·08	− ·08	− ·02	43·56	22 01·15	·41	+ ·01
	333.	35 44·11	− ·02	− ·23	+ ·08	− ·16	− ·02	43·76	34 61·28	·48	+ 08
	621......... ...	38 27·62	− ·02	− ·10	+ ·08	− ·18	− ·02	27·38	37 45·06	·32	− ·08
	i^1 Aquarii......	39 56·42	− ·02	− ·08	+ ·08	− ·18	− ·02	56·20	39 13·80	·40	·00

$a = +^{s}\cdot405 \qquad c = -^{s}\cdot077$

Chronometer correction at $23^{h}10^{m} = -42^{s}\cdot404 \pm {}^{s}\cdot020$

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, October 8th, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·36	s.		h. m. s.	m. s.	s.
E	σ Aquarii......	22 27 02·53	+ ·07	− ·15	− ·18	+ ·38	− ·02	02 63	22 25 34·30	−1 28·33	− 01
	320...........	31 54·16	+ ·07	− ·23	− ·18	+ ·35	− ·02	54·15	30 25·73	·42	+ ·08
	β Gruis	38 24·41	+ ·10	+ ·23	− ·27	+ ·31	− ·03	24·75	36 56·42	·33	− ·01
	329...........	23 01 28·02	+ ·05	− ·35	− ·19	+ ·17	− ·02	27·68	59 59·30	·38	+ ·04
	620...........	05 48·36	+ ·08	− ·07	− ·19	+ ·14	− ·02	48·30	23 04 20·00	·30	− ·04
	φ Aquarii	10 49·92	+ ·07	− ·19	− ·18	+ ·11	− ·02	49·71	09 21·46	·25	− ·09
	γ Toucani	13 18·29	+ ·13	+ ·47	− ·35	+ ·10	− ·04	18·60	11 50·24	·36	+ ·02
W	531...........	17 22·38	− ·02	− ·50	+ ·20	+ ·07	− ·02	22·11	15 53·87	·24	− ·10
	622...........	45 24·40	− ·02	− ·01	+ ·21	− ·09	− ·02	24·47	43 55·93	·54	+ ·20
	336...........	55 52·17	− ·02	− ·35	+ ·18	− ·15	− ·02	51·81	54 23·45	·36	+ ·02
	2 Ceti	24 00 18·31	− ·02	− ·12	+ ·19	− ·17	− ·02	18·17	58 49 80	·37	+ ·03
	33 Piscium.....	01 54·47	− ·02	− ·23	+ ·18	− ·19	− ·02	54·19	24 00 25·84	·35	+ ·01
	3	09 47·05	− ·02	− ·42	+ ·19	− ·24	− ·02	46·54	08 18·21	·33	− ·01
	ζ Toucani.....	16 32·92	− ·04	+ ·84	+ ·43	− ·28	− ·04	33·83	15 05·55	·28	− ·06

$a_1 = -{}^{s}\cdot489$, $a_2 = +{}^{s}\cdot587$ $c = -{}^{s}\cdot180$

Chronometer correction at $23^h\ 30^m = -1^m\ 28^s\cdot345 \pm {}^{s}\cdot015$

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, October 11th, 1903. Observer: F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·22	s.		h. m. s.	m. s.	s.
E	γ Gruis........	21 50 01 35	+ ·12	+ ·08	− ·20	+ ·15	− ·02	01·48	21 48 06·93	−1 54·55	+ ·08
	616..	22 03 09·85	+ ·09	− ·11	− ·16	+ ·10	− ·02	09·75	22 01 15·25	·50	+ ·03
	312.	04 27·81	+ ·06	− ·37	− ·17	+ ·09	− ·02	27·40	02 33·09	·31	− ·16
	314............	07 16·46	+ ·08	− ·23	− ·16	+ ·08	− ·02	16·21	05 21·70	·51	+ ·04
	α Toucani.......	13 49·79	+ ·17	+ ·45	− ·32	+ ·06	− ·04	50·11	11 55·72	·39	− ·08
	π Aquarii......	22 17·57	+ ·08	− ·21	− ·16	+ ·03	− ·02	17·29	20 22·75	·54	+ ·07
	σ Aquarii.......	27 28·94	+ ·09	− ·13	− ·16	+ ·01	− ·02	28·73	25 34·24	·49	+ ·02
W	β Gruis	38 50·49	− ·05	+ ·20	+ ·23	− ·03	− ·03	50·81	36 56·37	·44	− ·03
	323.........	43 49·78	− ·02	− ·36	+ ·17	− ·05	− ·02	49·50	41 55·07	·43	− ·04
	μ Pegasi.	47 17·69	− ·02	− ·37	+ ·17	− ·06	− ·02	17·39	45 22·89	·50	+ ·03
	326...	49 31·28	− ·03	− ·15	+ ·16	− ·07	− ·02	31·17	47 36·66	·51	+ ·04
	618.............	51 28·18	− ·03	− ·10	+ ·16	− ·08	− ·02	28·11	49 33·58	·53	+ ·06
	329......	23 01 53·92	− ·02	− ·30	+ ·16	− ·11	− ·02	53·63	59 59·28	·35	− ·12
	620.	06 14·53	− ·04	− ·06	+ ·17	− ·13	− ·02	14·45	23 04 19·98	·47	·00

$a = +^{s}\cdot415 \qquad c = -^{s}\cdot156$

Chronometer correction at $22^{h}\ 30^{m} = -1^{m}\ 54^{s}\cdot468 \pm {}^{s}\cdot016$

W	620.............	23 06 14·53	− ·03	− ·09	+ ·16	+ ·16	− ·02	14·71	23 04 19·98	−1 54·73	− ·04
	φ Aquarii .. .	11 16·08	− ·02	− ·24	+ ·15	+ ·14	− ·02	16·09	09 21·44	·65	− ·12
	γ Toucani	13 44·05	− ·04	+ ·58	+ ·15	+ ·14	− ·04	44·84	11 50·18	·66	− ·11
	621........ . .	39 39·79	− ·02	− ·12	+ ·15	+ ·04	− ·02	39·82	37 45·04	·78	+ ·01
	i^1 Aquarii......	41 08·53	− ·03	− ·15	+ ·15	+ ·03	− ·02	08·51	39 13·78	·73	− ·04
	622..	45 50·66	− ·03	− ·01	+ ·17	+ ·03	− ·02	50·80	43 55·91	·89	+ ·12
E	2 Ceti..........	24 00 44·77	+ ·06	− ·12	− ·15	− ·04	− ·02	44·50	58 49·79	·71	− ·06
	33 Piscium......	02 20·88	+ ·06	− ·24	− ·15	− ·04	− ·02	20·49	24 00 25·83	·66	− ·11
	ζ Toucani......	16 59·76	+ ·13	+ ·87	− ·35	− ·10	− ·04	60·27	14 65·53	·74	− ·03
	44 Piscium......	22 24·80	+ ·06	− ·31	− ·15	− ·12	− ·02	24·26	20 29·47	·79	+ ·02
	339	27 04·24	+ ·06	− ·25	− ·15	− ·14	− ·02	03·74	25 08·88	·86	+ ·09
	13 Baleine.......	32 14·26	+ ·06	− ·26	− ·15	− ·15	− ·02	13·74	30 18·95	·79	+ ·02
	130 Piazzi	34 20·44	+ ·07	− ·04	− ·16	− ·16	− ·02	20·13	32 25·27	·86	+ ·09

$a = +^{s}\cdot669 \qquad c = -^{s}\cdot146$

Chronometer correction at $23^{h}\ 50^{m} = -1^{m}\ 54^{s}\cdot770 \pm {}^{s}\cdot017$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, October 12th, 1903. Observer, F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·26	s.		h. m. s.	m. s.	s.
E	616	22 03 16·11	+ ·14	− ·11	− ·12	+ ·14	− ·02	16·14	22 01 15·24	−2 00·90	+ ·02
	312	04 34·21	+ ·09	− ·39	− ·13	+ ·13	− ·02	33·89	02 33·08	·81	− ·07
	314	07 22·76	+ ·12	− ·25	− ·12	+ ·12	− ·02	22·61	05 21·69	·92	+ ·04
	α Toucani	13 56·03	+ ·25	+ ·47	− ·25	+ ·09	− ·04	56·55	11 55·69	·86	− ·02
	317	18 43·12	+ ·13	− ·20	− ·12	+ ·07	− ·02	42·98	16 42·09	·89	+ ·01
	π Aquarii	22 23·80	+ ·13	− ·22	− ·12	+ ·05	− ·02	23·62	20 22·74	·88	·00
	320	32 26·82	+ ·13	− ·21	− ·12	+ ·01	− ·02	26·61	30 25·69	·92	+ ·04
W	β Gruis	38 56·74	+ ·11	+ ·20	+ ·18	− ·02	− ·03	57·18	36 56·35	·83	− ·05
	326	49 37·57	+ ·08	− ·16	− ·12	− ·06	− ·02	37·53	47 36·64	·89	+ ·01
	618	51 34·47	+ ·08	− ·10	+ ·13	− ·07	− ·02	34·49	49 33·57	·92	+ ·04
	329	23 02 00·34	+ ·06	− ·31	+ ·12	− ·11	− ·02	00·08	59 59·27	·81	− ·07
	620	06 20·90	+ ·06	− ·06	+ ·13	− ·13	− ·02	20·88	23 04 19·97	·91	+ ·03

$a = +^s\cdot440$ $c = -^s\cdot121.$

Chronometer correction at $22^h\ 35^m = -2^m\ 00^s\cdot877 \pm {}^s\cdot009$.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	φ Aquarii	23 11 22·39	+ ·03	− ·18	+ ·18	+ ·30	− ·02	22·70	23 09 21·43	−2 01·27	− ·08
	γ Toucani	13 50·56	+ ·06	+ ·44	+ ·35	+ ·29	− ·04	51·66	11 50·17	·49	+ ·14
	3	24 10 19·65	+ ·03	− ·33	+ ·19	+ ·04	− ·02	19·56	24 08 18·21	·35	·00
	ζ Toucani	17 05·62	+ ·07	+ ·65	+ ·44	+ ·01	− ·04	06·75	15 05·51	·24	− ·11
	44 Piscium	22 30·87	+ ·03	− ·23	+ ·18	− ·01	− ·02	30·82	20 29·48	·34	− ·01
	339	27 10·32	+ ·03	− ·19	+ ·18	− ·03	− ·02	10·29	25 08·88	·41	+ ·06
E	13 Baleine	32 20·54	+ ·13	− ·19	− ·18	− ·05	− ·02	20·23	30 18·95	·28	− ·07
	540	40 48·31	+ ·15	− ·09	− ·19	− ·09	− ·02	48·07	38 46·72	·35	·00
	11	44 17·78	+ ·10	− ·40	− ·20	− ·11	− ·02	17·15	42 15·83	·32	− ·03
	342	45 44·57	+ ·12	− ·27	− ·18	− ·12	− ·02	44·10	43 42·74	·36	+ ·01
	ζ¹ Piscium	25 10 45·56	+ ·12	− ·27	− ·18	− ·22	− ·02	44·99	25 08 43·56	·43	+ ·08

$a = +^s\cdot461$ $c = -^s.182$

Chronometer correction at $24^h\ 20^m = -2^m\ 01^s\cdot348 \pm {}^s\cdot019$

TRANSIT OBSERVATIONS.

Station: NORFOLK ISLAND. Date, October 16th, 1903. Observer, F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·20	s.		h. m. s.	m. s.	s.
E	α Toucani..	22 14 23·09	+ ·19	+ ·45	− ·50	+ ·10	− ·04	23 29	22 11 55·58	−2 27·71	− ·01
	317	19 10·08	+ ·10	− ·19	− ·24	+ ·09	− ·02	09·82	16 42·05	·77	+ ·05
	π Aquarii.......	22 50·69	+ ·10	− ·21	− ·24	+ ·08	− ·02	50·40	20 22 70	·70	− ·02
	σ Aquarii......	28 02·13	+ ·11	− ·13	− ·25	+ ·06	− ·02	01·90	25 34·19	·71	− ·01
	320.......	32 53·72	+ ·10	− ·20	− ·20	+ ·05	− ·02	53·45	30 25·66	·79	+ ·07
	β Gruis........	39 24·05	+ ·15	+ ·19	− ·36	+ ·02	− ·03	24·02	36 56·29	·73	+ .01
	323	44 23·29	+ ·07	− ·36	− ·27	·00	− ·02	22.71	41 55·02	·69	− ·03
W	μ Pegasi........	47 50·54	+ ·03	− ·36	+ ·27	− ·01	− ·02	50·45	45 22·81	·64	− ·08
	326.	50 04·26	+ ·05	− ·15	+ ·25	− ·02	− ·02	04·37	47 36·62	·75	+ ·03
	618............	52 01·07	+ ·05	− ·10	+ ·25	− ·02	− ·02	01·23	49 33·54	·69	− ·03
	329	23 02 27·09	+ ·04	− ·29	+ ·25	− ·06	− ·02	27·01	59 59·24	·77	+ ·05
	620.............	06 47·53	+ ·05	− ·06	+.26	− ·07	− ·02	47·69	23 04 19·94	·75	+ ·03
	φ Aquarii......	11 49·13	+ ·05	− ·16	+ ·25	− ·09	− ·02	49·16	09 21·40	·76	+ ·04
	γ Toucani.....	14 17·00	+ ·08	+ ·40	+ ·47	− ·10	− ·04	17·81	11 50·10	·71	− ·01

$a = +^{s}\cdot414$ $c = -^{s}\cdot244$

Chronometer correction at $22^{h}\ 45^{m} = -2^{m}\ 27^{s}\cdot723 \pm ^{s}\cdot008$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	534....... . ..	23 24 28·98	+ ·06	− ·31	+ ·30	+ ·14	− ·02	29·15	23 22 01·10	−2 28·05	+ ·07
	535	26 46·37	+ ·05	− ·42	+ ·31	+ ·13	− ·02	46·42	24 18·52	27·90	− ·08
	538	50 04·94	+ ·05	− ·49	+ ·32	+ ·05	− ·02	04·85	47 36·94	27·91	− ·07
	336.....	56 51·47	+ ·06	− ·37	+ ·31	+ ·03	− ·02	51·48	54 23·44	28·04	+ ·06
	2 Ceti.	24 01 17·60	+ ·07	− ·12	+ ·32	+ ·01	− ·02	17·86	58 49·78	28·08	+ ·10
	33 Piscium......	02 53·62	+ ·06	− ·24	+ ·31	+ ·01	− ·02	53·74	24 00 25·82	27·92	− ·06
	3	10 46·31	+ ·05	− ·44	+ ·31	− ·02	− ·02	46·19	08 18·21	27·98	·00
E	ζ Toucani....	17 33·11	+ ·22	+ ·89	− ·73	− ·04	− ·04	33·41	15 05·47	27·94	− ·04
	44 Piscium	22 58·02	+ ·10	− ·32	− ·30	− ·06	− ·02	57·42	20 29·47	27·95	− ·03
	α Phœnicis.....	24 01·20	+ ·15	+ ·20	− ·41	− ·06	− ·03	01·05	21 32·97	28·08	+ ·10
	339.............	27 37·43	+ ·10	− ·26	− ·30	− ·07	− ·02	36·88	25 08·89	27·99	+ ·01
	13 Baleine... .	32 47·51	+ ·10	− ·26	− ·30	− ·09	− ·02	46·94	30 18·96	27·98	·00
	130 Piazzi.......	34 53·66	+ ·13	− ·04	− ·34	− ·10	− ·02	53·29	32 25·28	28·01	+ ·03
	342......	46 11·44	+ ·09	− ·37	− ·31	− ·14	− ·02	10·69	43 42·75	27·94	− ·04

$a = +^{s}\cdot623$ $c = -^{s}\cdot304$

Chronometer correction at $24^{h}\ 05^{m} = -2^{m}\ 27^{s}\cdot982 \pm ^{s}\cdot015$

TRANSIT OBSERVATIONS.

Station: SOUTHPORT. Date, September 25th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. $r = -·12$	s.		h. m. s.	s.	s.
E	μ Aquarii. . ..	20 46 55·57	– ·10	– ·03	– ·25	+ ·22	– ·02	55·59	20 47 28·61	+ 33·02	– ·01
	32 Vulpeculæ ...	49 55·83	– ·06	– ·09	– ·28	– ·19	– ·02	55·69	50 28·66	32·97	+ ·04
	θ Capricorni....	21 00 00·14	+ ·10	– ·02	– ·26	+ ·14	– ·02	00·08	21 00 33·13	33·05	– ·04
	ζ Cygni.. ..	08 18·91	+ ·06	– ·09	– ·29	+ ·10	– ·02	18·67	08 51·70	33·03	– ·02
	α Equulei	10 28·95	+ ·08	– ·05	– ·25	– ·09	– ·02	28·80	11 01·79	32·99	+ ·02
W	β Aquarii	25 57·55	– ·19	– ·04	+ ·25	+ ·02	– ·02	57·57	26 30·55	32·98	+ ·03
	ξ Aquarii. ...	32 05·74	– ·19	– ·03	+ ·25	– ·02	·02	05·73	32 38·73	33·00	+ ·01
	ϵ Pegasi.......	38 55·71	– ·16	– ·06	+ ·25	– ·05	– ·02	55·67	39 28·68	33·01	·00
	α Toucani	22 11 22·99	– ·34	+ ·10	+ ·52	– ·22	– ·04	23·01	22 11 56·06	33·05	– ·04

$a = +^{s}·093 \qquad c = -^{s}·251$

Chronometer correction at $21^{h}\ 28^{m} = +33^{s}·010 \pm {}^{s}·008$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, September 29th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·40	s.		h. m. s.	s.	s.
E	β Pavonis	20 36 16·66	− ·08	+ ·68	− ·32	+ ·24	− ·05	17·13	20 36 18·15	+01·02	+ ·11
	ε Cygni	42 19·60	− ·02	− ·59	− ·18	+ ·20	− ·03	18·98	42 20·17	·19	− ·06
	μ Aquarii.	47 27·58	− ·04	− ·14	− ·13	+ ·17	− ·02	27·42	47 28·56	·14	− ·01
	ι Piscis Aust...	55 23·00	− ·05	+ ·04	− ·15	+ ·11	− ·02	22·93	55 24·15	·22	− ·09
	θ Capricorni....	21 00 32 03	− ·04	− ·08	− ·14	+ ·08	− ·02	31·83	21 00 33·08	·25	− ·12
	ν Aquarii	04 21·08	− ·04	− ·12	− ·13	+ ·05	− ·02	20·82	04 21·94	·12	+ ·01
	ζ Cygni	08 51 14	− ·03	− ·42	− ·15	+ ·03	− ·02	50·55	08 51·63	·08	+ ·05
W	γ Pavonis	18 29·16	− ·43	+ ·66	+ ·31	− 04	− ·05	29·61	18 30·81	·20	− ·07
	ζ Capricorni....	21 10·42	− ·25	− ·04	+ ·14	− ·06	− ·02	10·19	21 11·28	·09	+ ·04
	β Aquarii	26 29·82	− ·21	− ·17	+ ·13	− ·09	− ·02	29·46	26 30·51	·05	+ ·08
	ξ Aquarii	32 37·94	− ·22	− ·15	+ ·13	− ·13	− ·02	37·55	32 38·69	·14	− ·01
	ε Pegasi	39 28·08	− ·18	− ·27	+ ·13	·18	− ·02	27·56	39 28·64	·08	+ ·05
	δ Capricorni....	41 44·09	− ·23	− ·09	+ ·13	− ·19	− ·02	43·69	41 44·72	·03	+ ·10
	γ Gruis.........	48 06·15	− ·29	+ ·10	+ ·16	− ·24	− ·02	05·86	48 07·10	·24	− ·11

$a = +^{s}{\cdot}437$ $c = -^{s}{\cdot}129$

Chronometer correction at $21^{h}\ 12^{m} = +1^{s}{\cdot}132 \pm {}^{s}{\cdot}015$

W	κ Piscium	23 22 01·24	− ·13	− ·25	+ ·10	+ ·29	− ·02	01·23	23 22 01·20	−00·03	− ·03
	ι Phœnicis	29 54 97	− ·19	+ ·19	+ ·13	+ ·25	− ·03	55·32	29 55·14	·18	+ ·12
	ι Piscium	35 01·50	− ·12	− ·28	+ ·10	+ ·20	− ·02	01·38	35 01·30	·08	+ ·02
	δ Sculptoris	43 55·99	− ·17	+ ·01	+ ·11	+ ·15	− ·02	56·07	43 56·01	··06	·00
	ω Piscium.......	54 23·76	− ·12	− ·29	+ ·10	+ ·08	− ·02	23·51	54 23·48	·03	− ·03
	2 Ceti..........	58 49·91	− 15	− ·09	+ ·10	+ ·05	− ·02	49·80	58 49·79	·01	− ·05
	γ Pegasi	24 08 18·54	− ·11	− ·41	+ ·10	− ·01	− ·02	18·09	24 08 18·23	+ ·14	− ·20
E	β Hydri........	20 43·77	+ ·48	+1·85	− ·46	− ·09	− ·09	45·46	20 45·45	− ·01	− ·05
	12 Ceti..........	25 09·34	+ ·14	− ·21	− ·10	− ·13	− ·02	09.02	25 08·90	·12	+ ·06
	ε Andromedæ ..	33 30·59	+ ·10	− ·49	− ·11	− ·18	− ·02	29·89	33 29·85	·04	− ·02
	β Ceti.... .	38 47·03	+ ·16	−.·09	-- ·10	− ·21	− ·02	46·77	38 46·72	·05	− ·01
	δ Piscium	43 43·28	+ ·13	− ·30	− ·10	− ·25	− ·02	42·74	43 42·65	·09	+ ·03
	20 Ceti...	48 07·24	+ ·14	− ·23	− ·10	− ·28	− ·02	06·75	48 06·61	·14	+ ·08
	μ Andromedæ ..	51 27·52	+ ·08	− ·60	− ·12	-- ·29	− ·02	26·57	51 26·56	·01	− ·05

$a = +^{s}{\cdot}513$ $c = -^{s}{\cdot}097$

Chronometer correction at $24^{h}\ 06^{m} = -^{s}{\cdot}056 \pm {}^{s}{\cdot}015$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, September 30th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	r = − ·47 s.	s.		h. m. s.	s.	s.
E	β Pavonis.......	20 36 27·98	+ ·04	+ ·68	− ·17	+ ·26	− ·05	28·74	20 36 18·46	− 10·28	− ·04
	ε Cygni	42 30·80	+ ·01	− ·46	− ·08	+ ·21	− ·02	30·46	42 20·15	·31	− ·01
	μ Aquarii	47 38·93	+ ·02	− ·14	− ·07	+ ·17	− ·02	38·89	47 28·54	·35	+ ·03
	ι Piscis Aust...	55 34·45	+ ·03	+ ·04	− ·08	+ ·11	− ·02	34·53	55 24·14	·39	+ ·07
	ν Aquarii.....	21 04 32·39	+ ·02	− ·12	− ·07	+ ·04	− ·02	32·24	21 04 21·92	·32	·00
	ζ Cygni.......	09 02.45	+ ·02	− ·42	− ·08	·00	− ·02	01·95	08 51·63	·32	·00
W	γ Pavonis.......	18 40·77	− ·36	+ ·65	+ ·16	− ·07	− ·05	41·10	18 30·78	·32	·00
	ζ Capricorni....	21 21·87	− ·20	− ·04	+ ·07	− ·09	− ·02	21·59	21 11·27	·32	·00
	β Aquarii	26 41·21	− ·17	− ·16	+ ·07	− ·13	− ·02	40·80	26 30·50	·30	− ·02
	ξ Aquarii	32 49·50	− ·17	− ·15	+ ·07	− ·18	− ·02	49·05	32 38·68	·37	+ ·05
	ε Pegasi..	39 39·51	− ·15	− ·27	+ ·07	− ·24	− ·02	38·90	39 28·63	·27	− ·05
	δ Capricorni....	41 55·48	− ·19	− ·09	+ ·07	− ·26	− ·02	54·99	41 44·71	·28	− ·04

$a = +^{s}{\cdot}436 \qquad c = -^{s}{\cdot}067$

Chronometer correction at $21^{h}\ 09^{m} = -10^{s}{\cdot}319 \pm {}^{s}{\cdot}008$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 1st, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	r = − ·53 s.	s.	s.	h. m. s.	s.	s.
E	c² Aquarii......	23 04 43·82	− ·03	− ·05	− ·15	+ ·40	− ·02	43·97	23 04 20·06	− 23·91	+ ·02
	γ Toucani......	12 13·81	− ·05	+ ·40	− ·26	+ ·31	− ·04	14·17	11 50·31	·86	− ·03
	τ Pegasi.......	16 18·02	− ·02	− ·35	− ·15	+ ·28	− ·02	17·76	15 53·91	·85	− ·04
	κ Piscium......	22 25·22	− ·03	− ·20	− ·14	+ ·24	− ·02	25·07	22 01·20	·87	− ·02
	ι Phœnicis. ...	30 19·04	− ·04	+ ·15	− ·19	+ ·17	− ·03	19·10	29 55·13	·97	+ ·08
	ι Piscium	35 25·43	− ·03	− ·22	− ·14	+ ·12	− ·02	25·14	35 01·32	·82	− ·07
	δ Sculptoris....	44 20·03	− ·03	·00	− ·16	+ ·04	− ·02	19·86	43 55·96	·90	+ ·01
W	ω Piscium......	54 47·52	+ ·01	− ·23	+ ·14	− ·04	− ·02	47·38	54 23·49	·89	·00
	γ Pegasi.......	24 08 42·45	+ ·01	− ·29	+ ·14	− ·15	− ·02	42·14	24 08 18·24	·90	+ ·01
	ι Ceti	14 56·78	+ ·01	− ·13	+ ·14	− ·22	− ·02	56·56	14 32·68	·88	− ·01
	β Hydri	21 07·52	+ ·03	+ 1·48	+ ·65	− ·28	− ·09	09·31	20 45·43	·88	− ·01
	12 Ceti	25 33·21	+ ·01	− ·16	+ ·14	− ·31	− ·02	32·87	25 08·90	·97	+ ·08
	ε Andromedæ..	33 54·36	+ ·01	− ·39	+ ·16	− ·40	− ·02	53·72	33 29·86	·86	− ·03

$a = +^{s}{\cdot}409 \qquad c = -^{s}{\cdot}137$

Chronometer correction at $23^{h}\ 49^{m} = -23^{s}{\cdot}890 \pm {}^{s}{\cdot}009$

TRANSIT OBSERVATIONS.

Station: SOUTHPORT. Date, October 2nd, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·596	s.		h. m. s.	s.	s.
E	μ Aquarii......	20 48 03·00	− ·01	− ·15	− ·16	+ ·37	− ·02	03·03	20 47 28·51	−34·52	+ ·08
	32 Vulpeculæ...	51 03·22	·00	− ·45	− ·18	+ ·34	− ·02	02·91	50 28·54	·37	− ·07
	1 Piscis Aust....	55 58·45	− 01	+ ·05	− ·19	+ ·30	− ·02	58·58	55 24·11	·47	+ ·03
	θ Capricorni ...	21 01 07·50	− ·01	− ·09	− ·16	+ ·24	− ·02	07·46	21 00 33·04	·42	− ·02
	ν Aquarii.....	04 56·49	− ·01	− ·14	− ·16	+ ·21	− ·02	56·37	04 21·89	·48	+ ·04
	γ Pavonis......	19 04·78	− ·02	+ ·73	− 38	+ ·06	− ·05	05·12	18 30 70	·42	− ·02
W	β Aquarii.......	27 05·35	− ·32	− ·18	+ ·16	− ·02	− ·02	04·97	26 30·48	·49	+ ·05
	ε Pegasi...	40 03·46	− ·19	− ·30	+ ·16	− ·15	− ·02	02·96	39 28·60	·36	− ·08
	δ Capricorni . ..	42 19·53	− ·25	− ·10	+ ·16	− ·17	− ·02	19·15	41 44·69	46	+ ·02
	α Aquarii	22 01 26·61	− ·22	− ·22	+ ·16	− ·36	− ·02	25·95	22 00 51 50	·45	+ ·01
	α Gruis.......	02 45·92	− ·35	+ ·24	+ ·23	− ·37	− ·03	45·64	02 11·20	·44	.00

$a = +^{s}{\cdot}484 \qquad c = -^{s}{\cdot}156$

Chronometer correction at $21^{h}\ 25^{m} = -34^{s}{\cdot}442 \pm {}^{s}{\cdot}012$

W	α Pegasi......	23 00 34·96	− ·05	− ·30	+ ·07	+ ·54	− ·02	35·30	22 59 59·36	−35·94	− ·01
	c² Aquarii......	04 55·47	+ ·07	− ·05	+ ·07	+ ·50	− ·02	56·04	23 04 20·06	·98	+ ·03
	τ Pegasi........	16 29·73	+ ·04	− 36	+ ·08	+ ·38	− ·02	29·85	15 53·91	·94	− ·01
	κ Piscium... ...	22 36·87	+ ·06	− ·20	+ ·07	+ ·32	− ·02	37·10	22 01·19	·91	− ·04
	ι Phœnicis......	30 30·60	+ ·10	+ ·16	+ ·09	+ ·24	− ·03	31·16	29 55·13	36·03	+ ·08
	ι Piscium	35 37·14	+ ·06	− ·23	+ ·07	+ ·19	− ·02	37·21	35 01·30	35·91	− ·04
	δ Sculptoris. ...	44 31·70	+ ·07	·00	+ ·08	+ ·10	− ·02	31·93	43 56·01	·92	− 03
E	α Andromedæ...	24 04 02·98	+ ·06	− ·40	− ·08	− ·10	− ·02	02·44	24 03 26·44	36·00	+ ·05
	ι Ceti..	15 08·99	+ ·09	·14	− ·07	− ·21	− ·02	08·64	14 32·68	35·96	+ ·01
	β Hydri........	21 20·24	+ ·29	+1·53	− ·33	− ·27	− ·09	21·37	20 45·44	·93	− ·02
	12 Ceti...... ..	25 45·35	+ ·09	− ·17	− ·07	− ·31	− ·02	44·87	25 08·90	·97	+ ·02
	ε Andromedæ...	34 06·62	+ ·06	− ·40	− ·08	− ·40	− ·02	05·78	33 29·87	·91	− ·04
	δ Piscium.......	44 19·39	+ ·08	− ·25	− ·07	− ·50	− ·02	18·63	43 42·67	·96	+ ·01
	20 Ceti.....	48 43·31	+ 09	− ·19	− ·07	− ·54	− ·02	42·58	48 06·63	·95	·90

$a = +^{s}{\cdot}424 \qquad c = -^{s}{\cdot}069$

Chronometer correction at $23^{h}\ 54^{m} = -35^{s}{\cdot}952 \pm {}^{s}{\cdot}007$

TRANSIT OBSERVATIONS.

Station: SOUTHPORT. Date, October 3rd, 1903. Observer: OTTO KLOTZ

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·49	s.		h. m. s.	s.	s.
E	α Pavonis......	20 18 49·96	+ ·07	+ ·30	− ·25	− ·34	− ·04	50·38	20 17 62·78	−47·60	− ·01
	α Indi	31 36·00	+ ·06	+ ·17	− ·20	+ ·23	− ·03	36·23	30 48·50	·73	+ ·12
	α Delphini.....	35 58·67	+ ·03	− ·24	− ·14	+ ·20	− ·02	58·50	35 10·87	·63	+ ·02
	ε Cygni........	43 08·01	+ ·03	− ·36	− ·16	+ ·14	− ·03	07·63	42 20·09	·54	− ·07
	θ Capricorni....	21 01 20·73	+ ·65	− ·06	− ·14	− ·01	− ·02	20·55	21 00 33·03	·52	− ·09
	ν Aquarii.	05 09·73	+ ·04	− ·10	− ·14	− ·04	− ·02	09·47	04 21·88	·59	− ·02
W	γ Pavonis	19 17·62	− ·07	+ ·50	+ ·33	− ·15	− ·05	18·18	18 30·67	·51	− ·10
	ζ Capricorni ...	21 58·97	− ·04	− ·03	+ ·15	− ·17	− ·02	58·86	21 11·23	·63	+ ·02
	β Aquarii......	27 18·34	− ·03	− ·12	+ ·14	− ·21	− ·02	18·10	26 30·46	·64	+ ·03
	ξ Aquarii......	33 26·65	− ·04	− ·12	+ ·14	− ·27	− ·02	26·34	32 38·65	·69	+ ·08
	ε Pegasi........	40 16·71	− ·03	− ·21	+ ·14	− ·32	− ·02	16·27	39 28·59	·68	+ ·07
	δ Capricorni....	42 32·65	− ·04	− ·07	+ ·14	− ·34	− ·02	32·32	41 44·68	·64	+ ·03

$a = +^{s}\cdot340 \qquad c = -^{s}\cdot136$

Chronometer correction at $21^{h}\ 00^{m} = -47^{s}\cdot615 \pm {}^{s}\cdot015$

W	σ Aquarii.......	22 26 22·71	− ·04	− ·13	+ ·11	+ ·37	− ·02	23·00	22 25 34·32	−48·68	·00
	η Aquarii.......	31 14·31	− ·04	− ·20	+ ·11	+ ·33	− ·02	14·49	30 25·79	·70	+ ·02
	β Gruis	37 44·63	− ·06	+ ·22	+ ·16	+ ·28	− ·03	45·20	36 56·47	·73	+ ·05
	η Pegasi.......	39 19·82	− ·03	− ·43	+ ·12	+ ·26	− ·02	19·72	38 30·99	·73	+ ·05
	ε Gruis	43 33·77	− ·06	+ ·29	+ ·17	+ ·24	− ·03	34·38	42 45·78	·60	− ·08
	α Pegasi........	23 00 48·17	− ·03	− ·31	+ ·11	+ ·09	− ·02	48·01	59 59·36	·65	− ·03
E	γ Toucani ...	12 38·54	+ ·33	+ ·43	− ·21	− ·01	− ·04	39·04	23 11 50·29	·75	+ ·07
	κ Piscium......	22 50·12	+ ·17	− ·21	− ·11	− ·09	− ·02	49·86	22 01·19	·67	− ·01
	ι Piscium.	35 50·35	+ ·17	− ·24	− ·11	− ·20	− ·02	49·95	35 01·30	·65	− ·03
	δ Sculptoris.....	44 44·81	+ ·21	·00	− ·12	− ·27	− ·02	44·61	43 56·01	·60	− ·08
	φ Pegasi	48 26·31	+ ·14	− ·34	− ·11	− ·30	− ·02	25·68	47 36·98	·70	+ ·02
	ω Piscium	55 12·71	+ ·16	− ·25	− ·11	− ·37	− ·02	12·12	54 23·48	·64	− ·04

$a = +^{s}\cdot439 \qquad c = -^{s}\cdot108$

Chronometer correction at $23^{h}\ 11^{m} = -48^{s}\cdot676 \pm {}^{s}\cdot012$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 6th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = – ·40	s.		h. m. s.	m. s.	s.
E	θ Aquilæ......	20 07 40·87	·00	– ·15	– ·10	+ ·19	·02	40·79	20 06 20·84	-1 19·95	+ ·01
	α² Capricorni....	14 03·39	·00	– ·09	– ·10	+ ·15	– ·02	03·33	12 43·40	·93	– ·01
	β Capricorni....	16 56·69	·00	– ·08	– ·10	+ ·13	– ·02	56·62	15 36·76	·86	– ·08
	α Pavonis . ..	19 22·45	·00	+ ·29	– ·18	+ ·11	– ·04	22·63	18 02·69	·94	·00
	ρ Capricorni ...	24 42·83	·00	– ·06	– ·10	+ ·08	·02	42·73	23 22·83	·90	– 04
	ε Delphini.... .	29 57·81	·00	– ·21	– ·10	+ ·05	– ·02	57·53	28 37·58	·95	+ ·01
	α Indi.........	32 08·42	·00	+ ·16	– ·15	+ ·03	– ·03	08·43	30 48·43	20·00	+ ·06
W	β Pavonis	37 37·79	– ·39	+ ·51	+ ·25	– ·01	·05	38·10	36 18·20	19·90	– ·04
	ε Cygni.... ...	43 40·39	– ·11	– ·35	+ ·12	– ·05	– ·02	39·98	42 20·03	·95	+ ·01
	μ Aquarii	48 48·79	– ·19	– ·11	+ ·10	– ·08	– ·02	48·49	47 28·45	20·04	+ ·10
	32 Vulpeculæ....	51 48·85	– ·13	– ·31	+ ·11	– ·10	– ·02	48·40	50 28·48	19·92	– ·02
	1 Piscis Aust....	56 44·26	– ·24	+ ·03	+ ·12	– ·13	– ·02	44·02	55 24·04	·98	+ ·04
	θ Capricorni....	21 01 53·22	– ·21	– ·06	+ ·10	– ·17	– ·02	52·86	21 00 32·99	·87	– ·07
	ν Aquarii ...	05 42·22	– ·20	– ·09	+ ·10	– ·19	– ·02	41·82	04 21·84	·98	+ ·04

$a = +^{s}\cdot330 \qquad c = -^{s}\cdot099$

Chronometer correction at $20^{h}\ 36^{m} = -1^{m}\ 19^{s}\cdot942 \pm {}^{s}\cdot010$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	α Piscis Aust...	22 53 42·04	– ·13	+ ·01	+ ·10	+ ·29	– ·02	42·29	22 52 21·09	-1 21·20	+ ·05
	α Pegasi.......	23 01 20·47	– ·09	– ·25	+ ·09	+ ·24	– ·02	20·44	59 59·34	·10	– ·05
	γ Toucani......	13 10·97	– ·19	+ ·35	+ ·16	+ ·16	·04	11·41	23 11 50·26	·15	·00
	τ Pegasi.......	17 15·16	– ·08	– ·30	+ ·09	+ ·13	– ·02	14·98	15 53·90	·08	– ·07
	κ Piscium......	23 22·42	– ·10	– ·17	+ ·08	+ ·09	– ·02	22·30	22 01·18	·12	– ·03
	ι Phœnicis... .	31 16·22	– ·15	+ ·13	+ ·11	+ ·04	– ·03	16·32	29 55·11	·21	+ ·06
	ι Piscium	36 22·62	– ·10	– ·20	+ ·08	+ ·01	– ·02	22·39	35 01·29	·10	– ·05
E	δ Sculptoris....	45 17·12	+ ·14	·00	– ·09	– ·05	– ·02	17·10	43 56·00	·10	– ·05
	ω Piscium	55 44·98	+ ·10	– ·20	– ·08	– ·12	– ·02	44·66	54 23·50	·16	+ ·01
	2 Ceti	24 00 11·16	+ ·13	– ·06	– ·09	– ·15	– ·02	10·97	58 49·80	·17	+ ·02
	α Andromedæ..	04 48·23	+ ·08	– ·34	– ·09	– ·18	– ·02	47·68	24 03 26·45	·23	+ ·08
	γ Pegasi...... ..	09 39·86	+ ·09	– ·25	– ·09	– ·21	– ·02	39·38	08 18·24	·14	– ·01
	ι Ceti........ .	15 54·21	+ ·12	– ·11	– ·08	– ·25	– ·02	53·87	14 32·69	·18	+ ·03
	β Hydri........	22 05·68	+ ·37	+1·28	– ·39	– ·29	– ·09	06·56	20 45·43	·13	– ·02

$a = +^{s}\cdot355 \qquad c = -^{s}\cdot083$

Chronometer correction at $23^{h}\ 37^{m} = -1^{m}\ 21^{s}\cdot148 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 7th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = – ·35	s.		h. m. s.	m. s.	s.
E	ξ Aquarii......	21 34 09·63	+ ·17	– ·13	– ·08	+ ·26	– ·02	09·83	21 32 38·60	-1 31·23	+ ·02
	ε Pegasi........	40 59·74	+ ·14	– ·23	– ·08	+ ·22	– ·02	59·77	39 28·54	·23	+ ·02
	δ Capricorni....	43 15·61	+ ·18	– ·08	– ·08	+ ·20	– ·02	15·81	41 44·63	·18	– ·03
	γ Gruis	49 37·87	+ ·22	+ ·08	– ·10	+ ·17	– ·03	38·21	48 06·97	·24	+ ·03
	α Aquarii.......	22 02 22 71	+ ·16	– ·17	– ·08	+ ·09	– ·02	22·69	22 00 51·45	·24	+ ·03
	ι Pegasi...... .	04 04·52	+ ·12	– ·33	– ·08	+ ·08	– ·02	04·29	02 33·14	·15	– ·06
W	η Pegasi.......	40 02·65	– ·07	– ·36	+ ·09	– ·13	– ·02	02·16	38 30·96	·20	– ·01
	ε Gruis	44 16·85	– ·16	+ ·24	+ ·12	– ·15	– ·03	16·87	42 45·72	·15	– ·06
	μ Pegasi.... ..	46 54·66	– ·07	– ·32	+ ·08	– ·16	– ·02	54·17	45 22·90	·27	+ ·06
	λ Aquarii.... ..	49 08·27	– ·10	– ·13	+ ·08	– ·18	– ·02	07·92	47 36·74	·18	– ·03
	δ Aquarii.......	51 05·19	– ·11	– ·08	+ ·08	– 19	– ·02	04·87	49 33·65	·22	+ ·01
	α Piscis Aust...	53 52·60	– ·13	+ ·01	+ ·09	– ·20	– ·02	52·35	52 21·08	·27	+ ·06
	α Pegasi.......	23 01 31·07	– ·08	– ·26	+ ·08	– ·26	– ·02	30·53	59 59·34	·19	– ·02

$a = +^{s}\cdot372 \qquad c = -^{s}\cdot077$

Chronometer correction at $22^{h}\ 18^{m} = -1^{m}\ 31^{s}\cdot215 \pm {}^{s}\cdot010$

W	δ Sculptoris	23 45 27·83	– ·16	·00	+ ·18	+ ·20	– ·02	28·03	23 43 55·95	-1 32·08	+ ·08
	φ Pegasi........	49 09·09	– ·10	– ·35	+ ·16	+ ·17	– ·02	08·95	47 36·98	31·97	– ·03
	ω Piscium	55 55·63	– ·11	– ·26	+ ·16	+ ·14	– ·02	55·54	54 23·50	32·04	+ ·04
	2 Ceti..........	24 00 21·82	– ·14	– ·08	+ ·16	+ ·11	– ·02	21·85	58 49·80	32·05	+ ·05
	α Andromedæ ..	04 58 68	– ·08	– 43	+ ·18	+ ·09	– ·02	58·42	24 03 26·45	31·97	– ·03
	γ Pegasi.. . .	09 50·42	– ·10	– ·32	+ ·16	+ ·06	– ·02	50·20	08 18·25	31·95	– ·05
	ζ Toucani	16 36·79	– 27	+ ·66	+ ·37	+ ·02	– ·05	37·52	15 05 55	31·97	– ·03
E	β Hydri........	22 16·05	+ ·58	+1·64	– ·73	– ·02	– ·09	17·43	20 45·42	32·01	+ ·01
	12 Ceti....... ...	26 41·17	+ ·17	– ·18	– ·15	– ·04	– ·02	40·95	25 08·93	32·02	+ ·02
	ε Andromedæ ..	35 02·37	+ ·12	– ·43	– ·18	– ·09	– ·02	01 77	33 29·89	31·88	– ·12
	β Ceti	40 18·97	+ ·20	– ·08	– ·16	– ·12	– ·02	18·79	38 46·76	32·03	+ ·03
	δ Piscium	45 15 23	+ ·14	– ·26	– ·16	– ·15	– ·02	14·78	43 42·70	32·08	+ ·08
	20 Ceti..	49 39·09	+ ·17	– ·20	– ·15	– ·18	– ·02	38·71	48 06·65	32·06	+ ·06
	μ Andromedæ ..	52 59·45	+ 10	– ·52	– ·20	– ·20	– ·03	58·60	51 26·63	31·97	– ·03

$a = +^{s}\cdot455 \qquad c = -^{s}\cdot155$

Chronometer correction at $24^{h}\ 19^{m} = -1^{m}\ 32^{s}\cdot005 \pm {}^{s}\cdot012$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 8th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·50	s.		h. m. s.	m. s.	s.
E	β Pavonis	20 37 59·55	+ ·27	+ ·59	− ·27	+ ·35	− ·05	60·44	20 36 18·11	−1 42·33	+ ·03
	ε Cygni...	44 02·43	+ ·08	− ·40	− ·13	+ ·30	− ·02	02·26	42 19·99	·27	− ·03
	μ Aquarii......	49 10·58	+ ·13	− ·12	− ·11	+ ·26	− ·02	10·72	47 28·42	·30	·00
	32 Vulpeculæ....	52 10·88	+ ·09	− ·35	− ·12	+ ·23	− ·02	10·71	50 28·44	·27	− ·03
	ι Piscis Aust....	57 06·03	+ ·16	+ ·04	− ·13	+ ·19	− ·02	06·27	55 24·01	·26	− ·04
	θ Capricorni....	21 02 15·16	+ ·15	− ·07	− ·11	+ ·15	− ·02	15·26	21 00 32·96	·30	·00
	ν Aquarii	06 04·07	+ ·14	− ·11	− ·11	+ ·12	− ·02	04·09	04 21·81	·28	− ·02
W	γ Pavonis	20 12·25	− ·31	+ ·57	+ ·26	·00	− ·05	12·72	18 30·49	·23	− ·07
	ζ Capricorni....	22 53·66	− ·17	− ·04	+ ·12	− ·02	− ·02	53·53	21 11·19	·34	+ ·04
	β Aquarii	28 12·99	− ·15	− ·14	+ ·11	− ·07	− ·02	12·72	26 30·40	·32	+ ·02
	ξ Aquarii	34 21·17	− ·15	− ·13	+ ·11	− ·12	− ·02	20·86	32 38·58	·28	− ·02
	ε Pegasi	41 11·28	− ·13	− ·24	+ ·11	− ·17	− ·02	10·83	39 28·53	·30	·00
	γ Gruis.........	49 49·57	− ·20	+ ·08	+ ·13	− ·24	− ·03	49·31	48 06·96	·35	+ ·05
	α Aquarii	22 02 34·32	− ·14	− ·17	+ ·11	− ·35	− ·02	33·75	22 00 51·44	·31	+ ·01

$a = +^{s}\cdot380 \qquad c = -^{s}\cdot106$

Chronometer correction at $21^{h}\ 20^{m} = -1^{m}\ 42^{s}\cdot296 \pm {}^{s}\cdot007$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	α Toucani	22 13 38·20	− ·21	+ ·44	+ ·22	+ ·49	− ·04	39·10	22 11 55·80	−1 43·30	+ ·08
	η Pegasi	40 14·24	− ·07	− ·38	+ ·13	+ ·27	− ·02	14·17	38 30·95	·22	·00
	μ Pegasi	47 06·21	− ·08	− ·34	+ ·12	+ ·21	− ·02	06·10	45 22·90	·20	− ·02
	λ Aquarii.......	49 19·92	− ·11	− ·13	+ ·11	+ ·19	− ·02	19·96	47 36·73	·23	+ ·01
	δ Aquarii.......	51 16·81	− ·12	− ·08	+ ·11	+ ·17	− ·02	16·87	49 33·64	·23	+ ·01
	α Piscis Aust...	54 04·21	− ·14	+ ·02	+ ·13	+ ·15	− ·02	04·35	52 21·07	·28	+ ·06
	α Pegasi.......	23 01 42·76	− ·09	− ·27	+ ·11	+ ·09	− ·02	42·58	59 59·33	·25	+ ·03
E	γ Toucani	13 32·90	+ ·35	+ ·39	− ·21	− ·01	− ·04	33·38	23 11 50·24	·14	− ·08
	ι Piscium	36 44·91	+ ·17	− ·22	− ·11	− ·20	− ·02	44·53	34 61·29	·24	+ ·02
	φ Pegasi........	49 20·83	+ ·16	− ·30	− ·11	− ·31	− ·02	20·25	47 36·98	·27	+ ·05
	ω Piscium	56 07·27	+ ·17	− ·22	− ·11	− ·37	− ·02	06·72	54 23·49	·23	+ ·01
	2 Ceti..........	24 00 33·35	+ ·22	− ·07	− ·11	− ·40	− ·02	32·97	58 49·80	·17	− ·05
	α Andromedæ ..	05 10·47	+ ·13	− ·37	− ·12	− ·44	− ·02	09·65	24 03 26·45	·20	− ·02
	γ Pegasi........	10 02·13	+ ·16	− ·27	− ·11	− ·49	− ·02	01·40	08 18·25	·15	− ·07

$a = +^{s}\cdot392 \qquad c = -^{s}\cdot109$

Chronometer correction at $23^{h}\ 12^{m} = -1^{m}\ 43^{s}\cdot219 \pm {}^{s}\cdot010$

TRANSIT OBSERVATIONS.

Station : Southport. Date, October 9th, 1903. Observer : Otto Klotz.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = −·48	s.		h. m. s.	m. s.	s.
E	β Pavonis	20 38 11·49	+·31	+·60	−·27	+·29	−·05	12·37	20 36 18·09	−1 54·28	+·06
	ε Cygni	45 14·40	+·09	−·40	−·13	+·23	−·02	14·17	42 19·97	·20	−·02
	μ Aquarii	49 22·51	+·15	−·12	−·11	+·20	−·02	22·61	47 28·41	·20	−·02
	32 Vulpeculæ	52 22·86	+·10	−·36	−·12	+·18	−·02	22·64	50 28·42	·22	·00
	ι Piscis Aust.	57 17·94	+·19	+·04	−·13	+·14	−·02	18·16	55 23·99	·17	−·05
	θ Capricorni	21 02 27·04	+·16	−·07	−·12	+·10	−·02	27·09	21 00 32·94	·15	−·07
	ν Aquarii	06 16·06	+·16	−·11	−·11	+·06	−·02	16·04	04 21·79	·25	+·03
W	γ Pavonis	20 24·15	−·31	−·58	+·27	−·05	−·05	24·59	18 30·45	·14	−·08
	ζ Capricorni	23 05·57	−·17	−·04	+·12	−·07	−·02	05·39	21 11·15	·24	+·02
	β Aquarii	28 24·88	−·15	−·15	+·11	−·11	−·02	24·56	26 30·39	·17	−·05
	ξ Aquarii	34 33·24	−·15	−·13	+·11	−·16	−·02	32·89	32 38·57	·32	+·10
	ε Pegasi	41 23·25	−·13	−·24	+·11	−·22	−·02	22·75	39 28·52	·23	−·01
	δ Capricorni	43 39·21	−·16	−·08	+·11	−·23	−·02	38·83	41 44·60	·23	+·01
	γ Gruis	50 01·50	−·20	+·08	+·14	−·29	−·03	01·20	48 06·95	·25	−·03

$a = +^{s}\cdot386$ $c = -^{s}\cdot110$

Chronometer correction at $21^{h}\ 14^{m} = -1^{m}\ 54^{s}\cdot217 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station : Southport. Date, October 10th, 1903. Observer : Otto Klotz.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = −·50	s.		h. m. s.	m. s.	s.
E	β Pavonis	20 38 23·42	+·30	+·56	−·36	+·30	−·05	24·17	20 36 18·06	−2 06·11	+·01
	ε Cygni	44 26·29	+·09	−·38	−·17	+·25	−·02	26·06	42 19·95	·11	+·01
	μ Aquarii	49 34·43	+·15	−·12	−·14	+·21	−·02	34·51	47 28·40	·11	+·01
	32 Vulpeculæ	52 34·75	+·10	−·34	−·16	+·18	−·02	34·51	50 28·40	·11	+·01
	ι Piscis Aust.	57 29·90	+·18	+·04	−·16	+·14	−·02	30·08	55 23·97	·11	+·01
	θ Capricorni	21 02 38·95	+·16	−·07	−·14	+·10	−·02	38·98	21 00 32·93	·05	−·05
	ν Aquarii	06 27·92	+·15	−·10	−·14	+·06	−·02	27·87	04 21·78	·09	−·01
W	γ Pavonis	20 35·98	−·27	+·54	+·34	−·05	−·05	36·49	18 30·41	·08	−·02
	ζ Capricorni	23 17·36	−·15	−·04	+·15	−·07	−·02	17·23	21 11·14	·09	−·01
	β Aquarii	28 36·73	−·13	−·14	+·14	−·12	−·02	36·46	26 30·38	·08	−·02
	ξ Aquarii	34 44·96	−·13	−·12	+·14	−·17	−·02	44·66	32 38·56	·10	·00
	ε Pegasi	41 35·07	−·11	−·22	+·14	−·23	−·02	34·63	39 28·50	·13	+·03
	δ Capricorni	43 51·01	−·14	−·08	+·14	−·24	−·02	50·67	41 44·59	·08	−·02
	γ Gruis	50 13·34	−·17	+·08	+·18	−·30	−·03	13·10	48 06·93	·17	+·07

$a = +^{s}\cdot362$ $c = -^{s}\cdot138$

Chronometer correction at $21^{h}\ 14^{m} = -2^{m}\ 06^{s}\cdot102 \pm {}^{s}\cdot005$

TRANSIT OBSERVATIONS.

Station: SOUTHPORT. Date, October 11th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = · ·44	s		h. m. s.	m. s.	s.
E	ρ Capricorni....	20 25 39·44	+ ·09	− ·06	− ·11	+ ·23	− ·02	39·57	20 23 22·74	−2 16·83	+ ·04
	ε Delphini......	30 54·39	+ ·07	− ·23	− ·11	+ ·19	− ·02	54·29	28 37·50	·79	·00
	β Pavonis.......	38 34·26	+ ·16	+ ·56	− ·27	+ ·14	− ·05	34·80	36 18·00	·80	+ ·01
	ε Cygni....... .	44 37·09	+ ·05	− ·38	− ·13	+ ·10	− ·02	36·71	42 19·92	·79	·00
	μ Aquarii	49 45·26	+ ·08	− ·11	− ·11	+ ·06	− ·02	45·16	47 28·38	·78	− ·01
	32 Vulpeculæ....	52 45·50	+ ·05	− ·33	− ·12	+ ·04	− ·02	45·12	50 28·38	·74	− ·05
	ι Piscis Aust...	57 40·73	+ ·10	+ ·04	− ·13	·00	− ·02	40·72	55 23·95	·77	− ·02
W	θ Capricorni...	21 02 49·83	− ·16	− ·06	+ ·11	− ·04	− ·02	49·66	21 00 32·91	·75	− ·04
	ν Aquarii.......	06 38·83	− ·16	− ·10	+ ·11	− ·06	− ·02	38·60	04 21·76	·84	+ ·05
	ζ Cygni	11 08·70	− ·10	− ·35	+ ·12	− ·11	− ·02	08·24	08 51·44	·80	+ ·01
	α Equulei.... .	13 18·72	− ·13	− ·19	+ ·11	− ·11	− ·02	18·38	11 01·58	·80	+ ·01
	γ Pavonis.	20 46·87	− ·31	+ ·54	+ ·26	− ·16	− ·05	47 15	18 30·37	·78	− ·01
	ζ Capricorni.....	23 28·23	− ·17	− ·04	+ ·12	− ·19	− ·02	27·93	21 11·12	·81	+ ·02
	β Aquarii.......	28 47·57	− ·15	− ·14	+ ·11	− ·23	− ·02	47·14	26 30·36	·78	− ·01

$a = +^{s}·357$ $c = -^{s}·106$

Chronometer correction at $20^{h}\ 57^{m} = -2^{m}\ 16^{s}·789 \pm {}^{s}·005$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ε Pegasi........	21 41 45·86	− ·13	− ·19	+ ·09	+ ·34	− ·02	45 95	21 39 28·49	−2 17·46	− ·01
	δ Capricorni....	44 01·87	− ·16	− ·06	+ ·10	+ ·32	− ·02	02·05	41 44 58	·47	·00
	γ Gruis	50 24·17	− ·19	+ ·07	+ ·12	+ ·28	− ·03	24·42	48 06·91	·51	+ ·04
	α Aquarii	22 03 08·91	− ·14	− ·14	+ ·09	+ ·19	− ·02	08·89	22 00 51·41	·48	+ ·01
	ι Pegasi.	04 50·62	− ·10	− ·26	+ ·10	+ ·17	− ·02	50·51	02 33·09	·42	− ·05
	α Toucani......	14 12·86	− ·26	+ ·33	+ ·19	+ ·10	− ·01	13·18	11 55·72	·46	− ·01
E	ε Gruis	45 03·04	+ ·17	+ ·19	− ·15	− ·13	− ·03	03·09	42 45·64	·45	− ·02
	δ Aquarii.......	51 51·28	+ ·12	− ·06	− ·10	− ·16	− ·02	51·06	49 33·62	·44	− ·03
	α Piscis Aust...	54 38·68	+ ·13	+ ·01	− ·11	− ·18	− ·02	38·51	52 21·04	·47	·00
	α Pegasi........	23 02 17·29	+ ·08	− ·21	− ·10	− ·25	− ·02	16·79	59 59·31	·48	+ ·01
	c^2 Aquarii.......	06 37·78	+ ·12	− ·04	− ·10	− ·27	− ·02	37·47	23 04 20·01	·46	− ·01
	γ Toucani....	14 07·73	+ ·19	+ ·30	− ·18	− ·34	− ·04	07·66	. 11 50·18	·48	+ ·01

$a = +^{s}·298$ $c = -^{s}·093.$

Chronometer correction at $22^{h}28^{m} = -2^{m}17^{s}·466 \pm {}^{s}·005$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 12th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·36	s.		h. m. s.	m. s.	s.
E	β Pavonis.......	20 38 46·06	+ ·06	+ ·55	− ·22	+ ·19	− ·05	46·59	20 36 17·96	−2 28·63	+ ·06
	ε Cygni........	44 48·72	+ ·02	− ·37	− ·10	+ ·16	− ·02	48·41	42 19·90	·51	− ·06
	μ Aquarii	49 56·98	+ ·03	− ·11	− ·09	+ ·12	− ·02	56·91	47 28·36	·55	− ·02
	32 Vulpeculæ....	52 57·17	+ ·02	− ·33	− ·10	+ ·11	− ·02	56·85	50 28·36	·49	− ·08
	ι Piscis Aust...	57 52·49	+ ·04	+ ·04	− ·10	+ ·08	− ·02	52·53	55 23·93	·60	+ ·03
	θ Capricorni....	21 03 01·50	+ ·03	− ·07	− ·09	+ ·04	− ·02	01·39	21 00 32·89	·50	− ·07
	ν Aquarii... ...	06 50·48	+ ·03	− ·10	− ·09	+ ·02	− ·02	50·32	04 21·75	·57	·00
W	ζ Cygni........	11 20·46	− ·11	− ·34	+ ·10	− ·01	− ·02	20·08	08 51·42	·66	+ ·09
	α Equulei	13 30·46	− ·16	− ·19	+ ·09	− ·02	− ·02	30·16	11 01·55	·61	+ ·04
	γ Pavonis......	20 58·53	− ·37	+ ·53	+ ·21	− ·06	− ·05	58·79	18 30·33	·46	− ·11
	ζ Capricorni....	23 39·92	− ·20	− ·04	+ ·09	− ·08	− ·02	39·67	21 11·10	·57	·00
	β Aquarii.......	28 59·27	− ·17	− ·13	+ ·09	− ·11	− ·02	58·93	26 30·35	·58	+ ·01
	ξ Aquarii.......	35 07·53	− ·18	− ·13	+ ·09	− ·15	− ·02	07·14	32 38·53	·61	+ ·04
	ε Pegasi	41 57·56	− ·15	− ·22	+ ·09	− ·19	− ·02	57·07	39 28·48	·59	+ ·02

$a = +^{s}\cdot 354$ $c = -^{s}\cdot 086$

Chronometer correction at $21^{h}\ 10^{m} = -2^{m}\ 28^{s}\cdot 565 \pm {}^{s}\cdot 012$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	δ Capricorni....	21 44 13·52	− ·16	− ·06	+ ·06	+ ·25	− ·02	13·59	21 41 44·56	−2 29·03	− ·02
	γ Gruis	50 35·89	− ·19	+ ·06	+ ·08	+ ·21	− ·03	36·02	48 06·89	·13	+ ·08
	α Aquarii	22 03 20·55	− ·14	− ·13	+ ·06	+ ·13	− ·02	20·45	22 00 51·40	·05	·00
	ι Pegasi........	05 02·31	− ·10	− ·24	+ ·07	+ ·12	− ·02	02·14	02 33·07	·07	+ ·02
	α Toucani	14 24·51	− ·27	+ ·31	+ ·13	+ ·07	− ·04	24·71	11 55·69	·02	− ·03
	γ Aquarii	19 11·36	− ·14	− ·12	+ ·06	+ ·04	− ·02	11·18	16 42·13	·05	·00
E	μ Pegasi . . .	47 52·35	+ ·08	− ·24	− ·07	− ·13	− ·02	51·97	45 22·86	·11	+ ·06
	λ Aquarii	50 05·92	+ ·11	− ·09	− ·06	− ·15	− ·02	05·71	47 36·70	·01	− ·04
	δ Aquarii	52 02·88	+ ·12	− ·06	− ·06	− ·16	− ·02	02·70	49 33·61	·09	+ ·04
	α Piscis Aust...	54 50·16	+ ·14	+ ·01	− ·07	− ·17	− ·02	50·05	52 21·03	·02	− ·03
	c^2 Aquarii	23 06 49·20	+ ·12	− ·03	− ·07	− ·25	− ·02	48·95	23 04 20·00	28·95	− ·10
	γ Toucani......	14 19·27	+ ·19	+ ·27	− ·12	− ·29	− ·04	19·28	11 50·17	29·11	+ ·06

$a = +^{s}\cdot 277$ $c = -^{s}\cdot 062$

Chronometer correction at $22^{h}\ 25^{m} = -2^{m}\ 29^{s}\cdot 053 \pm {}^{s}\cdot 011$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 13th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·38	s.		h m. s.	m. s.	s.
E	ε Gruis	22 45 25·39	+ ·16	+ ·23	− ·04	+ ·13	− ·03	25·84	22 42 45·57	−2 40·27	+ ·04
	μ Pegasi.. .. .	48 03·26	+ ·07	− ·31	− ·03	+ ·11	− ·02	03·08	45 22·85	·23	·00
	λ Aquarii	50 16·83	+ ·10	− ·12	− ·03	+ ·09	− ·02	16·85	47 36·69	·16	− ·07
	δ Aquarii	52 13·78	+ ·11	− ·07	− ·03	+ ·08	− ·02	13·85	49 33·60	·25	+ ·02
	α Piscis Aust...	55 01·07	+ ·13	+ ·01	− ·03	+ ·06	− ·02	01·22	52 21·02	·20	− ·03
W	α Pegasi........	23 02 39·79	− ·08	− ·25	+ ·03	+ ·02	− ·02	39·49	59 59·29	·20	− ·03
	c² Aquarii	07 00·41	− ·12	− ·04	+ ·03	− ·01	− ·02	00·25	23 04 19·99	·26	+ ·03
	γ Toucani.....	14 30·24	− ·19	+ ·35	+ ·05	− ·05	− ·04	30·36	11 50·15	·21	− ·02
	τ Pegasi..	18 34·58	− ·08	− ·30	+ ·03	− ·08	− ·02	34·13	15 53·86	·27	+ ·04
	κ Piscium......	24 41·79	− ·10	− ·17	+ ·03	− ·13	− ·02	41·40	22 01·15	·25	+ ·02

$a = +^{s}·355 \qquad c = -^{s}·025$

Chronometer correction at $23^{h}\ 06^{m} = -2^{m}\ 40^{s}·229 \pm^{s}·009$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 15th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·44	s.		h. m. s.	m. s.	s.
E	γ Gruis	21 51 10·11	+ ·04	+ ·07	− ·13	+ ·35	− ·03	10·41	21 48 06·85	−3 03·56	·00
	α Toucani	22 14 58·95	+ ·06	+ ·34	− ·21	+ ·18	− ·04	59·28	22 11 55·61	·67	+ ·11
	γ Aquarii.	19 45·73	+ ·03	− ·13	− ·10	+ ·14	− ·02	45·65	16 42·09	·56	·00
	σ Aquarii.......	28 37·74	+ ·04	− ·09	− ·10	+ ·07	− ·02	37·64	25 34·20	·44	− ·12
	η Aquarii.......	33 29·43	+ ·03	− ·14	− ·10	− ·04	− ·02	29·16	30 25·68	·48	− ·08
W	α Piscis Aust...	55 24·76	− ·17	+ ·01	+ ·12	− ·13	− ·02	24·57	52 21·00	·57	+ ·01
	α Pegasi..	23 03 03·32	− ·11	− ·21	+ ·10	− ·19	− ·02	02·89	59 59·28	·61	+ ·05
	γ Toucani	14 53·65	− ·25	+ ·30	+ ·19	− ·27	− ·04	53·58	23 11 50·11	·47	− ·09
	τ Pegasi	18 57·99	− ·10	− ·26	+ ·11	− ·30	− ·02	57·42	15 53·84	·58	+ ·02
	κ Piscium	25 05·28	− ·13	− ·15	+ ·10	− ·35	− ·02	04·73	22 01·07	·66	+ ·10

$a = +^{s}·305 \qquad c = -^{s}·100$

Chronometer correction at $22^{h}\ 38^{m} = -3^{m}03^{s}·561 \pm^{s}·019$

TRANSIT OBSERVATIONS.

Station : SOUTHPORT. Date, October 16th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·45	s.		h. m. s.	m. s.	s.
E	β Capricorni.. .	20 18 50·73	+ ·17	− ·09	− ·11	+ ·27	− ·02	50·95	20 15 36·62	-3 14·33	+ ·02
	ρ Capricorni....	26 36·79	+ ·17	− ·07	− ·12	+ 21	− ·02	36·96	23 22·65	·31	·00
	ε Delphini.....	31 51 78	+ ·13	− ·24	− ·11	+ ·17	− ·02	51·71	28 37·41	·30	− ·01
	β Pavonis	39 31·36	+ ·33	+ ·59	− ·28	+ ·12	·05	32·07	36 17·73	·34	+ ·03
	ε Cygni	45 34·45	+ ·09	− ·40	− ·13	− ·07	− ·02	34·06	42 19·82	·24	− ·07
	μ Aquarii.	50 42·68	+ ·16	− ·12	− ·11	− ·03	− ·02	42·62	47 28·30	·32	+ ·01
	32 Vulpeculæ....	53 42·92	+ ·11	− ·35	− ·12	− ·01	− ·02	42·55	50 28·29	·26	− 05
W	θ Capricorni....	21 03 47·37	− ·16	− ·07	+ ·12	− ·07	− ·02	47·17	21 00 32·83	·34	− ·03
	ν Aquarii... ..	07 36·32	− 16	− ·11	+ ·11	− ·10	− ·02	36·04	04 21·69	·35	+ ·04
	ζ Cygni	12 06 15	− ·10	− ·37	+ ·13	− ·14	− ·02	05·65	08 51·34	·31	·00
	α Equulei	14 16·28	− ·13	− ·21	+ ·11	− ·15	− ·02	15·88	10 61 51	·37	+ ·06
	γ Pavonis	21 44·11	− ·31	+ ·57	+ 27	− ·20	− ·05	44·39	18 30·16	·23	− ·08
	ζ Capricorni. ..	24 25·71	− ·17	− ·04	+ ·12	− ·23	− ·02	25 37	21 11·04	·33	+ ·02
	β Aquarii......	29 45·10	− ·15	− 14	+ ·11	− ·27	·02	44·63	26 30·29	·34	+ 03

$a = -{}^{s}\cdot381 \qquad c = -{}^{s}\cdot110$

Chronometer correction at $20^{h}\ 54^{m} = -3^{m}\ 14^{s}\cdot311 \pm {}^{s}\cdot009$

W	ξ Aquarii.......	21 35 53·26	− ·16	− ·13	+ ·13	+ ·49	− ·02	53·57	21 32 38·47	-3 15·10	− ·02
	ε Pegasi........	42 43·41	− ·13	− ·24	+ ·13	+ ·45	− ·02	43·60	39 28·42	·18	+ ·06
	δ Capricorni....	44 59·31	− ·17	− ·08	+ ·13	+ ·43	− ·02	59·60	41 44 50	·10	− ·02
	γ Gruis	51 21·62	− ·21	+ 09	+ ·16	+ ·38	− ·03	22·01	48 06·84	17	+ ·05
	α Aquarii.	22 04 06·36	− ·15	− ·18	+ ·13	+ ·28	− ·02	06·42	22 00 51·35	·07	− ·05
	ι Pegasi	05 48·17	− ·11	− ·34	+ ·14	+ ·27	− ·02	48·11	02 33·01	·10	− ·02
	α Toucani . . .	15 10·15	− ·29	+ ·43	+ ·26	+ ·20	− ·04	10·71	11 55·58	·13	+ ·01
E	c^2 Aquarii.......	23 07 35·20	+ ·23	− ·05	− ·14	− ·20	− ·02	35·02	23 04 19·97	·05	− ·07
	γ Toucani	15 05·02	+ ·36	+ ·38	− ·24	− ·25	− ·04	05·23	11 50 10	·13	+ ·01
	τ Pegasi.......	19 09·63	+ ·15	− ·33	− ·13	− ·28	− ·02	09·02	15 53·84	·18	+ ·06
	κ Piscium	25 16 71	+ ·19	− ·19	− ·13	− 33	− ·02	16·23	21 61·13	·10	− ·02
	ι Phœnicis	33 10·32	+ ·28	+ ·14	− ·17	− ·39	− ·03	10·15	29 55·03	·12	·00
	ι Piscium	38 17·02	+ ·18	− ·21	− ·13	− 42	− ·02	16·42	35 01·26	·16	+ ·04
	δ Sculptoris	47 11·45	+ ·25	·00	− ·14	− ·49	− ·02	11·05	43 55·96	·09	− ·03

$a = +{}^{s}\cdot388 \qquad c = -{}^{s}\cdot126$

Chronometer correction at $22^{h}\ 41^{m} = -3^{m}\ 15^{s}\cdot119 \pm {}^{s}\cdot008$

The following observations at Sydney, together with their reduction and clock corrections have been furnished by Mr. H. A. Lenehan, Acting Government Astronomer. The method of determining the level, azimuth and collimation errors there, has already been given under 'Sydney Observatory.'

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, September 29th, 1903. Observer: H. A. LENEHAN.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
ε Delphini	20 28 21·92	+ ·01	+2·46	Losing 1s·00 every 24 hours.	24·39	20 28 37·69	+13·30
α Indi	20 30 36·64	+ ·02	-1·18		35·48	20 30 48·60	13·12
ε Aquarii	20 42 13·98	+ ·01	+1·39		15·38	20 42 28·73	13·35
μ Aquarii	20 47 13·78	+ ·01	+1·44		15·23	20 47 28·56	13·33
32 Vulpeculæ	20 50 11·80	+ ·01	+3·39		15·20	20 50 28·60	13·40
ι Piscis Aust	20 55 10·67	+ ·02	+0·09		10·78	20 55 24·16	13·38
						Mean	13·31

Chronometer correction at $20^h 42^m = +13^s \cdot 31$

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, October 2nd, 1903. Observer: W. E. RAYMOND.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
β Capricorni	20 15 18·88	- ·01	+1·14	Losing 1s·30 every 24 hours.	20·01	20 15 36·83	+16·82
α Pavonis	20 17 48·67	- ·02	-2·53		46·12	20 17 62·81	16·69
ε Delphini	20 28 18·21	- ·01	+2·48		20·68	20 28 37·64	16·96
α Indi	20 30 33·09	- ·02	-1·19		31·88	20 30 48·52	16·64
α Delphini	20 34 51·19	- ·01	+2·74		53·92	20 35 10·89	16·97
ε Aquarii	20 42 10·41	- ·01	+1·39		11·79	20 42 28·68	16·89
μ Aquarii	20 47 10·25	- ·01	+1·44		11·68	20 47 28·51	16·83
θ Capricorni	21 00 15·09	- ·01	+0·98		16·06	21 00 33·04	16·98
γ Pavonis	21 18 18·40	- ·03	-4·44		13·93	21 18 30·70	16·77
β Aquarii	21 26 11·96	- ·01	+1·60		13·55	21 26 30·47	16·92
						Mean	16·85

Chronometer correction at $20^h 44^m = +16^s \cdot 85$

TRANSIT OBSERVATIONS.

Station : SYDNEY. Date, October 3rd, 1903. Observer : W. E. RAYMOND.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
μ Aquarii	20 47 08·68	− ·04	+1·46	Losing 1s 60 every 24 hours.	10·10	20 47 28·50	+18·40
32 Vulpeculæ	20 50 06·57	− ·03	+3·43		9·97	20 50 28·53	18·56
1 Piscis Aust.	20 55 05·55	− ·06	+0·09		5·58	20 55 24·09	18·51
θ Capricorni	21 00 13·61	− ·05	+0·99		14·55	21 00 33·02	18·47
ι Capricorni	21 16 34·64	− ·05	+1·04		35·63	21 16 54·11	18·48
γ Pavonis	21 18 16·87	− ·10	−4·47		12·30	21 18 30·67	18·37
ζ Capricorni	21 20 52·09	− ·05	+0·73		52·77	21 21 11·24	18·47
β Aquarii	21 26 10·41	− ·04	+1·61		11·98	21 26 30·46	18·48
ξ Aquarii	21 32 18·72	− ·04	+1·51		20·19	21 32 38·64	18·45
ε Pegasi	21 39 07·66	− ·04	+2·39		10·01	21 39 28·59	18·58
δ Capricorni	21 41 25·18	− ·05	+1·04		26·17	21 41 44·66	18·49
γ Gruis	21 47 48·85	− ·06	−0·31		48·48	21 48 07·04	18·56
						Mean	18·49

Chronometer correction at $21^h\ 21^m = -18^s{\cdot}49$

TRANSIT OBSERVATIONS.

Station : SYDNEY. Date, October 6th, 1903. Observer : H. A. LENEHAN.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
β¹ Scorpii	15 59 27·08	− ·08	+0·88	Losing 1s·18 per day.	27·88	15 59 49·61	+21·73
δ Ophiuchi	16 08 53·81	− ·06	+1·75		55·50	16 09 17·34	21·84
α Scorpii	16 23 07·43	− ·08	+0·52		7·87	16 23 29·66	21 79
α Triang. Aust.	16 38 10·66	− ·17	−5·46		5·03	16 38 26·88	21·85
ε Scorpii	16 43 33·50	− ·09	−0·02		33·39	16 43 55·10	21·71
η Ophiuchi	17 04 28·11	− ·07	+1·08		29·12	17 04 51·00	21·88
						Mean	21·80

Chronometer correction at $16^h\ 29^m = +21^s{\cdot}80$

μ Aquarii	20 47 05·08	− ·07	+1·44	Losing 1s·32 per day.	6·45	20 47 28·45	+22·00
32 Vulpeculæ	20 50 02·98	− ·04	+3·40		6·34	20 50 28·47	22·13
1 Piscis Aust.	20 55 02·04	− ·09	+0·09		2·04	20 55 24·04	22·00
β Aquarii	21 26 06·81	− ·07	+1·66		8·34	21 26 30·43	22·09
γ Gruis	21 47 45·33	− ·09	−0·30		44·94	21 48 07·00	22·06
α Aquarii	22 00 27·56	− ·06	+1·86		29·36	22 00 51·46	22·10
ι Pegasi	22 02 07·81	− ·04	+3·25		11·02	22 02 33·15	22·13
						Mean	22·07

Chronometer correction at $21^h\ 24^m = +22^s{\cdot}07$

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, October 7th, 1903. Observer, W. E. RAYMOND.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
ι Piscis Aust.	20 55 00·49	− ·06	+ ·09	Losing $1^s·43$ per day.	0·52	20 55 24·03	+23·51
θ Capricorni	21 00 08·56	− ·05	+ ·98		9·49	21 00 32·97	23·48
ι Capricorni	21 16 29·61	− ·05	+1·04		30·60	21 16 54·06	23·46
ζ Capricorni	21 20 47·06	− ·06	+ ·73		47·73	21 21 11·18	23·45
β Aquarii	21 26 05·34	− ·05	+1.60		6·89	21 26 30·41	23·52
ξ Aquarii	21 32 13·64	− ·05	+1·50		15·09	21 32 38·59	23·50
ε Pegasi	21 39 02·65	− ·04	+2·38		4·99	21 39 28·54	23·55
δ Capricorni	21 41 20·12	− ·05	+1·04		21·11	21 41 44·62	23·51
α Aquarii	22 00 26·08	− ·05	+1.86		27·89	22 00 51·45	23·56
ι Pegasi	22 02 06·28	− ·03	+3·26		9·51	22 02 33·14	23·63
σ Aquarii	22 25 09·48	− ·05	+1·35		10·78	22 25 34·29	23·51
η Aquarii	22 30 00·49	− ·05	+1·86		2·30	22 30 25·76	23·46
						Mean.....	23·51

Chronometer correction at $21^h\ 39^m = +23^s·51$

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, October 8th, 1903. Observer, W. E. RAYMOND.

Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Rate.	Seconds of corr. transit.	R. A.	Chronometer correction.
	h. m. s.	s.	s.			h. m. s.	s.
ε Aquarii	20 42 02·42	− ·06	+1·38	Losing $1^s·32$ per day.	3·74	20 42 28·60	+ 24·86
μ Aquarii	20 47 02·29	− ·06	+1·43		3·66	20 47 28·42	24·76
32 Vulpeculæ	20 50 00·27	− ·04	+3·37		3·60	20 50 28·44	24·84
ι Piscis Aust.	20 54 59·23	− ·08	+0·09		59·24	20 55 24·01	24·77
θ Capricorni	21 00 07·22	− ·07	+0·97		8·12	21 00 32·96	24·84
ι Capricorni	21 16 28·34	− ·07	+1·02		29·29	21 16 54·04	24·75
ζ Capricorni	21 20 45·76	− ·07	+0·71		46·40	21 21 11·16	24·76
β Aquarii	21 26 04·06	− ·06	+1·58		5·58	21 26 30·40	24·82
ξ Aquarii	21 32 12·36	− ·06	+1·48		13·78	21 32 38·58	24·80
ε Pegasi	21 39 01·35	− ·05	+2·35		3·65	21 39 28·53	24·88
δ Capricorni	21 41 18·84	− ·07	+1·02		19·79	21 41 44·61	24·82
γ Gruis	21 47 42·57	− ·08	−0·30		42·19	21 48 06·97	24·78
α Aquarii	22 00 24·75	− ·06	+1·84		26·53	22 00 51·44	24·91
σ Aquarii	22 25 08·11	− ·06	+1·33		9·38	22 25 34·28	24·90
						Mean....	24·82

Chronometer correction at $21^h\ 23^m = +24^s·82$.

The following observations on November 5, January 22 and 23, were made for determining the differential personal equation between H. A. Lenehan, W. E. Raymond and Otto Klotz. The first two were the observers at Sydney during the longitude campaign, while the last was at Southport:—

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, November 5th, 1903. Observer: W. E. RAYMOND.

Star.	Corrected transit over mean of threads.			R. A.			Chronometer correction.
	h.	m.	s.	h.	m.	s.	s.
ξ Aquarii	21	32	35·22	21	32	38·18	+2·96
ϵ Pegasi	21	39	25·15	21	39	28·12	2·97
δ Capricorni	21	41	41·29	21	41	44·20	2·91
16 Pegasi	21	48	38·76	21	48	41·75	2·99
α Aquarii	22	00	48·17	22	00	51·07	2·90
ι Pegasi	22	02	29·74	22	02	32·70	2·96
c^2 Aquarii	23	04	16·87	23	04	19·74	2·87
ϵ Piscium	0	57	55·42	0	57	58·30	2·88
ζ^1 Piscium	1	08	40·64	1	08	43·61	2·97
				Mean			2·934

Chronometer correction at $23^h\ 25^m = +2^s{\cdot}934 \pm {}^s{\cdot}010$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, November 5th, 1903. Observer: OTTO KLOTZ.

Star.	Corrected transit over mean of threads.			R. A.			Chronometer correction.
	h.	m.	s.	h.	m.	s.	s.
γ Piscium	23	12	08·79	23	12	11·57	+2·78
τ Pegasi	23	15	50·90	23	15	53·64	2·74
κ Piscium	23	21	58·11	23	21	60·97	2·86
ι Phœnicis	23	29	52·08	23	29	54·76	2·68
ι Piscium	23	34	58·30	23	34	61·11	2·81
27 Piscium	23	53	43·09	23	53	45·89	2·80
2 Ceti	23	58	46·86	23	58	49·65	2·79
α Andromedæ	0	03	23·49	0	03	26·32	2·83
γ Pegasi	0	08	15·24	0	08	18·16	2·92
ι Ceti	0	14	29·89	0	14	32·60	2·71
44 Piscium	0	20	26·51	0	20	29·41	2·90
12 Ceti	0	25	05·95	0	25	08·87	2·92
ϵ Andromedæ	0	33	27·01	0	33	29·86	2·85
				Mean			2·815

Chronometer correction at $23^h\ 25^m = +2^s{\cdot}815 \pm {}^s{\cdot}015$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, November 5th, 1903. Observer: H. A. LENEHAN.

Star.	Corrected transit over mean of threads. h.	m.	s.	R.A. h.	m.	s.	Chronometer correction. s.
σ Aquarii	22	25	31·04	22	25	33·95	+2·91
η Aquarii	22	30	22·55	22	30	25·45	2·90
ζ Pegasi	22	36	37·66	22	36	40·62	2·96
η Pegasi	22	38	27·70	22	38	30·59	2·89
μ Pegasi	22	45	19·76	22	45	22·58	2·82
λ Aquarii	22	47	33·61	22	47	36·45	2·84
α Sculptoris	0	53	56·47	0	53	59·28	2·81
β Phœnicis	1	01	45·90	1	01	48·58	2·68
θ Ceti	1	19	11·35	1	19	14·11	2·76
				Mean			2·841

Chronometer correction at $23^h\ 25^m = +2^s{\cdot}841 \pm {}^s{\cdot}019$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 22nd, 1904. Observer: W. E. RAYMOND.

Star.	Corrected transit over mean of threads. h.	m.	s.	R.A. h.	m.	s.	Chronometer correction. s.
δ Eridani	3	38	08·37	3	38	39·67	+31·30
α Tauri	4	29	54·66	4	30	25·89	31·23
53 Eridani	4	33	16·85	4	33	48·00	31·15
π^1 Orionis	4	44	07·61	4	44	38·87	31·26
α Leporis	5	27	59·87	5	28	31·04	31·17
β Canis Majorum	6	17	58·51	6	18	29·82	31·31
ε Geminoris	6	37	32·11	6	38	03·24	31·13
				Mean			31·221

Chronometer correction at $5^h\ 32^m = +31^s{\cdot}221 \pm {}^s{\cdot}018$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 22nd, 1904. Observer: H. A. LENEHAN.

Star.	Corrected transit over mean of threads. h.	m.	s.	R.A. h.	m.	s.	Chronometer correction. s.
τ Tauri	4	35	59·13	4	36	30·24	+31·11
β Orionis	5	09	25·49	5	09	56·68	31·19
δ Orionis	5	26	36·23	5	27	07·42	31·19
α Columbæ	5	35	40·58	5	36	11·81	31·23
ζ Canis Majoris	6	16	08·08	6	16	39·23	31·15
γ Geminorum	6	31	40·34	6	32	11·56	31.22
				Mean			31·182

Chronometer correction at $5^h\ 32^m = +31^s{\cdot}182 \pm {}^s{\cdot}012$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 22nd, 1904. Observer: OTTO KLOTZ.

Star.	Corrected transit over mean of threads.	R. A.	Chronometer correction.
	h. m. s.	h. m. s.	s.
μ Eridani	4 40 11·99	4 40 43·23	+31·24
ε Leporis	5 00 53·88	5 01 25·01	31.13
γ Orionis	5 19 28·90	5 19 60·22	31·32
ε Orionis	5 30 50·54	5 31 21·84	31·30
η Geminorum	6 08 35·40	6 09 06·56	31·16
ν Geminorum	6 22 46·16	6 23 17·37	31·21
ξ Geminorum	6 39 24·43	6 39 55·65	31·22
		Mean	31·226

Chronometer correction at $5^h\ 32^m = +31^s{\cdot}226 \pm {}^s{\cdot}017$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 23rd, 1904. Observer: W. E. RAYMOND.

Star.	Corrected transit over mean of threads.	R. A.	Chronometer correction.
	h. m. s.	h. m. s.	s.
γ¹ Eridani	3 53 01·26	3 53 33·80	+32·54
τ Tauri	4 35 57·74	4 36 30·23	32·49
ε Leporis	5 00 52·32	5 01 25·00	32·68
δ Orionis	5 26 34·66	5 27 07·41	32·75
κ Orionis	5 42 40·91	5 43 13·56	32·65
β Canis Majoris	6 17 57·12	6 18 29·81	32·69
		Mean	32·633

Chronometer correction at $5^h\ 20^m = +32^s{\cdot}633 \pm {}^s{\cdot}027$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 23rd, 1904. Observer: H. A. LENEHAN.

Star.	Corrected transit over mean of threads.	R. A.	Chronometer correction.
	h. m. s.	h. m. s.	s.
o¹ Eridani	4 06 39·21	4 07 11·64	+32·43
μ Eridani	4 40 10·70	4 40 43·22	32·52
β Orionis	5 09 24·04	5 09 56·67	32·63
ε Orionis	5 30 49·19	5 31 21·83	32·64
η Geminorum	6 08 33·94	6 09 06·55	32·61
ν Geminorum	6 22 44·72	6 23 17·37	32·65
		Mean	32·580

Chronometer correction at $5^h\ 20^m = +32^s{\cdot}580 \pm {}^s{\cdot}024$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SYDNEY. Date, January 23rd, 1904. Observer: OTTO KLOTZ.

Star.	Corrected transit over mean of threads.	R. A.	Chronometer correction.
	h. m. s.	h. m. s.	s.
53 Eridani	4 33 15·49	4 33 47·99	−32·50
π^1 Orionis	4 44 06·28	4 44 38 86	32·58
γ Orionis	5 19 27·60	5 19 60·22	32 62
α Columbæ	5 35 39·12	5 36 11 80	32·68
ζ Canis Majoris	6 16 06·60	6 16 39·22	32·62
γ Geminorum	6 31 38·87	6 32 11·56	32·69
		Mean	32·615

Chronometer correction at $5^h\ 20^m = +32^s{\cdot}615 \pm {}^s{\cdot}019$

PERSONAL EQUATION.

Date.	Clock Correction.			K-L	K-R
	Klotz.	Lenehan.	Raymond.		
	s. s.	s. s.	s. s.	s.	s.
Nov. 5, 1903	+ 2·815± 015	+ 2·841±·019	+ 2·934± 010	− ·026	− ·119
Jan. 22, 1904	+31·226±·017	+31·182±·012	+31·221±·018	+ ·044	+ ·005
" 23, 1904	+32·615±·019	+32·580±·024	+32·633±·027	+ ·035	− ·018
Weighted				+ ·018±·015	− ·067±·027

That is, Klotz anticipates Lenehan, and Raymond anticipates Klotz.

TRANSIT OBSERVATIONS.

Station: BRISBANE. Date, September 29th, 1903. Observer: THOS. D. FRASER.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·01	s.		h. m. s.	s.	s.
E	δ Pavonis....	19 58 33·55	+ ·02	+ ·04	- 1·16	- ·01	- 05	32·39	19 59 17·93	+45·54	+ ·17
	α² Capricorni....	20 11 58·09	+ ·02	- ·01	- ·48	- ·01	- ·02	57·59	20 12 43·52	·93	- ·22
	β Capricorni....	14 51 55	+ ·02	- ·01	- ·48	- ·01	- ·02	51·05	15 36·88	·83	- ·12
	γ Cygni..... ..	18 02·46	+ ·01	+ ·03	- ·60	- ·01	- ·02	01·87	18 47·56	69	+ ·02
	ρ Capricorni....	22 37·70	+ ·02	·00	- ·49	·00	- ·02	37·21	23 22·95	·74	- ·03
	α Delphini.....	34 25·75	+ ·01	- ·02	- ·48	00	- ·02	25·24	35 10·93	·69	+ ·02
	ε Aquarii......	41 43·43	+ ·02	- ·01	- ·47	·00	- ·02	42 95	42 28·73	·78	- ·07
W	θ Capricorni....	59 47·05	- ·02	·00	+ ·49	·00	- ·02	47·50	21 00 33·08	·58	+ ·13
	ζ Cygni..... ..	21 08 05·56	- ·01	- ·02	+ ·53	·00	- ·02	06·04	08 51·65	·61	+ ·10
	γ Pavonis.....	17 43·89	- ·05	+ ·04	+ 1·13	·00	- ·05	44·96	18 30·81	·85	- ·14
	ζ Capricorni....	20 25·05	- ·02	·00	- ·50	+ ·01	- ·02	25 52	21 11·28	·76	- ·05
	β Aquarii	25 44.47	- ·02	- ·01	+ ·47	+ ·01	- ·02	44 90	26 30·51	·61	+ ·10
	ξ Aquarii......	31 52·57	- ·02	- ·61	+ ·47	+ ·01	- ·02	53 00	32 38 69	·69	+ ·02
	δ Capricorni....	40 58·62	- ·02	·00	+ ·48	+ ·01	- ·02	59·07	41 44·72	·65	+ ·06

$a = +^{s}\cdot024$ $c = {}^{s}\,462$

Chronometer correction at $20^{h}\ 50^{m} = +45^{s}\ 715 \pm {}^{s}\cdot022$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	σ Aquarii......	22 24 48·31	- ·10	- ·02	- ·47	- ·01	- ·02	48·63	22 25 34·35	+45·72	+ ·02
	η Aquarii ..	29 39·76	- ·09	- ·04	+ ·46	·00	- ·02	40·07	30 25·82	·75	- ·01
	ε Poisson......	34 34·97	- ·11	·00	+ ·52	·00	- ·02	35·36	35 21·07	·71	+ ·03
	η Pegasi.......	37 44·98	- ·08	- ·08	+ ·53	·00	- ·02	45·33	38 31·03	·70	+ ·04
	ε Gruis........	41 59·49	- ·14	+ ·06	+ ·75	·00	- ·03	60·13	42 45·83	·70	+ ·04
	λ Aquarii.....	46 50·69	- ·09	- ·03	+ ·46	00	- ·02	51·01	47 36·79	·78	- ·04
	δ Aquarii.....	48 47·49	- ·10	- ·02	+ ·48	·00	- ·02	47·83	49 33·70	·87	- ·13
E	α Pegasi.......	59 14·26	- ·01	- ·06	- ·47	·00	- ·02	13·70	59 59·38	·68	+ ·06
	c² Aquarii......	23 03 34·78	- ·02	- ·01	- ·50	·00	- ·02	34·23	23 04 20·07	·84	- ·10
	γ Toucani.... .	11 05·52	- ·02	+ ·09	- ·89	·00	- ·04	04·66	11 50·33	·67	+ ·07
	τ Pegasi.......	15 08·81	- ·01	- ·07	- ·50	·00	- ·02	08·21	15 53·92	·71	+ ·03
	κ Piscium......	21 16·05	- ·01	- ·04	- ·46	·00	- ·02	15·52	22 01·20	·68	+ ·06
	ι Piscium......	34 16·07	- ·01	- ·05	- ·46	+ ·01	- ·02	15·54	35 01·30	·76	- ·02

$a = +^{s}\cdot086$ $c = -^{s}\cdot461$

Chronometer correction at $22^{h}\ 57^{m} = +45^{s}\ 737 \pm {}^{s}\cdot014$

TRANSIT OBSERVATIONS.

Station : BRISBANE. Date, October 2nd, 1903. Observer : THOS. D. FRASE

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·02	s.		h. m. s.	s.	s.
E	α² Capricorni....	20 11 56·84	+ ·04	− ·03	− ·42	− ·01	− ·02	56·40	20 12 43·46	+47·06	+ ·15
	β Capricorni....	14 50·06	+ ·04	− ·03	− ·42	− ·01	− ·02	49·62	15 36·84	·22	− ·01
	γ Cygni	18 00·93	+ ·02	− ·16	− ·53	− ·01	− ·02	00 23	18 47·49	·26	− ·05
	ρ Capricorni....	22 36·14	+ ·04	·02	− ·43	− ·01	− ·02	35·70	23 22·90	·20	+ ·01
	β Pavonis.....	35 31·86	+ ·07	+ ·22	−1·01	− ·01	− ·05	31·08	36 18·40	·32	− ·11
	ε Aquarii	41 41·96	+ ·04	− ·04	− ·41	− ·01	− ·02	41·52	42 28·68	·16	+ ·05
	μ Aquarii	46 41·76	+ ·04	− ·04	− ·41	·00	·02	41·33	47 28·51	·18	+ ·03
W	ζ Cygni........	21 08 04·00	− ·02	− ·13	+ ·47	·00	− ·02	04·30	21 08 51·59	·29	− ·08
	γ Pavonis......	17 42·43	− ·06	+ ·21	+ ·99	+ ·01	− ·05	43·53	18 30·70	·17	+ ·04
	ζ Capricorni....	20 23·63	− ·03	− ·01	+ ·44	+ ·01	− ·02	24·02	21 11·24	·22	− ·01
	β Aquarii......	25 43·01	− ·03	− ·05	+ ·41	+ ·01	− ·02	43·33	26 30·48	·15	+ ·06
	ξ Aquarii......	31 51·01	− ·03	− ·04	+ ·41	+ ·01	− ·02	51·34	32 38·66	·32	− ·11
	γ Capricorni....	33 58·90	− ·03	− ·03	+ ·43	+ ·01	− ·02	59·26	34 46·47	·21	·00
	δ Capricorni....	40 57·13	− ·03	− ·03	+ ·42	+ ·01	− ·02	57·48	41 44·69	·21	·00

$a = +^{s}\cdot138 \qquad c = -^{s}\cdot404$

Chronometer correction at $20^{h}\ 56^{m} = +47^{s}\cdot215 \pm {}^{s}\cdot014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	γ Aquarii	22 15 54·75	− ·06	− ·04	+ ·50	− ·02	− ·02	55·11	22 16 42·21	+47·10	+ ·10
	η Aquarii	29 38·19	− ·05	− ·04	+ ·50	− ·01	− ·02	38·57	30 25·80	·23	− ·03
	ε Poisson.... ..	34 33·34	− ·06	·00	+ ·57	− ·01	− ·02	33·82	35 21·05	·23	− ·03
	η Pegasi.	37 43·35	·04	− ·08	+ ·58	− ·01	− ·02	43·78	38 31·00	·22	− ·02
	ε Gruis	41 58·04	− ·68	+ ·06	+ ·81	− ·01	− ·03	58·79	42 45·79	·00	+ ·20
	λ Aquarii.......	46 49·23	− ·05	− ·02	+ ·51	− ·01	− ·02	49·64	47 36·77	·13	+ ·07
	δ Aquarii	48 46·13	− ·05	− ·02	+ ·52	− ·01	− ·02	46·55	49 33·68	·13	+ ·07
E	c² Aquarii	23 03 33·41	− ·02	− ·01	− ·54	·00	− ·02	32·82	23 04 20·06	·24	− ·04
	γ Toucani	11 03·92	− ·03	+ ·08	− ·97	·00	− ·03	02·97	11 50·30	·33	− ·13
	τ Pegasi	15 07·43	− ·01	− ·07	− ·55	·00	− ·02	06·78	15 53·91	·13	+ ·07
	κ Piscium	21 14·47	− ·01	− ·04	− ·50	+ ·01	− ·02	13·91	22 01·19	·28	− ·08
	ι Piscium	34 14·61	− ·01	− ·05	− ·51	+ ·01	− ·02	14·03	35 01·29	·26	− ·06
	δ Sculptoris	43 09·27	− ·02	·00	− ·57	+ ·01	− ·02	08·67	43 56·00	·33	− ·13
	27 Piscium.. ..	52 59·36	− ·01	− ·03	− ·50	+ ·02	− ·02	58·82	53 46·02	·20	·00

$a = +^{s}\cdot083 \qquad c = -^{s}\cdot502$

Chronometer correction at $23^{h}\ 04^{m} = +47^{s}\cdot200 \pm {}^{s}\cdot018$

TRANSIT OBSERVATIONS.

Station : Brisbane. Date, October 3rd, 1903. Observer : Thos. D. Fraser.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·01	s.		h. m. s.	s.	s.
E	α^2 Capricorni ...	20 11 56·03	·00	– ·02	– ·51	– ·01	– ·02	55·47	20 12 43·45	+47·98	– ·03
	β Capricorni	14 49·33	·00	– ·02	– ·51	– ·01	– 02	48·77	15 36·82	48·05	– ·10
	γ Cygni	17 60·16	·00	– ·09	– ·64	– ·01	– ·02	59·40	18 47·46	·06	– 11
	ρ Capricorni ...	22 35·49	·00	– ·01	– ·52	– ·01	– ·02	34·93	23 22·88	47·95	·00
	β Pavonis.......	35 31 57	·00	+ ·12	–1·23	·00	– 05	30·41	36 18·36	·95	·00
	ψ Capricorni	39 37·24	·00	·00	– ·55	·00	– ·02	36·67	40 24·55	·88	+ ·07
	ϵ Aquarii......	41 41·31	·00	– ·02	– ·50	·00	– ·02	40·77	42 28·69	·92	+ ·03
W	ζ Cygni	21 08 03·24	– ·02	– ·07	+ ·56	·00	– ·02	03·69	21 08 51·58	·89	+ ·06
	γ Pavonis......	17 41·46	– ·06	+ ·11	+1·20	·00	– ·05	42·66	18 30·67	48·01	– ·06
	ζ Capricorni.....	20 22·86	– ·04	– ·01	+ ·54	·00	– ·02	23·33	21 11·23	47·90	+ ·05
	β Aquarii.....	25 42·14	– ·03	– ·02	+ ·50	·00	– ·02	42·57	26 30·46	·89	+ ·06
	ξ Aquarii.......	31 50·37	– ·03	– ·02	+ ·50	+ ·01	– ·02	50·81	32 38·64	·83	+ ·12
	γ Capricorni....	33 57·98	– ·03	– ·01	+ ·52	+ ·01	– ·02	58·45	34 46·48	48·03	– ·08
	δ Capricorni.....	40 56·22	– ·03	– 02	+ ·51	+ ·01	– ·02	56·67	41 44·67	48·00	– ·05

$a = +^{s}{\cdot}079 \qquad c = -^{s}{\cdot}491$

Chronometer correction at $20^{h}\ 56^{m} = +47^{s}{\cdot}954 \pm {}^{s}{\cdot}014$

W	σ Aquarii.......	22 24 46·04	– ·05	·00	+ ·45	– ·01	– ·02	46·41	22 25 34·32	+47·91	+ ·06
	η Aquarii.......	29 37·50	– ·05	·00	+ ·44	– ·01	– ·02	37·86	30 25·79	·93	+ ·04
	ϵ Poisson.......	34 32·59	– ·06	·00	+ ·50	– ·01	– ·02	33·00	35 21·04	48·04	– ·07
	η Pegasi........	37 42·65	– ·04	+ ·01	+ ·51	– ·01	– ·02	43·10	38 30·99	·89	+ ·08
	ϵ Gruis........	41 57·19	– ·08	– ·01	+ ·72	– ·01	– ·03	57·78	42 45·77	·99	– ·02
	λ Aquarii. ...	46 48·39	– ·05	·00	+ ·45	– ·01	– ·02	48·76	47 36·76	48·00	– ·03
	δ Aquarii.......	48 45·28	– ·06	·00	+ ·46	– ·01	– ·02	45·65	49 33·67	·02	– 05
E	c^2 Aquarii.....	23 03 32·53	·00	·00	– ·48	·00	– ·02	32·03	23 04 20·05	·02	– ·05
	γ Toucani.......	11 03·26	·00	– ·01	– ·86	·00	– ·03	02·36	11 50·29	47·93	+ ·04
	τ Pegasi.........	15 06·32	·00	+ ·01	– ·48	·00	– ·02	05·83	15 53·91	48·08	– ·11
	κ Piscium.....	21 13·70	·00	·00	– ·44	·00	– ·02	13·24	22 01·18	47·94	+ ·03
	ι Piscium.....	34 13·84	·00	·00	– ·45	+ ·01	– ·02	13·38	35 01·29	·91	+ ·06
	δ Sculptoris.....	43 08·55	·00	·00	– ·51	+ ·01	– ·02	08·03	43 56·00	·97	·00
	27 Piscium.......	52 58·49	·00	·00	– ·44	+ ·01	– ·02	58·04	53 46·02	·98	– ·01

$a = +^{s}{\cdot}006 \qquad c = -^{s}{\cdot}444$

Chronometer correction at $23^{h}\ 08^{m} = +47^{s}{\cdot}971 \pm {}^{s}{\cdot}012$

TRANSIT OBSERVATIONS.

Station : BRISBANE. Date, October 6th, 1903. Observer : THOS. D. FRASER.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·01	s.		h. m. s.	s.	s.
E	ρ Capricorni	20 22 32·64	- ·01	- 02	- ·46	- ·01	- ·02	32·12	20 23 22·83	+50·71	- ·07
	β Pavonis	35 28·42	- ·01	+ ·33	-1·10	- ·01	- ·05	27·58	36 18·23	·65	- ·01
	ψ Capricorni ..	39 34·43	- ·01	- ·01	- ·49	- ·01	- ·02	33·89	40 24·50	·61	+ ·03
	ε Aquarii.......	41 38·55	- ·01	- ·06	- ·44	- ·01	- ·02	38·01	42 28·62	·61	+ ·03
	μ Aquarii.......	46 38·45	- ·01	- ·06	- ·44	·00	- ·02	37·92	47 28·45	·53	+ ·11
	32 Vulpeculæ....	49 38·50	·00	- ·19	- ·49	·00	- ·02	37·80	50 28·47	·67	- ·03
	θ Capricorni	59 42·95	- ·01	- ·04	- ·46	·00	- ·02	42·42	60 32·99	·57	+ ·07
W	γ Pavonis	21 17 38·86	- ·17	+ ·30	+1·07	·00	- ·05	40·01	21 18 30·56	·55	+ ·09
	ζ Capricorni	20 20·11	- ·10	- ·02	+ ·48	·00	- ·02	20·45	21 11·19	·74	- ·10
	β Aquarii....	25 39·50	- 08	- ·07	+ ·44	·00	- ·02	39·77	26 30·43	·66	- ·02
	ξ Aquarii.. ...	31 47·70	- ·09	- ·07	+ ·44	·00	- 02	47·96	32 38·61	·65	- ·01
	ε Pegasi	38 37·71	- ·07	- ·12	+ ·44	·00	- 02	37·94	39 28·56	·62	+ ·02
	δ Capricorni	40 53·67	- ·09	- ·04	+ ·46	·00	- ·02	53·98	41 44·64	·66	- ·02
	ι Pegasi	22 01 42 26	- ·06	- ·17	+ ·48	+ ·01	- ·02	42·50	22 02 33·15	·65	- ·01

$a = +^{s}\cdot 204 \qquad c = -^{s}\cdot 438$

Chronometer correction at $21^{h}\ 12^{m} = +50^{s}\cdot 636 \pm {}^{s}\cdot 012$

W	ε Gruis.........	22 41 54·57	- ·26	+ 02	+ ·75	- ·01	- ·03	55·04	22 42 45·74	+50·70	- ·06
	μ Pegasi......	44 32·05	- 12	- ·03	+ ·50	- ·01	- ·02	32·37	45 22·91	·54	+ ·10
	λ Aquarii	46 45·86	- ·17	- ·01	+ ·47	- ·01	- ·02	46·12	47 36·74	·62	+ ·02
	δ Aquarii... ...	48 42·77	- ·18	- ·01	+ ·48	- ·01	- ·02	43·03	49 33·65	·62	+ ·02
	α Piscis Aust ...	51 30·08	- ·20	·00	+ ·54	·00	- ·02	30·40	52 21·08	·68	- ·04
	c^2 Aquarii.	23 03 29·13	- ·19	·00	+ ·50	·00	- ·02	29·42	23 04 20·04	·62	+ ·02
E	γ Toucani.... .	11 00·80	- ·22	+ ·03	- ·89	·00	- ·03	59·69	11 50·26	·57	+ ·07
	κ Piscium.......	21 11·19	- ·12	- 02	- ·46	·00	- ·02	10·57	22 01·18	·61	+ ·03
	ι Piscium.......	34 11·27	- ·11	- ·02	- ·47	·00	- ·02	10·65	35 01·29	·64	·00
	δ Sculptoris.....	43 06·00	- ·15	·00	- ·53	·00	- ·02	05·30	43 56·00	·70	- ·06
	φ Pegasi...	46 46·91	- ·10	- ·02	- ·49	·00	- ·02	46·28	47 36·98	·70	- ·06
	27 Piscium.......	52 55·99	- ·13	- ·01	- ·46	+ ·01	- ·02	55·38	53 46·03	·65	- ·01
	2 Ceti	57 59·80	- ·14	- ·01	- ·48	+ ·01	- ·02	59·16	58 49·80	·64	·00

$a = +^{s}\cdot 034 \qquad c = -^{s}\cdot 462$

Chronometer correction at $23^{h}\ 19^{m} = +50^{s}\cdot 638 \pm {}^{s}\cdot 010$

TRANSIT OBSERVATIONS.

Station: BRISBANE. Date, October 7th, 1903. Observer: THOS. D. FRASER.

Clamp	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·01	s.		h. m. s.	s.	s.
E	ρ Capricorni....	20 22 31·81	− ·09	− ·02	− ·53	− ·01	− ·02	31·32	20 23 22·81	+51·49	− ·01
	β Pavonis......	35 27·67	− ·17	− ·23	−1·26	− ·01	− ·05	26·75	36 18·19	·44	+ ·04
	ψ Capricorni...	39 33·40	− ·10	− ·01	− ·56	·00	− ·02	32·91	40 24·49	·58	− ·10
	ε Cygni...... ..	41 29·21	− ·05	− ·16	− ·60	·00	− ·02	28·48	42 20·00	·52	− ·04
	α Aquarii	46 37·51	− ·08	− ·05	− ·51	·00	− ·02	37·01	47 28·44	·43	− ·05
	32 Vulpeculæ....	49 37·70	− ·06	− ·14	− ·57	·00	− ·02	37·03	50 28·46	·43	− ·05
	θ Capricorni....	59 41·88	− ·09	− ·03	− ·53	·00	− ·02	41·39	21 00 32·93	·54	·06
W	γ Pavonis..	21 17 37·49	+ ·11	− ·22	−1·22	·00	− ·05	38·99	18 30·52	·53	− ·05
	ζ Capricorni ...	20 19·13	+ ·07	− ·01	+ ·55	·00	− ·02	19·72	21 11·18	·46	+ ·02
	β Aquarii.	25 38·51	− ·06	− ·05	+ ·51	·00	− ·02	39·01	26 30·41	·40	+ ·08
	ξ Aquarii . .	31 46·61	·06	− ·05	+ ·51	·00	− ·02	47·11	32 38·60	·49	− ·01
	γ Capricorni....	35 51·39	+ ·06	− ·03	+ ·53	·00	− ·02	54·93	34 46·41	·48	·00
	δ Capricorni ...	40 52·62	+ ·06	− ·03	+ ·52	+ ·01	− ·02	53·16	41 44·63	·47	+ ·01
	16 Pegasi	47 50·28	+ ·04	− ·13	+ ·56	+ ·01	− ·02	50·74	48 42·20	·46	+ ·02

$a = +^{s}\cdot153 \qquad c = -^{s}\cdot503$

Chronometer correction at $21^{h}\ 05^{m} = +51^{s}\cdot479 \pm^{s}\cdot010$

Clamp	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	δ Aquarii.....	22 48 41·60	+ ·09	− ·01	+ ·43	− ·01	− ·02	42·08	22 49 33·65	+51·57	− ·05
	α Pegasi..	59 07·37	+ ·06	− ·04	+ ·43	− ·01	− ·02	07·79	59 59·34	·55	− ·03
	c² Aquarii	23 03 27·93	+ ·09	− ·01	+ ·45	·00	− ·02	28·44	23 04 20·04	·60	− ·08
	γ Toucani	10 58·01	+ ·13	+ ·06	+ ·80	·00	− ·03	58·97	11 50·25	·28	+ ·24
	τ Pegasi.	15 01·92	− ·06	− ·05	+ ·45	·00	− ·02	02·36	15 53·89	·53	− ·01
	κ Piscium	21 09·16	− ·07	− ·03	+ ·41	·00	− ·02	09·59	21 61·17	·58	− ·06
	ι Piscium	34 09·29	− ·07	·04	+ ·41	·00	− ·02	09·71	35 01·29	·58	− ·06
E	δ Sculptoris ...	43 04·80	+ ·13	·00	− ·47	·00	− ·02	04·44	43 56·00	·56	− ·04
	φ Pegasi........	46 45·88	+ ·09	− ·05	− ·44	·00	− ·02	45·46	47 36·98	·52	·00
	27 Piscium	52 54·81	+ ·11	− ·03	− ·41	·00	− ·02	54·46	53 46·03	·57	− ·05
	30 Poisson. . ..	56 11·56	+ ·11	− ·02	− ·42	·00	− ·02	11·21	57 02·72	·51	+ ·01
	2 Ceti..	57 58·63	+ ·12	− ·01	− ·43	·00	− ·02	58·29	58 49·80	·51	+ ·01
	α Andromedæ...	24 02 35·37	+ ·08	− ·06	− ·47	+ ·01	− ·02	34·91	24 03 26·45	·54	− ·02
	ζ Toucani......	14 14·84	+ ·23	− ·09	−1·00	+ ·01	− ·04	14·13	15 05·55	·42	+ ·10

$a = +^{s}\cdot063 \qquad c = -^{s}\cdot413$

Chronometer correction at $23^{h}\ 31^{m} = +51^{s}\cdot522 \pm^{s}\cdot016$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: SOUTHPORT. Date, October 23rd, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m s.	s.	s.	s.	s. r = − ·45	s.		h. m. s.	m. s.	s.
E	α Toucani	22 16 35·30	+ ·15	+ ·54	− ·30	+ ·62	− ·04	36·27	22 11 55·37	-4 40·90	+ ·05
	γ Aquarii	21 22·62	+ ·08	− ·21	− ·14	+ ·59	− ·02	22·92	16 41·99	·93	+ ·08
	σ Aquarii	30 14·71	+ ·08	− ·14	− ·15	+ ·52	− ·02	15·09	25·34·12	·88	+ ·03
	η Aquarii	35 06·23	+ ·08	− ·22	− ·14	+ ·48	− ·02	06·41	30 25·59	·82	− ·03
	ζ Pegasi	41 21·56	+ ·07	− ·30	− ·15	+ ·44	− ·02	21·60	36 46·78	·82	− ·03
	η Pegasi	43 11·73	+ ·05	− ·47	− ·17	+ ·42	− ·02	11·54	38 30·78	·76	− ·09
	μ Pegasi	50 03·71	+ ·06	− ·42	− ·16	+ ·37	− ·02	03·54	45 22·78	·76	− ·09
W	δ Sculptoris	23 48 36·97	− ·16	·00	+ ·16	− ·07	− ·02	36·88	23 43 55·91	·97	+ ·12
	φ Pegasi	52 18·32	− ·10	− ·37	+ ·15	− ·10	− ·02	17·88	47 36·92	·96	+ ·11
	ω Piscium	59 04·67	− ·10	− ·28	+ ·15	− ·15	− ·02	04·27	54 23·43	·84	− ·01
	2 Ceti	24 03 30·86	− ·12	− ·09	+ ·15	− ·18	− ·02	30·60	58 49·75	·85	·00
	α Andromedæ	08 07·85	− ·07	− ·46	+ ·16	− ·22	− ·02	07·24	24 03 26·41	·83	− ·02
	γ Pegasi	12 59·56	− ·08	− ·34	+ ·15	− ·25	− ·02	59·02	08 18·22	·80	− ·05
	ζ Toucani	19 45·62	− ·21	+ ·71	+ ·35	− ·30	− ·05	46·12	15 05·37	·75	− ·10

$a = +^{s}\cdot484 \qquad c = -^{s}\cdot144$

Chronometer correction at $23^{h}\ 39^{m} = -4^{m}\ 40^{s}\cdot848 - ^{s}\cdot015$

Observer: THOS. D. FRASER.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
						r = − ·45					
E	α Pegasi	23 04 39·98	+ ·11	− ·31	− ·14	+ ·26	− ·02	39·88	22 59 59·21	-4 40·67	− ·09
	c² Aquarii	09 00·42	+ ·16	− ·05	− ·14	+ ·23	− ·02	00·60	23 04 19·90	·70	− ·06
	γ Toucani	16 30·19	+ ·25	+ ·44	− ·26	+ ·17	− ·04	30·75	11 49·95	·80	+ ·04
	τ Pegasi	20 34·82	+ ·10	− ·38	− ·15	+ ·14	− ·02	34·51	15 53·78	·73	− ·03
	κ Piscium	26 41·57	+ ·13	− ·21	− ·13	+ ·10	− ·02	41·84	21 61·08	·76	·00
	ι Phœnicis	34 35·63	+ ·20	+ ·16	− ·18	+ ·04	− ·03	35·82	29 54·95	·87	+ ·11
	ι Piscium	39 42·17	+ ·13	− ·24	− ·13	·00	− ·02	41·91	35 01·22	·69	− ·07
W	β Hydri	0 25 24·31	− ·39	+1·60	+ ·63	− ·34	− ·09	25·72	0 20 45·01	·71	− ·05
	12 Ceti	29 50·41	− ·12	− ·18	+ ·13	− ·38	− ·02	49·84	25 08·92	·92	+ ·16
	ε Andromedæ	38 11·49	− ·08	− ·42	+ ·15	− ·44	− ·02	10·68	33 29·91	·77	+ ·01
	β Ceti	43 28·17	− ·14	− ·08	+ ·14	− ·48	− ·02	27·59	38 46·77	·82	+ ·06
	δ Piscium	48 24·28	− ·11	− ·26	+ ·14	− ·52	− ·02	23·51	43 42·74	·77	+ ·01
	20 Ceti	52 48·22	− ·12	− ·20	+ ·13	− ·55	− ·02	47·46	48 06·70	·76	·00
	μ Andromedæ	56 08·41	− ·06	− ·51	+ ·17	− ·58	− ·02	07·41	51 26·68	·73	− ·03

$a = +^{s}\cdot443 \qquad c = -^{s}\cdot134$

Chronometer correction at $23^{h}\ 39^{m} = -4^{m}\ 40^{s}\cdot765 + ^{s}\cdot014$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : BRISBANE. Date, October 29th, 1903. Observer, OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·02	s.		h. m. s.	m. s.	s.
E	μ Pegasi	22 44 16·22	+ ·02	+ ·02	− ·43	− ·02	− ·02	15·79	22 45 22·67	+1 06.88	+ ·04
	λ Aquarii	46 29·93	+ ·03	+ ·01	− ·40	− ·02	− ·02	29·53	47 36·53	07·00	·08
	δ Aquarii	48 26·88	+ ·04	+ ·01	− ·41	·02	− 02	26·48	49 33·44	06·96	− ·04
	α Pegasi	58 52·61	+ ·03	+ ·02	− ·41	− ·01	− ·02	52·22	59 59·14	·92	·00
	c^2 Aquarii	23 03 13·31	+ ·04	·00	− ·43	− ·01	− ·02	12·89	23 04 19·83	·94	− .02
	γ Toucani......	10 43·69	+ ·06	− ·02	− ·76	− ·01	− ·03	42·93	11 49·81	·88	+ ·04
	τ Pegasi	14 47·28	+ ·03	+ ·02	− ·43	− ·01	·02	46·87	15 53·71	·84	+ ·08
W	12 Ceti	24 24 01·55	− ·03	− ·01	− ·39	+ ·02	− ·02	01·92	24 25 08·91	·99	− ·07
	β Ceti	37 39·34	− ·03	·00	+ ·41	+ ·02	− ·02	39·72	38 46·76	07·04	− ·12
	δ Piscium.......	42 35·42	− ·03	+ ·01	+ ·40	+ ·02	− ·02	35·80	43 42·73	06·93	− ·01
	20 Ceti	46 59·39	− ·03	+ ·01	+ ·39	+ ·02	− ·02	59·76	48 06·69	·93	− ·01
	ϵ Piscium.......	56 51·05	− ·03	+ ·01	+ ·40	+ ·03	− ·02	51·44	57 58·32	·88	+ ·04
	β Phœnicis.. ...	25 00 41·31	− ·06	− ·01	+ ·60	+ ·03	− ·03	41 84	25 01 48·64	·80	+ ·12
	θ Ceti....	18 06·85	− ·04	+ ·01	+ ·40	+ ·03	− ·02	07·23	19 14·11	·88	+ ·04

$a = -^{s}\cdot025$ $c = -^{s}\cdot394$

Chronometer correction at $23^h\ 35^m = +1^m 06^s\cdot918 \pm {}^s\cdot013$

Observer, THOS. D. FRASER.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
						r = + ·02					
E	α Aquarii	21 59 44·44	+ ·03	+ ·08	− ·50	− ·03	− ·02	44·00	22 00 51·17	+1 07.17	− ·04
	ι Pegasi.. . .	22 01 26·06	+ ·02	+ ·16	− ·55	− ·03	− ·02	25·64	02 32·81	·17	− ·04
	α Toucani.. ...	10 49·27	+ ·06	− ·21	−1·03	− ·03	− ·04	48·02	11 55·17	·15	− ·02
	γ Aquarii... ...	15 35·20	+ ·03	+ ·08	− ·50	− ·03	− ·02	34·76	16 41·92	·16	− ·03
	σ Aquarii. .. .	24 27·38	+ ·03	+ ·05	− ·51	− ·02	− ·02	26·91	25 34·05	·14	− ·01
	η Aquarii	29 18·86	+ ·03	+ ·08	− ·50	− ·02	− ·02	18·43	30 25·54	·11	+ ·02
	ζ Pegasi	35 34·04	+ ·03	+ ·12	− ·51	− ·02	− ·02	33·64	36 40·71	·07	+ ·06
W	ι Piscium	23 33 53·66	+ ·03	− ·04	+ ·51	·00	− ·02	54.14	23 34 61·17	·03	+ ·10
	δ Sculptoris	42 48·09	+ ·04	·00	+ ·57	00	− ·02	48·68	43 55·86	·18	− ·05
	ϕ Pegasi	46 29·28	+ ·02	− ·05	+ ·53	·00	− ·02	29·76	47 36·89	·13	·00
	27 Piscium	52 38·41	+ ·03	− ·03	+ ·50	+ ·01	− 02	38·90	53 45·95	·05	+ ·08
	2 Ceti.....	57 42·11	+ ·03	− ·01	+ ·53	+ ·01	− ·02	42·65	58 49·71	·06	+ ·07
	α Andromedæ...	24 02 18·57	+ ·02	− ·07	+ ·57	+ ·01	− ·02	19·08	24 03 26·38	·30	− ·17
	β Hydri.........	19 34·98	+ ·10	+ ·26	+2·37	+ ·01	− ·09	37·63	20 44·77	·14	− ·01

$a_1 = -^{s}\cdot188$ $a_2 = +^{s}\cdot072$ $c = -^{s}\cdot500$

Chronometer correction at $23^h\ 35^m = +1^m 07^s\cdot134 \pm {}^s\cdot014$

Hence the weighted personal equation of the two values, Fraser anticipates Klotz ${}^s\cdot153 \pm {}^s\cdot044$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, December 5th, 1903. Observer, F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·45	s.		h. m. s.	s.	s.
E	β Phœnicis......	1 02 06·26	− ·05	+ ·30	− ·70	+ ·28	− ·03	06·06	1 01 48·14	−17·92	+ ·01
	ζ¹ Piscium......	09 02·07	− ·03	− ·39	− ·48	+ ·23	− ·02	01·38	08 43·46	17·92	+ ·01
	21....	19 32·49	− ·03	− ·23	− ·48	+ ·16	− ·02	31·89	19 13·95	17·94	+ ·03
	γ Phœnicis......	24 30·57	− ·05	+ ·23	− ·66	+ ·12	− ·03	30·18	24 12·18	18·00	+ ·09
	22.............	26 40·20	− ·03	− ·47	− ·49	+ ·10	− ·02	39·29	26 21·44	17·85	− ·06
	α Eridani........	34 26·98	− ·06	+ ·59	− ·89	+ ·04	− ·03	26·63	34 08·89	17·74	− ·17
	ν Piscium.......	36 45·53	− ·03	− ·39	− ·48	+ ·03	− ·02	44·64	36 26·75	17·89	− ·02
W	542..	39 54·84	− ·08	− ·14	+ ·49	+ ·01	− ·02	55·10	39 37·01	18·09	+ ·18
	544............ .	47 01·76	− ·08	− ·21	+ ·48	− ·05	− ·02	01·88	46 43·87	18·01	+ ·10
	37.......	2 23 22·30	− ·02	− ·40	+ ·48	− ·32	− ·02	22·02	2 22 64·09	17·93	+ ·02
	σ Baleine.. .	27 50·85	− ·02	− ·16	+ ·49	− ·35	− ·02	50·79	27 32·95	17·84	− ·07
	ν Ceti.	31 09·18	− ·02	− ·26	+ ·48	− ·38	− ·02	08·98	30 50·99	17·99	+ ·08
	355..............	33 41·13	− ·02	− ·54	+ ·51	− ·40	− ·02	40·66	33 22·89	17·77	− ·14
	39......... ...	34 52·55	− ·02	− ·32	+ ·48	− ·41	− ·02	52·26	34 34·49	17·77	− ·14

$a = +^{s}\cdot657$ $c = -^{s}.475$

Chronometer correction at $1^{h}\ 40^{m} = -17^{s}\cdot905 \pm {}^{s}\cdot023$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	547...	2 39 52·15	− ·02	− ·13	+ ·46	+ ·23	− ·02	52·67	2 39 33·97	−18·70	+ ·12
	β Fornacis.....'.	45 23·12	− ·02	+ ·04	+ ·53	+ ·19	− ·02	23·84	45 05·22	·62	+ ·04
	46.	52 03·36	− ·02	− ·17	+ ·45	+ ·14	− ·02	03·74	51 45·07	·67	+ ·09
	ε Arietis.... ...	54 02·82	− ·02	− ·40	+ ·47	+ ·12	− ·02	02·97	53 44·40	·57	− ·01
	47............. .	57 34·87	− ·02	− ·27	+ ·44	+ ·10	− ·02	35·10	57 16·54	·56	− ·02
	μ Horologii......	3 01 39·45	− ·03	+ ·51	+ ·89	+ ·07	− ·04	40·85	3 01 22·40	·45	− ·13
E	549..............	08 19·59	+ ·02	·00	− ·51	+ ·02	− ·02	19·10	07 60·44	·66	+ ·08
	53.........	19 59·23	+ ·02	− ·31	− ·45	− ·06	− ·02	58·41	19 39·83	·58	·00
	55..............	25 54·88	+ ·01	− ·33	− ·45	− ·11	− ·02	53·98	25 35·39	·59	+ ·01
	B.A.C. 1106.....	30 03·49	+ ·03	+ ·29	− ·70	− ·15	− ·03	02·93	29 44·24	·69	+ ·11
	10 Taureau.....	32 18·75	+ ·02	− ·24	− ·44	− ·17	− ·02	17·90	31 59·45	·45	− ·13
	550..............	38 59·22	+ ·02	− ·16	− ·45	− ·21	− ·02	58·40	38 39·98	·42	− ·16

$a = +^{s}\cdot492$ $c = -^{s}\cdot443$

Chronometer correction at $3^{h}\ 10^{m} = -18^{s}\cdot580 \pm {}^{s}\cdot021$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, December 9th, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·29	s.		h. m. s.	s.	s.
E	47	2 58 02·16	− ·02	− ·24	− ·53	+ ·14	− ·02	01·49	2 57 16 54	−44·95	+ ·07
	μ Horologii	3 02 07·68	− ·03	+ ·47	−1·06	+ ·13	− ·04	07·15	3 01 22·32	·83	− ·05
	359	06 55·19	− ·01	− ·36	− ·56	+ ·10	− ·02	54 34	06 09·41	·93	+ ·05
	549	08 45·76	− ·02	·00	− ·61	+ ·09	·02	45·20	08 00·43	·77	− ·11
	ζ Arietis	10 09·92	− ·01	− ·37	− ·56	+ ·09	− 02	09·05	09 24·10	·95	+ ·07
	ε Eridani	16 52·12	− ·02	+ ·15	− ·73	+ ·06	− ·03	51·55	16 06·68	·87	− ·01
	53	20 25·52	− ·02	− ·28	− ·53	+ ·04	− ·02	24·71	19 39 81	·90	+ ·02
	54	22 44·72	− ·02	− ·29	− ·53	+ ·03	− ·02	43·89	21 59·01	·88	·00
W	55	26 20·16	− ·08	− ·31	+ 54	+ ·02	− ·02	20·31	25 35·39	·92	+ ·04
	B.A.C. 1106	30 28·22	− ·16	+ ·26	+ ·83	·00	− ·03	29 12	29 44·21	·91	+ ·03
	10 Taureau	32 44·09	− ·09	− ·22	+ ·53	− ·01	− ·02	44·28	31 59·45	·83	− ·05
	61	42 32·75	− ·07	− ·39	+ ·57	− ·06	− ·02	32·78	41 47·85	·93	+ ·05
	g Eridani	46 37·22	− ·13	+ ·07	+ ·65	− ·07	− ·03	37·71	45 52·91	·80	− ·08
	552	54 18·70	− ·11	− ·12	+ ·44	− ·10	− .02	18 79	53 34·02	·77	− ·11

$a = +^{s}{\cdot}453 \qquad c = -^{s}{\cdot}527$

Chronometer correction at $3^{h}\ 30^{m} = -44^{s}{\cdot}876 \pm {}^{s}{\cdot}012$

TRANSIT OBSERVATIONS.

Station : Norfolk Island. Date, December 10th, 1903. Observer : F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = −·23	s.		h. m. s.	s	s.
E	ζ¹ Piscium....	1 09 35·22	+·01	−·32	−·49	−·12	·02	34·52	1 08 43·42	−51·10	+·01
	γ Phœnicis......	25 03·61	+·01	+·19	−·67	+·05	−·03	03·16	24 12 10	·06	−·03
	22..............	27 13·40	+·01	−·38	−·50	+·05	−·02	12·56	26 21·40	·16	+·07
	ν Piscium......	37 18·62	+·01	−·32	−·48	+·01	−·02	17·82	36 26·74	·08	−·01
	542...........	40 28·68	+·01	−·12	−·50	·00	−·02	28·05	39 36·97	·08	−·01
	25.	41 12·03	+·01	−·33	−·49	·00	−·02	11·20	40 20·07	·13	+·04
	543...........	42 01·04	+·01	·04	−·54	−·01	−·02	00·44	41 09·37	·07	−·02
W	χ Baleine..	45 43·52	−·06	−·17	+·49	−·02	−·02	43·74	44 52·72	·02	−·07
	544..	47 34·62	−·06	·17	+·49	−·02	−·02	34·84	46 43·83	·01	−·08
	ψ Phœnicis.....	50 38·68	−·09	+·24	+·71	−·04	−·03	39·47	49 48·25	·22	+·13
	545..	56 20·14	−·06	−·08	+·52	−·06	−·02	20·44	55 29·43	·01	−·08
	33.......... ..	2 02 37·79	−·04	−·45	+·52	−·08	−·02	37·72	2 01 46·57	·15	+·06

$a = +^{s}{\cdot}538 \qquad c = -^{s}{\cdot}483$

Chronometer correction at $1^{h}\ 40^{m} = -51^{s}{\cdot}089 \pm ^{s}{\cdot}016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	39..............	2 35 25·63	−·05	−·27	+·52	+·09	−·02	25·90	2 34 34·48	−51·42	+·03
	41.	39 11·56	−·05	−·30	+·52	+·07	·02	11·78	38 20·42	·36	−·03
	547............	40 25·03	−·05	−·14	+·54	+·07	·02	25·43	39 33·95	·48	+·09
	β Fornacis	45 56·06	−·06	+·04	+·62	+·05	−·02	56·69	45 05·19	·50	+·11
	46.	52 36·16	−·05	−·19	+·53	−·03	−·02	36·46	51 45·06	·40	+·01
	θ Eridani........	55 28·87	−·06	+·15	+·69	−·02	−·02	29·65	54 38·31	·34	−·05
	τ³ Eridani........	59 01·25	−·05	−·05	+·57	·00	−·02	01·70	58 10·44	·26	−·13
E	359......... ...	3 07 01·88	+·01	·41	−·55	−·03	·02	00·88	3 06 09·41	·47	+·08
	549............	08 52·36	+·02	+·01	−·60	−·03	−·02	51·74	08 00·43	·31	−·08
	ζ Arietis...	10 16·52	+·01	−·46	−·56	−·04	−·02	15·45	09 24·10	·35	−·04
	ε Eridani........	16 58·67	+·02	+·19	−·72	−·06	−·03	58·07	16 06·68	·39	·00
	53.	20 32·17	+·01	−·35	−·53	−·07	−·02	31·21	19 39·81	·40	+·01
	55.	26 27·82	+·01	−·38	−·53	−·09	−·02	26·81	25 35·40	·41	+·02
	B.A.C. 1106.....	30 36·27	+·02	+·32	−·83	−·11	−·03	35·64	29 44.21	·43	+·04

$a = +^{s}{\cdot}557 \qquad c = -^{s}{\cdot}523$

Chronometer correction at $3^{h}\ 00^{m} = -51^{s}{\cdot}393 \pm ^{s}{\cdot}013$

TRANSIT OBSERVATIONS.

Station: Norfolk Island. Date, December 11th, 1903. Observer: F. W. O. Werry.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = – 26	s.		h. m. s.	s.	s.
E	21	1 20 11·81	+ ·02	– ·21	– ·46	+ ·13	– ·02	11·27	1 19 13·90	– 57·37	+ ·01
	γ Phœnicis	25 09·80	+ ·03	+ ·21	– ·63	+ ·11	– ·03	09·49	24 12·08	·41	+ ·05
	22	27 19·52	+ ·01	– ·43	– ·47	+ ·10	– ·02	18·71	26 21·39	·32	– ·04
	α Eridani	35 06·20	+ ·04	+ ·55	– ·85	+ ·06	– ·04	05·96	34 08·72	·24	– ·12
	ν Piscium	37 24·82	+ ·02	– ·37	– ·45	+ ·05	– ·02	24·05	36 26·73	·32	– ·04
	542	40 34·91	+ ·02	– ·14	– ·47	+ ·04	– ·02	34·34	39 36·96	·38	+ ·02
	25	41 18·29	+ ·02	– ·38	– ·46	+ ·04	– ·02	17·49	40 20·06	·43	+ ·07
	543	42 07·28	+ ·02	– ·04	– ·50	+ ·04	– ·02	06·78	41 09·36	·42	+ ·06
W	544	47 40·85	– ·02	– ·20	+ ·46	+ ·01	– ·02	41·08	46 43·83	·25	– ·11
	ψ Phœnicis	50 44·83	– ·03	+ ·28	+ ·66	·00	– ·03	45·71	49 48·23	·48	+ ·12
	545	56 26·40	– ·02	– ·09	+ ·49	– ·03	– ·02	26·73	55 29·43	·30	– ·06
	33	2 02 43·98	– ·02	– ·52	+ ·48	·06	– ·02	43·84	2 01 46·56	·28	– ·08
	546	09 38·50	– ·02	+ ·02	+ ·53	– ·09	– ·02	38·92	08 41·41	·51	+ ·15
	φ Eridani	14 01·73	– ·04	+ ·39	+ ·73	– ·11	– ·03	02·67	13 05·42	·25	– ·11

$a = +^{s}\cdot618$ $c = -^{s}\cdot450$

Chronometer correction at $1^h\ 50^m = -57^s\cdot355 \pm {}^s\cdot017$

W	ε Arietis	2 54 42·09	– ·02	– ·52	– ·51	+ ·11	– ·02	42·15	2 53 44·40	– 57·75	·00
	47	58 13·98	– ·02	– ·34	+ ·47	+ ·10	– ·02	14·17	57 16·53	·64	– ·11
	μ Horologii	3 02 18·52	– ·03	+ ·65	+ ·95	+ ·08	– ·04	20·13	3 01 22·28	·85	+ ·10
	359	07 07·17	– ·01	·50	+ ·50	+ ·06	– ·02	07·20	06 09·41	·79	+ ·04
	549	08 57·45	·00	+ ·01	+ ·54	+ ·05	– ·02	58·03	08 00·42	·61	– ·14
	e Eridani	17 03·59	·00	+ ·21	+ ·65	+ ·01	– ·03	04·43	16 06·67	·76	+ ·01
E	53	20 38·41	+ ·06	– ·39	– ·48	·00	– ·02	37·58	19 39·81	·77	+ ·02
	54	22 57·62	+ ·05	– ·40	– ·48	·01	– ·02	56·76	21 59·01	·75	·00
	55	26 34·15	+ ·06	– ·43	– ·48	– ·03	– ·02	33·25	25 35·39	·86	+ ·11
	B. A. C. 1106	30 42·28	+ ·10	– ·36	– ·75	– ·05	– ·03	41·91	29 44·20	·71	– ·04
	10 Taureau	32 58·04	+ ·06	– ·31	– ·47	– ·06	– ·02	57·24	31 59·45	·79	+ ·04
	550	39 38·39	+ ·07	– ·21	– ·48	– ·09	– ·02	37·66	38 39·98	·68	– ·07
	551	43 42·44	+ ·07	– ·06	– ·52	– ·11	– ·02	41·80	42 44·07	·73	– ·02

$a = +^{s}\cdot629$ $c = -^{s}\cdot473$

Chronometer correction at $3^h\ 20^m = -57^s\cdot749 \pm {}^s\cdot015$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, December 17th, 1903, Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·27	s.		h. m. s.	m. s.	s.
E	544	1 48 20·71	+ ·13	− ·19	− ·50	+ ·10	− ·02	20·23	1 46 43·78	−1 36·45	− ·03
	ψ Phœnicis	51 24·84	+ ·19	+ ·28	− ·73	+ ·09	− ·03	24·64	49 48·14	·50	+ ·02
	545	57 06·18	+ ·14	− ·08	− ·52	+ ·06	− ·02	05·76	55 29·37	·39	− ·09
	33	2 03 23·93	+ ·09	− ·51	·52	+ ·03	− ·02	23·00	2 01 46·52	·48	·00
	546	10 18·39	+ ·16	+ ·02	− ·57	·00	− ·02	17·98	08 41·35	·63	+ ·15
	φ Eridani.	14 42·03	+ ·20	+ ·38	·78	− ·02	− ·03	41·78	13 05·33	·45	− ·03
W	δ Hydri	21 37·27	+ ·16	+1·09	+1·36	− ·05	− ·05	39·78	20 03·30	·48	·09
	37	24 40·37	+ ·06	− ·37	+ ·49	− ·07	− ·02	40·46	23 04·05	·41	− ·07
	ν Ceti	32 27·32	+ ·07	− ·24	+ ·49	− ·10	− ·02	27·52	30 50·96	·56	+ ·08
	355	34 59·44	+ ·05	− ·50	+ ·52	− ·11	− ·02	59·38	33 22·85	·53	+ ·05
	39	36 10·89	+ ·07	− ·29	+ ·49	− ·12	− ·02	11·02	34 34·45	·57	+ ·09
	41	39 56·70	+ ·07	− ·32	+ ·49	·13	·02	56·79	38 20·39	·40	− ·08
	547	41 10·09	+ ·08	− ·16	+ ·50	− ·14	− ·02	10·35	39 33·91	·44	− ·04

$a = +^s \cdot 603$ $c = -^s \cdot 486$

Chronometer correction at $2^h\ 10^m = -1^m 36^s \cdot 485 \pm {}^s \cdot 015$

TRANSIT OBSERVATIONS.

Station : NORFOLK ISLAND. Date, December 18th, 1903. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·27	s.		h. m. s.	m. s.	s.
E	α Hydri	1 57 28·73	+ ·15	+ ·59	1·27	+ ·28	− ·04	28·44	1 55 44·84	−1 43·60	+ ·11
	353	2 13 56·27	+ ·08	− ·19	− ·60	+ ·20	− ·02	55·74	2 12 12·31	·43	− ·06
	κ Fornacis	19 53·48	+ ·07	− ·05	− ·65	+ ·18	− ·02	53·01	18 09·58	·43	− ·06
	σ Baleine	29 15·73	+ ·09	− ·12	− ·62	+ ·14	− ·02	16·20	27 32·88	·32	− ·17
	355	35 07·31	+ ·05	− ·41	− ·64	+ ·11	− ·02	06·40	33 22·84	·56	+ ·07
W	54	3 23 42·26	+ ·04	− ·32	+ ·60	− ·11	− ·02	42·45	3 21 59·01	·44	− ·05
	B.A.C. 1106	31 26·49	+ ·08	+ ·29	+ ·94	− ·14	− ·03	27·63	29 44·12	·51	+ ·02
	550	40 23·22	+ ·05	− ·17	+ ·60	− ·18	− ·02	23·50	38 39·99	·51	+ ·02
	61	43 31·42	+ ·03	− ·44	+ ·65	− ·20	− ·02	31·44	41 47·87	·57	+ ·08
	552	55 17·26	+ ·05	− ·14	+ ·61	− ·25	− ·02	17·51	53 34·04	·47	− ·02
	66	57 06·32	+ ·04	− ·34	+ ·61	− ·26	− ·02	06·35	55 22·80	·55	+ ·06
	δ Réticule	58 57·09	+ ·09	+ ·58	+1·25	− ·27	− ·04	58·70	57 15·27	·43	− ·06

$a = +^s \cdot 505$ $c = -^s \cdot 594$

Chronometer correction at $3^h\ 00^m = -1^m\ 43^s \cdot 486 \pm {}^s \cdot 016$

TRANSIT OBSERVATIONS.

Station: Norfolk Island. Date, December 19th, 1903. Observer: F. W. O. Werby.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = – ·25	s.		h. m. s.	m s.	s.
W	21	1 21 03·22	– ·05	– ·18	+ ·55	+ ·16	– ·02	03·78	1 19 13·82	-1 49·96	– ·03
	22	28 10·95	+ ·04	– ·37	+ ·56	+ ·13	– ·02	11·29	26 21·32	·97	– ·02
	α Eridani	35 56·79	– ·09	+ ·48	+1·02	+ ·10	– ·04	58·44	34 08·51	·93	– ·06
	ν Piscium	38 16·37	– ·64	– ·32	– ·55	+ ·09	– ·02	16·71	36 26·67	50·04	+ ·05
	542	41 26·34	– ·06	– ·12	+ ·57	+ ·08	– ·02	26·91	39 36·88	·03	+ ·04
	25	42 09·70	– ·05	– ·33	+ ·55	+ ·07	·02	10·02	40 20·00	·02	+ ·03
E	α Hydri	57 35·17	– ·24	+ ·61	–1·16	+ ·01	– ·04	34·83	55 44·80	·03	+ ·04
	37	2 24 54·85	– ·11	– ·32	– ·55	– ·10	– ·02	53·97	2 22 64·03	49·94	– ·05
	σ Baleine	29 23·45	+ ·14	– ·13	– ·57	·12	– ·02	22·75	27 32·87	·88	– ·11
	ν Ceti	32 41·85	– ·13	– ·21	– ·55	– ·13	– ·02	41·07	30 50·94	50·13	+ ·14
	355	35 13·82	– ·10	– ·43	– ·58	·15	– ·02	12·74	33 22·83	49·91	– ·08
	39	36 25·26	– ·12	– ·25	– ·55	– ·15	– ·02	24·41	34 34·45	·96	– ·03
	41	40 11·30	– ·12	– ·28	– ·55	– ·17	– ·02	10·40	38 29·38	50·02	+ ·03

$a = +^{s}\cdot528 \qquad c = -^{s}\cdot546$

Chronometer correction at $2^{h}\ 00^{m} = -1^{m}\ 49^{s}\cdot986 \pm {}^{s}\cdot015$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
E	53	3 21 30·95	– ·06	– ·34	– ·49	+ ·12	– ·02	30·28	3 19 39·80	-1 50·48	+ ·04
	54	23 50·13	+ ·06	– ·35	– ·49	+ ·11	– ·02	49·44	21 59·00	·44	·00
	55	27 26·59	+ ·06	– ·38	– ·50	+ ·10	– ·02	25·85	25 35·39	·46	+ ·02
	10 Taureau	33 50·57	– ·07	– ·27	– ·49	+ ·07	– ·02	49·93	31 59·45	·48	+ ·04
	550	40 30·93	+ ·08	– ·18	– ·50	+ ·04	– ·02	30·35	38 39·98	·37	– ·07
	551	44 34·98	+ ·09	– ·06	– ·53	+ ·02	– ·02	34·48	42 44·06	·42	– ·02
W	552	55 24·26	+ ·01	– ·15	+ ·50	– ·02	– ·02	24·58	53 34·03	·55	+ ·11
	66	57 13·13	– ·01	– ·37	+ ·50	– ·03	– ·02	13·22	55 22·80	·42	– ·02
	366	4 09 02·13	– ·01	– ·33	+ ·49	– ·08	– ·02	02·20	4 07 11·83	·37	– ·07
	α Horologii	12 40·25	+ ·04	+ ·18	+ ·66	– ·09	– ·03	41·01	10 50·60	·41	– ·03
	71	19 15·62	+ ·01	– ·42	+ ·51	– ·12	– ·02	15·58	17 25·12	·46	+ ·02
	d Eridani	22 17·08	– ·03	+ ·06	+ ·59	– ·13	– ·02	17·61	20 27·14	·47	+ ·03

$a = +^{s}\cdot556 \qquad c = -^{s}\cdot488$

Chronometer correction at $3^{h}\ 50^{m} = -1^{m}\ 50^{s}\cdot444 \pm {}^{s}\cdot018$

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 5th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·49	s.		h. m. s.	s.	s.
E	ω Piscium.......	23 54 39·77	− ·01	− ·30	− ·41	+ ·42	− ·02	39·45	23 54 23·07	−16·38	+ ·01
	2 Ceti..........	59 05·89	− ·02	− ·14	− ·42	+ ·36	− ·02	05·65	58 49·32	·33	− ·04
	γ Pegasi.........	24 08 34·73	− ·01	− ·35	− ·42	+ ·30	− ·02	34·23	24 08 17·86	·37	·00
	ζ Toucani.	15 20·54	− ·04	+ ·55	− ·97	+ ·25	− ·04	20·29	15 04·01	·28	− ·09
	β Hydri.........	20 58·90	− ·06	+1·44	−1·91	+ ·20	− ·08	58·49	20 42·09	·40	+ ·03
	12 Ceti	25 25·56	− ·01	− ·23	− ·40	+ ·16	− ·02	25·06	25 08·63	·43	+ ·06
	β Ceti	39 03.40	− ·01	− ·13	− ·42	+ ·05	− ·02	02·87	38 46·45	·42	+ ·05
W	α Sculptoris... .	54 15·46	− ·36	− ·04	+ ·46	− ·07	− ·02	15·43	53 59·00	·43	+ ·06
	ε Piscium..	58 14·76	− ·23	− ·30	+ ·41	− ·11	− ·02	14·51	57 58·14	·37	·00
	β Phœnicis......	25 02 04·41	− ·45	+ ·14	+ ·59	− ·14	− ·02	04·53	25 01 48·15	·38	+ ·01
	θ Ceti.....	19 30·69	− ·30	− ·20	+ ·41	− ·28	− ·02	30·30	19 13·97	·33	− ·04
	γ Phœnicis.......	24 28·65	− ·43	+ ·09	+ ·56	− ·32	− ·02	28·53	24 12·18	·35	− ·02
	η Piscium.	26 38·29	− ·21	− ·35	+ ·42	− ·33	− ·02	37·80	26 21·47	·33	− ·04
	α Eridani.....	34 25·20	− ·54	+ ·32	+ ·75	− ·42	− ·03	25·28	34 08·89	·39	+ ·02

$a = +^{s}\cdot448 \qquad c = -^{s}\cdot403$

Chronometer correction at $24^{h}\ 45^{m} = -16^{s}\cdot371 \pm {}^{s}\cdot009$

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 6th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·49	s.		h. m. s.	s.	s.
E	2 Ceti	23 59 19·81	+ ·17	− ·14	− ·51	+ ·44	− ·02	19·75	23 58 49·31	−30·44	− ·05
	γ Pegasi..... ...	24 08 48·70	+ ·11	− ·35	− ·50	+ ·35	− ·02	48·29	24 08 17·86	·43	− ·06
	ι Ceti...........	15 03·09	+ ·15	− ·19	− ·49	+ ·31	− ·02	02·85	14 32·32	·53	+ ·04
	β Hydri........	21 12·57	+ ·59	+1·43	−2·31	+ ·26	− ·08	12·46	20 42·00	·46	− ·03
	β Ceti.	39 17·36	+ ·17	− ·13	− ·51	+ ·11	− ·02	16·98	38 46·46	·52	+ ·03
	δ Piscium..	44 13·65	+ ·13	− ·30	− ·50	+ ·07	− ·02	13·03	43 42·50	·53	+ ·04
	20 Ceti..........	48 37·58	+ ·15	− ·24	− ·49	+ ·04	− ·02	37·02	48 06·47	·55	+ ·06
W	α Sculptoris	54 29·30	− ·23	− ·05	+ ·56	− ·01	− ·02	29·55	53 58·99	·56	+ ·07
	ε Piscium..	58 28·64	− ·15	− ·30	+ ·49	− ·04	− ·02	28·62	57 58·13	·49	·00
	β Phœnicis.. ...	25 02 18·21	− ·29	+ ·14	+ ·72	− ·07	− ·02	18 69	25 01 48·13	·56	+ ·07
	ζ¹ Piscium	09 13·98	− ·15	− ·30	+ ·49	− ·13	− ·02	13·87	08 43·45	·42	− ·07
	α Eridani... ...	34 38·81	− ·34	+ ·32	+ ·91	− ·33	− ·04	39·33	34 08·87	·46	− ·03
	ο Piscium.......	40 50·93	− ·15	− ·31	+ ·49	− ·38	− ·02	50·56	40 20 12	·44	− ·05
	ζ Ceti	47 14·66	− ·19	− ·19	+ ·50	− ·44	− ·02	14·32	46 43·92	·40	− ·09

$a = +^{s}\cdot445 \qquad c = -^{s}\cdot488$

Chronometer correction at $24^{h}\ 53^{m} = -30^{s}\cdot486 \pm {}^{s}\cdot011$

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 7th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = - ·44	s.		h. m. s.	s.	s.
E	β Hydri........	0 21 25·08	+ ·41	+1·23	-1·93	+ ·29	- ·08	25·00	0 20 41·91	-43·09	·00
	12 Ceti	25 51·92	+ ·10	- ·20	- ·41	+ ·26	- ·02	51·65	25 08·60	·05	- ·04
	β Ceti	39 29·73	+ ·12	- ·11	- ·43	+ ·16	- ·02	29·45	38 46·45	·00	- ·09
	δ Piscium.......	44 26·10	+ ·09	- ·26	- ·41	+ ·12	- ·02	25·62	43 42·49	·13	+ ·04
	26 Ceti..........	48 49·97	+ ·10	- ·21	- ·41	+ ·09	- ·02	49·52	48 06·46	·06	- ·03
	α Sculptoris.....	54 42·45	+ ·14	- ·04	- ·47	+ ·05	- ·02	42·11	53 58·98	·13	+ ·04
	ϵ Piscium......	58 41·84	+ ·09	- ·26	- ·41	+ ·02	- ·02	41·26	57 58·12	·14	+ ·05
W	ζ^1 Piscium.......	1 09 26·60	- ·15	- ·26	+ ·41	- ·06	- ·02	26·52	1 08 43·44	·08	- ·01
	θ Ceti...........	19 57·13	- ·18	- ·17	+ ·41	- ·13	- ·02	57·04	19 13·95	·09	·00
	γ Phœnicis......	24 55·12	- ·27	+ ·08	+ ·57	- ·17	- ·02	55·31	24 12·15	·16	+ ·07
	η Piscium.......	27 04·75	- ·13	- ·30	+ ·42	- ·19	- ·02	04·53	26 21·44	·09	·00
	α Eridani........	34 51·47	- ·34	+ ·28	+ ·76	- ·24	- ·04	51·89	34 08·84	·05	- ·04
	ν Piscium......	37 10·14	- ·15	- ·25	+ ·41	- ·26	- ·02	09·87	36 26·75	·12	+ ·03
	o Piscium.......	41 03·52	- ·15	- ·27	+ ·41	- ·29	- ·02	03·20	40 20·11	·09	·00

$a = +^{s}·383 \qquad c = -^{s}·407$

Chronometer correction at $1^{h}\ 01^{m} = -43^{s}·091 \pm {}^{s}·009$

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 9th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = - ·42	s.		h. m. s.	m. s.	s.
E	β Ceti..........	0 39 52·42	+ ·13	- ·15	- ·47	+ ·57	- ·02	52·48	0 38 46·42	-1 06.06	- ·10
	δ Piscium.......	44 48·76	+ ·10	- ·33	- ·45	+ ·52	- ·02	48·58	43 42·47	·11	- ·05
	α Sculptoris.....	55 05·17	+ ·15	- ·05	- ·51	+ ·45	- ·02	05·19	53 58·95	·24	+ ·08
	β Phœnicis......	1 02 54·22	+ ·18	+ ·15	- ·66	+ ·41	- ·02	54·28	1 01 48·07	·21	+ ·05
	α Eridani........	35 15·11	+ ·22	+ ·35	- ·84	+ ·17	- ·03	14·98	34 08·79	·19	+ ·03
	o Piscium......	41 26·76	+ ·09	- ·34	- ·45	+ ·13	- ·02	26·17	40 20·10	·07	- ·09
W	κ Fornacis.......	2 19 15·74	- ·16	- ·10	+ ·49	- ·13	- ·02	15·82	2 18 09·66	·16	·00
	δ Hydri........	21 08·25	- ·35	+ ·77	+1·25	- ·15	- ·05	09·72	20 03·63	·09	- ·07
	ξ^2 Ceti..........	24 10·41	- ·11	- ·33	+ ·45	- ·17	- ·02	10·23	23 04·10	·13	- ·03
	θ Eridani.......	55 44·48	- ·18	+ ·06	+ ·59	- ·39	- ·02	44·54	54 38·32	·22	+ ·06
	α Ceti..........	58 23·28	- ·11	- ·31	+ ·45	- ·41	- ·02	22·88	57 16·59	·29	+ ·13
	o Tauri........	3 20 46·60	- ·11	- ·34	+ ·45	- ·57	- ·02	46·01	3 19 39·82	·19	+ ·03

$a = +^{s}·489 \qquad c = -^{s}·446$

Chronometer correction at $2^{h}\ 00^{m} = -1^{m}\ 06^{s}·164 \pm {}^{s}·016$

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 10th, 1903. OBSERVER : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·42	s.		h. m. s.	m. s.	s.
E	β Hydri	0 21 59·41	+ ·45	+1·06	−1·83	+ 31	− ·08	59·32	0 20 41·64	-1 17·68	+ ·02
	β Ceti..	40 04·25	+ ·13	− ·10	− ·41	+ ·18	− ·02	04·03	38 46·41	·62	− ·04
	δ Piscium	45 00·54	+ ·10	− ·22	− ·39	+ ·14	− ·02	00·15	43 42·46	·69	+ ·03
	20 Ceti..........	49 24·44	+ ·11	− ·18	− ·39	+ ·11	− ·02	24·07	48 06·43	·64	− ·02
	α Sculptoris.....	55 16·88	+ ·15	− ·03	− ·45	+ ·07	− ·02	16·60	53 58·93	·67	+ ·01
	ε Piscium	59 16·23	+ 10	− ·22	− ·39	+ ·04	− ·02	15·74	57 58·09	·65	− ·01
	β Phœnicis......	1 03 05·95	+ ·18	+ ·10	− ·57	+ ·01	− ·02	05·65	1 01 48·05	·60	− ·06
W	θ Ceti	20 31 60	− ·13	− ·15	+ ·39	− ·10	− ·02	31·59	19 13·93	·66	·00
	γ Phœnicis.......	25 29·52	− ·19	+ ·07	+ ·54	− ·15	− 02	29·77	24 12·10	·67	+ ·01
	η Piscium.......	27 39·23	− ·10	− ·26	+ ·40	− ·15	− ·03	39·09	26 21·43	·66	·00
	α Eridani.......	35 25 94	− ·26	+ ·24	+ ·72	− ·21	− ·02	26·41	34 08·76	·65	− ·01
	ν Piscium.......	37 44·57	− ·10	− ·21	+ ·39	− ·22	− ·02	44·41	36 26·75	·66	·00
	ζ Ceti...........	48 01·73	− ·14	− ·14	+ ·39	− ·30	− ·02	01·52	46 43·89	·63	− ·03
	β Arietis.........	50 39·01	− ·09	− ·29	+ ·41	− ·31	− ·02	38·71	49 21·01	·70	+ ·04

$a = +^{s}\cdot330$ $c = -^{s}\cdot387$

Chronometer correction at $1^h\ 05^m = -1^m\ 17^s\cdot657 \pm ^s\cdot005$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	σ Arietis........	2 47 30·97	− ·13	− ·32	+ ·41	+ ·34	− ·02	31·25	2 46 12·49	-1 18·76	+ ·08
	θ Eridani	55 56·23	− ·25	+ ·05	+ ·52	+ ·29	− ·02	56·82	54 38·30	·52	− ·16
	α Ceti.........	58 35·05	− ·15	− ·25	+ ·40	+ ·27	− ·02	35·30	57 16·58	·72	+ ·04
	μ Horologii	3 02 40·04	− ·34	+ ·34	+ ·79	+ ·24	− ·04	41·03	3 01 22·30	·73	+ ·05
	ο Tauri.........	20 58·48	− ·14	− ·28	+ ·40	+ ·11	− ·02	58·55	19 39·82	·73	+ ·05
	ε Eridani	29 44·01	− ·17	− ·17	+ ·40	+ ·05	− ·02	44·10	28 25·41	·69	+ ·01
E	δ Eridani.......	39 59·19	+ ·08	− ·17	− ·40	− ·02	− ·02	58·66	38 39·98	·68	·00
	γ Hydri........	50 05·76	+ ·26	+ ·97	−1·48	− ·10	− ·07	05·34	48 46·64	·70	+ ·02
	γ¹ Eridani	54 53·36	+ ·10	− ·15	− ·41	− ·13	− ·02	52·75	53 34·05	·70	+ ·02
	A¹ Tauri........	4 00 22·01	+ ·05	− ·36	− ·43	− ·17	− ·02	21·08	59 02·41	·67	− ·01
	ο¹ Eridani	08 31·21	+ ·08	− ·19	− ·40	− ·22	− ·02	30·46	4 07 11·82	·64	− ·04
	ε Tauri	24 21·64	+ ·06	− ·35	− ·42	− ·34	− ·02	20·57	22 61·89	·68	·00

$a = +^{s}\cdot405$ $c = -^{s}\cdot395$

Chronometer correction at $3^h\ 36^m = -1^m\ 18^s\cdot683 \pm ^s\cdot013$

TRANSIT OBSERVATIONS.

Station: DOUBTLESS BAY. Date, December 11th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·40	s.		h. m. s.	m. s.	s.
E	ι Ceti	0 16 00 99	+ ·26	− ·15	− ·36	+ ·27	− ·02	00·99	0 14 32·27	-1 28·72	·00
	β Hydri	22 09·74	+ ·99	+1·10	−1·70	+ ·23	− ·08	10·28	20 41·55	·73	+ ·01
	12 Ceti	26 37·31	+ ·25	− ·17	− ·36	+ ·21	− ·02	37·22	25 08·56	·66	− ·06
	β Ceti	40 15·16	+ ·29	− ·10	− ·38	+ ·11	− ·02	15·06	38 46·40	·66	− ·06
	δ Piscium	45 11·54	+ ·21	− ·23	− ·36	+ ·08	− ·02	11·22	43 42·45	·77	+ ·05
	α Sculptoris	55 27·81	+ ·33	− ·03	− ·41	+ ·02	− ·02	27·70	53 58·92	·78	+ ·06
	ε Piscium	59 27·30	+ ·21	− ·23	− ·36	− ·02	− ·02	26·88	57 58·08	·80	+ ·08
W	β Phœnicis	1 03 16·10	+ ·06	+ ·11	+ ·53	− ·04	− ·03	16·73	1 01 48·03	·70	− ·02
	ζ^1 Piscium	10 12·06	+ ·03	− ·23	+ ·36	− ·09	− ·02	12·11	08 43·41	·70	− ·02
	θ Ceti	20 42·61	+ ·03	− ·15	+ ·36	− ·15	− ·02	42·68	19 13·91	77	+ ·05
	γ Phœnicis	25 40·45	+ ·05	+ ·07	+ ·50	− ·18	− ·02	40·87	24 12·08	·79	+ ·07
	η Piscium	27 50·25	+ ·02	− ·27	+ ·37	− ·20	− ·02	50·15	26 21·42	·73	+ ·01
	α Eridani	35 36·74	+ ·06	+ ·25	+ ·67	− ·26	− ·04	37·42	34 08·73	·69	− ·03
	ν Piscium	37 55·51	+ ·03	− ·22	+ ·36	− ·27	− ·02	55·39	36 26·72	·67	− ·05

$a = +^{s}\cdot341$ $c = -^{s}\cdot360$

Chronometer correction at $0^h\ 57^m = -1^m\ 28^s\cdot725 \pm {}^s\cdot010$

TRANSIT OBSERVATIONS.

Station: DOUBTLESS BAY. Date, December 12th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·40	s.		h. m. s.	m. s.	s.
E	γ Pegasi	0 09 58·46	+ ·13	− ·27	− ·41	+ ·34	− ·02	58·23	0 08 17·88	-1 40·35	− ·08
	ι Ceti..........	16 12·80	+ ·18	− ·15	− ·40	+ ·29	− ·02	12·70	14 32·25	·45	+ ·02
	β Hydri........	22 21·76	+ ·69	+1·13	−1·88	+ ·25	− ·08	21·87	20 41·45	·42	− ·01
	12 Ceti	26 49·19	+ ·17	− ·18	− ·40	+ ·22	− ·02	48·98	25 08·55	·43	·00
	β Ceti..........	40 26·98	+ ·20	− ·11	− ·42	+ ·13	− ·02	26·76	38 46·39	·37	− ·06
	δ Piscium......	45 23·36	+ ·15	− ·24	− ·40	+ 10	− ·02	22·95	43 42·44	·51	+ ·08
	α Sculptoris....	55 39·65	+ ·23	− ·04	− ·46	+ ·02	− ·02	39·38	53 58·91	·47	+ ·04
W	β Phœnicis.....	1 03 28·01	− ·16	+ ·11	+ ·59	− ·02	− ·03	28·50	1 01 48·00	·50	+ ·07
	ζ^1 Piscium......	10 23·82	− ·09	− ·23	+ ·40	− ·07	− ·02	23·81	08 43·39	·42	− ·01
	γ Phœnicis.....	25 52·23	− ·16	+ ·07	+ ·55	− ·18	− ·02	52·49	24 12·06	·43	·00
	η Piscium......	28 01·97	− ·08	− ·28	+ ·41	− ·19	− ·02	01·81	26 21·40	·41	− ·02
	α Eridani......	35 48·61	− ·20	+ ·25	+ ·74	− ·24	− ·04	49·12	34 08·71	·41	− ·02
	ν Piscium.....	38 07·31	− ·09	− ·22	+ ·40	− ·26	− ·02	07·12	36 26·71	·41	− ·02
	ζ Ceti..........	48 24·46	− ·11	− ·15	+ ·41	− ·34	− ·02	24·25	46 43·87	·38	− ·05

$a = +^{s}\cdot350 \quad c = -^{s}\cdot398$

Chronometer correction at $0^h\ 59^m = -1^m\ 40^s\cdot426 \pm {}^s\cdot009$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	μ Horologii.....	3 03 02·71	− ·42	+ ·34	+ ·92	+ ·31	− ·03	03·83	3 01 22·26	-1 41·57	+ ·02
	δ Arietis	08 50·73	− ·14	− ·35	+ ·49	+ ·27	− ·02	50·98	06 09·43	·55	·00
	τ^1 Arietis..	17 23·52	− ·14	− ·35	+ ·49	+ ·22	− ·02	23·72	15 42·18	·54	− ·01
	f Tauri........	27 16·81	− ·16	− ·30	+ ·47	+ ·15	− ·02	16·95	25 35·41	·54	− ·01
	ϵ Eridani.....	30 06·70	− ·21	− ·17	+ ·46	+ ·13	− ·02	06·89	28 25·41	·48	− ·07
	τ^5 Eridani.. ...	31 15·07	− ·24	− ·10	+ ·50	+ ·12	− ·02	15·33	29 33·76	·57	+ ·02
	η Tauri.......	43 29·48	− ·13	− ·37	+ ·50	+ ·04	− ·02	29·50	41 47·90	·60	+ ·05
E	A^1 Tauri........	4 00 44·79	+ ·09	− ·36	− ·50	− ·07	− ·02	43·93	59 02·42	·51	− ·04
	ω^1 Tauri.......	05 18·08	+ ·08	− ·35	− ·49	− ·10	− ·02	17·20	4 03 35·58	·62	+ ·07
	o^1 Eridani......	08 53·99	+ ·13	− ·18	− ·46	− ·13	− ·02	53·33	07 11·82	·51	− ·04
	α Reticuli......	14 55·45	+ ·29	+ ·41	−1·00	− ·17	− ·04	54·94	13 13·36	·58	+ ·03
	ϵ Tauri........	24 44·46	+ ·09	− ·35	− ·49	− ·23	− ·02	43·46	23 01·90	·56	+ ·01
	α Tauri	32 08·47	+ ·10	− ·33	− ·48	− ·29	− ·02	07·45	30 25·95	·50	− ·05
	53 Eridani......	35 30·51	+ ·15	− ·14	− ·47	− ·31	− ·02	29·72	33 48·13	·59	+ ·04

$a = +^{s}\cdot402 \quad c = -^{s}\cdot460$

Chronometer correction at $3^h\ 49^m = -1^m\ 41^s\cdot551 \pm {}^s.010$

TRANSIT OBSERVATIONS.

Station: DOUBTLESS BAY. Date, December 17th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·33	s.		h. m. s.	m. s.	s.
E	β Hydri.........	0 23 19·89	+ ·42	+1·00	−1·74	+ ·30	− ·08	19·79	0 20 40·98	−2 38·81	− ·07
	δ Piscium......	46 21·68	+ ·10	− ·21	− ·37	+ ·18	− ·02	21·36	43 42·39	·97	+ ·09
	α Sculptoris....	56 37·93	+ ·14	− ·03	− ·42	+ ·13	− ·02	37·73	53 58·84	·89	+ ·01
	ε Piscium......	1 00 37·40	+ ·10	− ·21	− ·37	+ ·10	− ·02	37·00	57 58·03	·97	+ ·09
	β Phœnicis.....	04 27·10	+ ·17	+ ·10	− ·54	+ ·08	− ·02	26·89	1 01 47·91	·98	+ ·10
	ζ¹ Piscium......	11 22·70	+ ·10	− ·21	− ·37	+ ·04	− ·02	22·24	08 43·35	·89	+ ·01
	θ Ceti..........	21 53·19	+ ·11	− ·14	− ·37	− ·01	− ·02	52·76	19 13·85	·91	+ ·03
W	ο Piscium......	42 58·92	− ·12	− ·22	+ ·37	− ·13	− ·02	58·80	40 20·03	·77	− ·11
	ζ Ceti..........	49 22·64	− ·16	− ·13	+ ·38	− ·17	− ·02	22·54	46 43·83	·71	− ·17
	β Arietis.......	52 00·06	− ·10	− ·27	+ ·39	− ·18	− ·02	59·88	49 20·96	·92	+ ·04
	α Hydri........	58 23·40	− ·32	+ ·30	+ ·79	− ·21	− ·04	23·92	55 44·87	39·05	+ ·17
	α Arietis.	2 04 25·62	− ·10	− ·29	+ ·40	− ·25	− ·02	25·36	2 01 46·55	38·81	− ·07
	67 Ceti........ .	14 51·42	− ·15	− ·15	+ ·37	− ·30	− ·02	51·17	12 12·33	·84	− ·04
	κ Fornacis.....	20 48·63	− ·18	− ·06	+ ·41	− ·33	− ·02	48·45	18 09·59	·86	− ·02

$a = +^{s}.310$ $c = -^{s}\cdot369$

Chronometer correction at $1^{h}\ 19^{m} = -2^{m}\ 38^{s}\cdot883 \pm {}^{s}\cdot018$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	δ Eridani......	3 41 19·62	− ·25	− ·18	+ ·37	+ ·25	− ·02	19·79	3 38 39·98	−2 39·81	− ·07
	γ Hydri........	51 24·65	− ·79	+ ·98	+1·36	+ ·19	− ·06	26·33	48 46·40	·93	+ ·05
	γ¹ Eridani......	56 13·85	− ·26	− ·15	+ ·37	+ ·17	− ·02	13·96	53 34·06	·90	+ ·02
	A¹ Tauri..	4 01 42·31	− ·16	− ·37	+ ·39	+ ·14	− ·02	42·29	58 62·44	·85	− ·03
	ω¹ Tauri........	06 15 50	− ·17	− ·35	+ ·38	+ ·11	− ·02	15·45	4 03 35·60	·85	− ·03
	ο¹ Eridani......	09 51·68	− ·24	− ·19	+ ·37	+ ·09	− ·02	51·69	07 11·84	·85	− ·03
E	α Doradûs......	34 37·41	− ·04	+ ·24	− ·64	− ·04	− ·03	36·90	31 57·17	·73	− ·15
	π¹ Orionis.......	47 19·67	− ·02	− ·27	− ·37	− ·12	− ·02	18·87	44 38·92	·95	+ ·07
	ε Leporis......	5 04 05·79	− ·02	− ·09	− ·39	− ·21	− ·02	05·06	5 01 25·12	·94	+ ·06
	β Eridani......	05 49·82	− ·02	− ·20	− ·36	− ·22	− ·02	49·00	03 09·06	·94	+ ·06
	μ Leporis.....	11 19·17	− ·02	− ·13	− ·38	− ·25	− ·02	18·37	08 38·39	·98	+ ·10

$a = +^{s}\cdot408$ $c = -^{s}\cdot363$

Chronometer correction at $4^{h}\ 26^{m} = -2^{m}\ 39^{s}\cdot885 \pm {}^{s}\cdot018$

TRANSIT OBSERVATIONS.

Station: DOUBTLESS BAY. Date, December 18th, 1903. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·37	s.		h. m. s.	m. s.	s.
E	β Hydri........	0 23 29·87	+ ·65	+1·17	−1·76	+ ·27	− ·08	30·12	0 20 40·88	−2 49·24	+ ·01
	β Ceti........ ...	41 35·66	+ ·19	− ·11	− ·39	+ ·15	− ·02	35·48	38 46·31	·17	− ·06
	δ Piscium......	46 32·00	+ ·14	− ·25	− ·38	+ ·12	− ·02	31·61	43 42·37	·24	+ ·01
	20 Ceti....	50 55·87	+ ·16	− ·20	− ·37	+ ·10	− ·02	55·54	48 06·35	·19	− ·04
	α Sculptoris.. ..	56 48·29	+ ·21	− ·04	− ·43	+ ·06	− ·02	48·07	53 58·82	·25	+ ·02
	ε Piscium. ...	1 00 47·73	+ ·14	− ·25	− ·38	+ ·04	− ·02	47·26	57 58·01	·25	+ ·02
	ζ¹ Piscium	11 33·17	+ ·14	− ·24	− ·38	− ·03	− ·02	32·64	1 08 43·36	·28	+ ·05
W	θ Ceti..........	22 03·06	− ·12	− ·16	+ ·37	− ·10	− ·02	03·03	19 13·84	·19	− ·04
	γ Phœnicis.....	27 00·90	− ·18	+ ·08	+ ·52	− ·13	− ·02	01·17	24 11·95	·22	− ·01
	η Piscium......	29 10·78	− ·09	− ·29	+ ·38	− ·14	− ·02	10·62	26 21·35	·27	+ ·04
	α Eridani.....	36 57·29	− ·22	+ ·26	+ ·70	− ·18	− ·03	57·82	34 08·54	·28	+ ·05
	ν Piscium......	39 16·06	− 10	− ·23	+ ·37	− ·20	− ·02	15·88	36 26·67	·21	− ·02
	ο Piscium......	43 09·49	− ·09	− ·25	+ ·38	− ·23	− ·02	09·28	40 20·02	·26	+ ·03
	υ Ceti..........	58 18·76	− ·13	− ·09	+ ·40	− ·32	− ·02	18·60	55 29·39	·21	− ·02

$a = +^{s}·362 \quad c = -^{s}·373$

Chronometer correction at 1ʰ 06ᵐ = − 2ᵐ 49ˢ·234 ± ˢ·007

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	f Tauri.... ...	3 28 25·48	− ·08	− ·27	+ ·43	+ ·25	− ·02	25·79	3 25 35·42	−2 50·37	+ ·01
	ε Eridani	31 15·37	− ·10	− ·15	+ ·42	+ ·23	− ·02	15·75	28 25·40	·35	− ·01
	τ⁵ Eridani... ...	32 23·70	− ·12	− ·09	+ ·45	+ ·22	− ·02	24·14	29 33·77	·37	+ ·01
	δ Eridani.......	41 29·99	− ·11	− ·15	+ ·43	+ ·17	− ·02	30·31	38 39·93	·38	+ ·02
	γ Hydri........	51 34·58	− ·33	+ ·85	+1·56	+ ·11	− ·06	36·71	48 46·36	·35	− ·01
	γ¹ Eridani	56 24·16	− ·11	− ·13	+ ·43	+ ·07	− ·02	24·40	53 34·06	·34	− ·02
E	A¹ Tauri........	4 01 52·75	− ·07	− ·32	+ ·45	+ ·04	− ·02	52·83	59 02·44	·39	+ ·03
	α Reticuli......	16 04·02	+ ·35	+ ·36	− ·91	− ·05	− ·04	03·73	4 13 13·29	·44	+ ·08
	ε Tauri..	25 53·03	+ ·11	− ·31	− ·44	− ·10	− ·02	52·27	23 01·93	·34	− ·02
	α Doradûs......	34 47·82	+ ·29	+ ·21	− ·73	− ·16	− ·03	47·40	31 57·16	·24	− ·12
	53 Eridani......	36 39·12	+ ·17	− ·13	− ·43	− ·17	− ·02	38·54	33 48·16	·38	+ ·02
	τ Tauri........	39 21·55	+ ·10	− ·32	− ·45	− ·19	− ·02	20·67	36 30·32	·35	− ·01
	μ Eridani .. .	43 34·36	+ ·15	− ·19	− ·42	− ·22	− ·02	33·66	40 43·32	·34	− 02
	π¹ Orionis.......	47 30·11	+ ·13	− ·24	− ·42	− ·25	− ·02	29·31	44 38·92	·39	+ ·03

$a = +^{s}·356 \quad c = -^{s}·417$

Chronometer correction at 4ʰ 08ᵐ = − 2ᵐ 50ˢ·360 ± ˢ·009

TRANSIT OBSERVATIONS.

Station : DOUBTLESS BAY. Date, December 19th, 1903. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·40	s.		h. m. s.	m. s.	s.
E	θ Eridani.	2 57 39·41	+ ·10	+ ·04	− ·54	+ ·33	− ·02	39·32	2 54 38·21	−3 01·11	− ·20
	α Ceti..	3 00 18·03	+ ·06	− ·18	− ·41	+ ·31	− ·02	17·79	57 16·56	·23	− ·08
	δ Arietis........	09 11·22	+ ·05	− ·24	− ·43	+ ·25	− ·02	10·83	3 06 09·43	·40	+ ·09
	f Tauri.	28 37·27	+ ·06	− ·21	− ·42	+ ·13	− ·02	36·81	25 35·42	·39	+ ·08
	ε Eridani.......	31 27·05	+ ·07	− ·12	− ·41	+ ·11	− ·02	26·68	28 25·39	·29	− ·02
	τ⁵ Eridani.	32 35·44	+ ·08	− ·07	− ·44	+ ·10	− ·02	35·09	29 33·76	·33	+ ·02
	δ Eridani.......	41 41·65	+ ·07	− ·12	− ·42	+ ·04	− ·02	41·20	38 39·93	·27	− ·04
W	γ Hydri....	51 45·88	− ·51	+ ·67	+1·54	− ·03	− ·06	47·49	48 46·31	·18	− ·13
	γ¹ Eridani..	56 35·26	− ·17	− ·10	+ ·42	− ·06	− ·02	35·33	53 34·06	·27	− ·04
	A¹ Tauri.........	4 02 03·82	− ·10	− ·25	+ ·44	− ·10	− ·02	03·79	59 02·44	·35	+ ·04
	ω¹ Tauri.........	06 37·07	− ·11	− ·24	+ ·43	− ·13	− ·02	37·00	4 03 35·60	·40	+ ·09
	o¹ Eridani.... .	10 13·21	− ·16	− ·13	+ ·41	− ·15	− ·02	13·16	07 11·84	·32	+ ·01
	ε Tauri...... ..	26 03·48	− ·11	− ·24	+ ·43	− ·26	− ·02	03·28	23 01·94	·34	+ ·03
	53 Eridani..	36 49·77	− ·17	− ·10	+ ·42	− ·33	− ·02	49·57	33 48·16	·41	+ ·10

$a = +^{s}\cdot 281$ $c = -^{s}\cdot 410$

Chronometer correction at $3^{h}\ 47^{m} = -3^{m}\ 01^{s}\cdot 306 \pm {}^{s}\cdot 020$

TRANSIT OBSERVATIONS.

Station: WELLINGTON. Date, December 6th, 1903. Observer: THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·25	s.		h. m. s.	s.	s.
E	δ Piscium.......	0 43 47·32	+ ·20	+ ·39	+ ·37	− ·23	− ·02	48·03	0 43 42·50	−5·53	+ ·03
	β Phœnicis	1 01 52·80	+ ·43	− ·08	+ ·54	− ·15	− ·02	53·52	1 01 48·13	·39	− ·11
	ζ¹ Piscium.......	08 48·20	+ ·20	+ ·39	+ ·37	− ·12	− ·02	49·02	08 43·45	·57	+ 07
	θ Ceti..........	19 18·53	+ ·24	+ ·28	+ ·37	− ·09	− ·02	19·31	19 13·96	·35	− ·15
	η Piscium.	26 26·30	+ ·15	+ ·45	+ ·38	− ·06	− ·02	27·20	26 21·46	·74	+ ·24
	α Eridani.. ...	34 13·44	+ ·53	− ·28	+ ·69	− ·01	− ·03	14·34	34 08·87	·47	− ·03
W	ζ Ceti.	46 49·16	+ ·17	+ ·49	− ·40	+ ·04	− ·02	49·44	46 43·92	·52	+ ·02
	α Hydri....	55 51·32	+ ·66	− ·39	− ·79	+ ·08	− ·03	50·85	55 45·20	·65	+ ·15
	ξ¹ Ceti...........	2 08 00·56	+ ·22	+ ·40	− ·37	+ ·13	− ·02	00·92	2 07 55·47	·45	− ·05
	κ Fornacis	18 14·79	+ ·36	+ ·17	− ·41	+ ·17	− ·02	15·06	18 09·68	·38	− ·12
	ν Ceti..........	30 55·93	+ ·23	+ ·38	− ·37	+ ·22	− ·02	56·37	30 50·99	·38	− ·12

$a = -^{s}\cdot522 \qquad c = +^{s}\cdot370$

Chronometer correction at $1^{h}\ 37^{m} = -5^{s}\cdot496 \pm {}^{s}\cdot031$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	γ Hydri........	3 48 52·86	+1·25	− ·88	−1·22	− ·22	− ·06	51·73	3 48 46·76	−4 97	+ ·13
	A¹ Tauri........	59 07·09	+ ·18	+ ·49	− ·35	− ·17	− ·02	07·22	59 02·39	·83	− ·01
	o¹ Eridani	4 07 16·49	+ ·31	+ ·29	− ·33	− ·14	− ·02	16·60	4 07 11·80	·80	− ·04
	γ Tauri	14 25·30	+ ·21	+ ·46	− ·34	− ·11	− ·02	25·50	14 20·95	·55	− ·29
	ε Tauri........	23 06·53	+ ·20	+ ·47	− ·35	− ·07	− ·02	06·76	23 01·86	·90	+ 06
	α Tauri....... .	30 30 34	+ ·21	+ ·46	− ·34	− ·04	− ·02	30 61	30 25·91	·70	− ·14
E	ι Aurigæ.......	50 49·73	+ ·10	+ ·59	+ ·39	+ ·04	− ·02	50·83	50 45·92	·91	+ ·07
	ε Leporis.......	5 01 29·24	+ ·31	+ ·18	+ ·35	+ ·05	− ·02	30·11	5 01 25·04	5·07	+ ·23
	β Orionis..... .	10 00·70	+ ·26	+ ·28	+ ·33	+ ·12	− ·02	01·67	09 56·59	·08	+ ·24
	β Doradûs..	32 53·74	+ ·62	− ·40	+ ·71	+ ·22	− 03	54·86	32 50·29	4·57	− ·27

$a = -^{s}\cdot512 \qquad c = +^{s}\cdot326$

Chronometer correction at $4^{h}\ 40^{m} = -4^{s}\cdot840 \pm {}^{s}\cdot040$

TRANSIT OBSERVATIONS.

Station : WELLINGTON. Date, December 7th, 1903. Observer : THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·09	s.		h. m. s.	s.	s.
E	η Piscium......	1 26 24·11	+ ·19	+ ·23	+ ·35	− ·07	− ·02	24·79	1 26 21·45	− 3·34	+ ·14
	α Eridani.......	34 11·04	+ ·60	− ·14	+ ·64	− ·06	− ·03	12·05	34 08·84	·21	+ ·01
	β Arietis.......	49 23·46	+ ·18	+ ·25	+ ·37	− ·04	− ·02	24·20	49 21·03	·17	− ·03
	υ Ceti..........	55 31·94	+ ·34	+ ·10	+ ·37	− ·03	− ·02	32·70	55 29.47	·23	+ ·03
	β Trianguli......	2 03 53·33	+ ·10	+ ·31	+ ·42	− ·02	− ·02	54·12	2 03 51 01	·11	− ·09
W	ν Ceti..........	30 54·19	+ ·23	+ ·19	− ·34	+ ·02	− ·02	54 27	30 50·99	·28	+ ·08
	γ² Ceti	38 23·43	+ ·24	+ ·19	− ·34	+ ·03	− ·02	23·53	38 20·43	·10	− ·10
	σ Arietis......	46 15·54	+ ·19	+ ·23	− ·35	+ ·05	− ·02	15·64	46 12·50	·14	− ·06
	ε Arietis......	53 47·56	+ ·17	+ ·25	− ·37	+ ·06	− ·02	47·65	53 44·41	·24	+ ·04
	μ Horologii.....	3 01 25·69	+ ·65	− ·17	− ·69	+ ·07	− ·03	25·52	3 01 22·36	·16	− ·04

$a = -^{s}·265$ $c = +^{s}·343$

Chronometer correction at $2^h\ 14^m = -3^s·195 \pm {}^s·024$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ε Persei........	3 51 29·30	+ ·08	+ ·48	− ·39	− ·06	− ·02	29·39	3 51 26 27	−3·12	− ·05
	A¹ Tauri........	59 05·37	+ ·20	+ ·36	− ·32	− ·05	− ·02	05·54	59 02·40	·14	− ·03
	ω¹ Tauri	4 03 38·57	+ ·21	+ ·34	− ·32	− ·04	− ·02	38·74	4 03 35·56	·18	+ ·01
	α Reticuli......	13 16·82	+ ·82	− ·30	− ·65	− ·03	− ·03	16·63	13 13·41	·22	+ ·05
	ε Tauri........	23 04·82	+ ·21	+ ·34	− ·32	− ·01	− ·02	05·02	23 01·87	·15	− ·02
E	α Doradûs	31 59 42	+ ·58	− ·16	+ ·52	·00	− ·02	60·34	31 57·20	·14	− ·03
	μ Eridani.......	40 45·70	+ ·27	+ ·23	+ ·30	+ ·02	− ·02	46·50	40 43·26	·24	+ ·07
	π¹ Orionis......	44 41·24	+ ·17	+ ·28	+ ·30	+ ·02	− ·02	41·99	44 38·85	·14	− ·03
	ι Aurigæ.......	50 48·33	+ ·11	+ ·43	+ ·35	+ ·03	− ·02	49·23	50 45·93	·30	+ ·13
	β Orionis.......	5 09 58·83	+ ·29	+ ·21	+ ·30	+ ·06	− ·02	59·67	5 09 56·61	·06	− ·11

$a = -^{s}·373$ $c = +^{s}·298$

Chronometer correction at $4^h\ 30^m = -3^s·165 \pm {}^s·022$

TRANSIT OBSERVATIONS.

Station : WELLINGTON. Date, December 11th, 1903. Observer : THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·09	s.		h. m. s.	s.	s.
E	α Eridani.......	1 34 06·72	+ ·53	− ·10	+ ·55	− ·07	− ·03	07·60	1 34 08·74	+1 14	− ·12
	o Piscium.......	40 18·73	+ ·26	+ ·11	+ ·30	− ·06	− ·02	19·32	40 20·08	0·76	+ ·26
	β Arietis.......	49 19 10	+ ·15	+ ·18	+ ·31	− ·05	− ·02	19·97	49 21·00	1·03	− ·01
	ξ¹ Ceti	2 07 53·80	+ ·19	+ ·15	+ ·30	− ·02	− ·02	54·40	2 07 55·45	1·05	− ·03
W	ν Ceti..........	30 49·79	+ ·23	+ ·14	− ·29	+ ·01	− ·02	49·86	30 50·98	1·12	− ·10
	γ²Ceti.........	38 19 30	+ ·26	+ ·14	− ·29	+ ·02	− ·02	19·41	38 20·42	1·01	+ ·01
	θ Eridani.......	54 37·11	+ ·47	·00	− ·39	+ ·05	− ·02	37·22	54 38·29	1·07	− ·05
	μ Horologii......	3 01 21·36	+ ·68	− ·13	− ·59	+ ·06	− ·03	21·35	3 01 22·28	0·93	+ ·09
	δ Arietis.......	06 08 26	+ ·19	+ ·18	− ·31	+ ·07	− ·02	08·37	06 09·44	1·07	− ·05

$a = -^{s}·196$ $c = +^{s}·293.$

Chronometer correction at $2^h\ 20^m = +1^s·021 \pm {}^s·031$

TRANSIT OBSERVATIONS.

Station : WELLINGTON. Date, December 12th, 1903. Observer : THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·12	s.		h. m. s.	s.	s.
E	ζ Ceti	1 46 40·04	+ ·20	+ ·16	+ ·27	− ·09	− ·02	40·56	1 46 43·87	+3·31	+ ·05
	α Hydri	55 41·04	+ ·46	− ·24	+ ·55	− ·07	− ·03	41·71	55 45·02	·31	+ ·05
	α Arietis.......	2 01 42·53	+ ·11	+ ·31	+ ·28	− ·06	− ·02	43·15	2 01 46·59	·44	− ·08
	67 Ceti	12 08·46	+ ·19	+ ·18	+ ·26	− ·04	− ·02	09 03	12 12·36	·33	+ ·03
	κ Fornacis.	18 05·56	+ ·24	+ ·10	+ ·29	− ·03	− ·02	06·14	18 09·63	·49	− ·13
W	ν Ceti	30 47·44	+ ·24	+ ·23	− ·26	·00	− ·02	47·63	30 50·97	·34	+ ·02
	γ^2 Ceti.........	38 16·89	+ ·25	+ ·22	− ·26	+ ·01	− ·02	17·09	38 20·41	·32	+ ·04
	σ Arietis......	46 08·90	+ ·21	+ ·27	− ·27	+ ·03	− ·02	09·12	46 12·48	·36	·00
	μ Horologii . ..	3 01 18·89	+ ·67	− ·20	− ·52	+ ·06	− ·03	18·87	3 01 22·26	·39	− ·03
	τ^1 Arietis... ...	15 38·57	+ ·17	+ ·30	− ·28	+ ·09	− ·02	38·83	15 42·18	·35	+ ·01

$a = -^{s}{\cdot}315 \quad c = +^{s}{\cdot}261$

Chronometer correction at $2^h\ 31^m = +3^s{\cdot}362 \pm ^{s}{\cdot}017$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	ε Tauri........	4 22 58·47	+ ·21	+ ·15	− ·30	− ·09	− ·02	58·42	4 23 01·90	+3·48	+ ·20
	α Doradûs......	31 53·52	+ ·67	− ·07	− ·49	− ·07	− ·03	53·53	31 57·19	·66	+ ·02
	μ Eridani......	40 39·54	+ ·31	+ ·10	− ·28	− ·05	− ·02	39·60	40 43·28	·68	·00
	ι Aurigæ.	50 42·34	+ ·13	+ ·18	− ·33	− ·03	− ·02	42·27	50 45·98	·71	− 03
	ε Leporis	5 01 21·22	+ ·40	+ ·06	− ·30	− ·01	− ·02	21·35	5 01 25·08	·73	− ·05
E	β Orionis.	09 52·19	+ ·31	+ ·09	+ ·28	+ ·01	− ·02	52·86	09 56·64	·78	− ·10
	Bellatrix	19 55·74	+ ·25	+ ·12	+ ·28	+ ·03	− ·02	56·40	20 00·12	72	− ·04
	B.A.C.1740.....	27 28·44	+ ·53	− ·02	+ ·41	+ ·04	− ·02	29·38	27 32·90	·52	+ ·16
	κ Orionis.	43 09·07	+ ·30	+ ·08	+ ·28	+ ·07	− ·02	09·78	43 13·42	·64	+ ·04
	α Orionis.	49 55·24	+ ·25	+ ·12	+ ·28	+ ·09	− ·02	55·96	49 59·67	·71	− ·03

$a = -^{s}{\cdot}147 \quad c = +^{s}{\cdot}280$

Chronometer correction at $5^h\ 06^m = +3^s{\cdot}684 \pm ^{s}{\cdot}034$

TRANSIT OBSERVATIONS.

Station: WELLINGTON. Date, December 17th, 1903. Observer: THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·04	s.		h. m. s.	s.	s.
E	ξ^1 Ceti	2 07 51·17	+ ·19	+ ·31	+ ·26	– 03	– ·02	51·88	2 07 55·41	+3·53	+ ·03
	ϕ Eridani	13 00·97	+ ·47	– ·12	+ ·41	– ·03	– ·02	01·68	13 05·33	·65	– ·09
	ξ^2 Ceti	22 59·94	+ ·19	+ ·31	+ ·26	– ·02	– ·02	60·66	23 04·06	·40	+ ·16
	ν Ceti	30 46·69	+ ·20	+ ·29	+ ·25	– ·01	– ·02	47·40	30 50·95	·55	+ ·01
	γ^2 Ceti	38 16·07	+ ·21	+ ·28	+ ·25	– ·01	– ·02	16·78	38 20·39	·61	– ·05
W	σ Arietis	46 08·57	+ ·25	+ ·34	– ·26	·00	– ·02	08·88	46 12·47	·59	– ·03
	μ Horologii	3 01 18·57	+ ·85	– ·26	– ·51	+ ·01	– ·03	18·63	3 01 22·15	·52	+ ·04
	τ^1 Arietis	15 38·30	+ ·21	+ ·38	– ·27	+ ·02	– ·02	38·62	15 42·18	·56	·00
	o Tauri	19 35·09	+ ·29	+ ·31	– ·26	+ ·02	– ·02	36·33	19 39·82	·49	+ ·07
	11 Tauri	34 59·49	+ ·22	+ ·40	– ·28	+ ·03	– ·02	59·84	35 03·51	·67	– ·11

$a = -{}^{s}\cdot 399 \qquad c = +{}^{s}\cdot 254$

Chronometer correction at $2^h\ 51^m = +3^s\cdot 559 \pm {}^{s}\cdot 027$

Station: WELLINGTON. Date, December 18th, 1903. Observer: THOS. KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = + ·04	s.		h. m. s.	s.	s.
E	ξ^1 Ceti	2 07 50·27	+ ·21	+ ·32	+ 24	– ·02	– ·02	51·00	2 07 55·41	+4·41	+ ·07
	ϕ Eridani	13 00·03	+ ·51	– ·13	+ ·39	– ·02	– ·02	00·76	13 05·31	·55	– ·07
	ξ^2 Ceti	22 58·89	+ 21	+ ·32	+ ·24	– ·01	– ·02	59·63	23 04·06	·43	+ ·05
	δ Ceti	34 29·32	+ ·24	+ ·28	+ ·24	– ·01	– ·02	30·05	34 34 50	·45	+ ·03
	γ^2 Ceti	38 15·14	+ ·23	+ ·29	+ ·24	·00	– ·02	15·88	38 20·39	·51	– ·03
W	γ Arietis	46 07·73	+ ·21	+ ·36	– ·25	·00	– ·02	08·03	46 12·47	·44	+ ·04
	ϵ Arietis	53 39·64	+ ·18	+ ·39	– ·26	+ ·01	– 02	39·94	53 44·39	·45	+ ·03
	μ Horologii	3 01 17·79	+ ·69	– ·27	– ·48	+ ·01	– ·03	17·71	3 01 22·13	·42	+ ·06
	τ^1 Arietis	15 37·40	+ ·17	+ ·40	– ·26	+ ·02	– ·02	37·71	15 42·18	·47	+ ·01
	o Tauri	19 34·81	+ ·23	+ ·32	– 24	+ ·03	– 02	35·13	19 39·82	·69	– ·21

$a = -{}^{s}\cdot 420 \qquad c = +{}^{s}\cdot 239$

Chronometer correction at $2^h\ 43^m = +4^s\cdot 479 \pm {}^{s}\cdot 029$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
W	α Reticuli	4 13 08·89	+ ·76	– ·21	– 73	– ·03	– ·03	08·65	4 13 13·29	+4·64	+ ·05
	ϵ Tauri	22 57·33	+ ·20	+ ·25	– ·36	– ·02	– ·02	57·38	23 01·93	·55	+ ·14
	α Tauri	30 21·16	+ ·21	+ ·23	– ·35	– ·02	– ·02	21·21	30 25·99	·78	– ·09
	τ Tauri	36 25·56	+ ·18	+ ·26	– ·36	– ·01	– ·02	25·61	36 30·33	·72	– ·03
	μ Eridani	40 38·47	+ ·29	+ ·16	– ·34	– ·01	– ·02	38·55	40 43·32	·77	– ·08
E	ι Aurigæ	50 40·66	+ ·09	+ ·31	+ ·40	·00	– ·02	41·44	50 46·04	·60	+ ·09
	ϵ Leporis	5 01 19·67	+ ·30	+ ·10	+ ·36	+ ·01	– ·02	20·42	5 01 25·12	·70	– ·01
	β Orionis	09 51·20	+ ·25	+ ·15	+ ·34	+ ·01	– ·02	51·93	09 56·70	·77	– ·08
	β Bellatrix	19 54·80	+ ·20	+ ·20	+ ·34	+ ·02	– ·02	55·54	20 00·18	·64	+ ·05
	β Doradûs	32 44·56	+ ·59	– ·21	+ ·73	+ ·03	– ·03	45·67	32 50·36	·69	·00

$a = -{}^{s}\cdot 268 \qquad c = +{}^{s}\cdot 336$

Chronometer correction at $4^h\ 53^m = +4^s\cdot 687 \pm {}^{s}\cdot 023$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: WELLINGTON. Date, January 10th, 1904. Observer: Thos. King.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R.A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·012	s.		h. m. s.	s.	s.
E	o^1 Eridani......	4 06 29·16	− ·07	+ ·38	+ ·17	+ ·01	− ·02	29·63	4 07 11·76	+42·13	+ ·01
	ε Tauri........	22 18·96	− ·05	+ ·61	+ ·18	+ ·01	− ·02	19·69	23 01·92	42·23	− ·09
	α Doradûs.....	31 15·00	− ·15	− ·28	+ ·30	+ ·01	− ·03	14·85	31 56·83	41·98	+ ·16
	π^1 Orionis.......	43 56·04	− ·06	+ ·50	+ ·17	+ ·01	− ·02	56·64	44 38·95	42·31	− ·17
W	κ Orionis.......	5 42 31·39	− ·02	+ ·35	− ·17	·00	− ·02	31·53	5 43 13·60	42·07	+ ·07
	1 Geminorum..	57 36·16	− ·01	+ ·65	− ·19	− ·01	− ·02	36·58	58 18·65	42·07	+ ·07
	α Argûs........	6 21 09·83	− ·03	− ·22	− ·28	− ·01	− ·03	09·26	6 21 51·57	42·31	− ·17
	γ Geminorum..	31 29·16	− ·01	+ ·59	− ·18	− ·01	− ·02	29·53	32 11·52	41·99	+ ·15

$a = -^s·665 \qquad c = +^s·173$

Chronometer correction at $5^h\ 18^m = +42^s·135 \pm {}^s·050$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station: WELLINGTON. Date, January 11th, 1904. Observer: THOS KING.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s r = − ·024	s.		h. m. s.	s.	s.
E	ε Geminorum...	6 37 20·13	+ ·02	+ ·83	+ ·14	+ ·02	− ·02	21·12	6 38 03·20	+42·08	− ·14
	ε Canis Majoris.	54 10·46	+ ·08	+ ·20	+ ·14	+ ·01	− ·02	10·87	54 52·89	42·02	− ·08
	δ Geminorum...	7 13 42·19	+ ·05	+ ·80	+ ·13	+ ·01	− ·02	43·16	7 14 24·99	41·83	+ ·11
	Q Carinæ........	32 37·73	+ ·11	− ·25	+ ·20	·00	− ·03	37·76	33 19·64	41·88	+ ·06
W	ζ Argûs........	59 32·86	+ ·20	+ ·02	− ·16	− ·01	− ·02	32·89	8 00 14·68	41·79	+ ·15
	ε Argûs.......	8 19 54·36	+ ·29	− ·49	− ·24	− ·02	− ·03	53·87	20 35·89	42·02	− ·08

$a = -^s·817 \qquad c = +^s·122$

Chronometer correction at $7^h\ 28^m = +41^s·935 \pm {}^s·044$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : WELLINGTON. Date, January 10th, 1904. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
			s.	s.	s.	s. r = −·012	s.		h. m. s.	s.	s.
E	η Tauri........	3 41 05·34	−·04	+·68	+·23	+·01	−·02	06·20	3 41 47·80	+41·60	−·01
	γ¹ Eridani....	52 51·95	−·08	+·32	+·22	+·01	−·02	52·40	53 33·95	·55	+·04
	ω¹ Tauri	4 02 53·18	−·05	+·63	+·23	+·01	−·02	53·98	4 03 35·55	·57	+·02
	α Reticuli.......	12 31·44	−·18	−·55	+·46	+·01	−·03	31·15	13 12·73	·58	+·01
	τ Tauri.........	35 47·83	−·04	+·67	+·23	·00	−·02	48·67	36 30·33	·66	−·07
W	ε Leporis......	5 00 43·65	−·06	+·25	−·23	·00	−·02	43·59	5 01 25·11	·52	+·07
	γ Orionis........	19 18·63	−·04	+·38	−·22	·00	−·02	18·73	20 00·27	·54	+·05
	β Doradûs	32 09·65	−·12	−·54	−·46	−·01	−·03	08·49	32 50·12	·63	−·04
	α Orionis..	49 18·02	−·04	+·52	−·22	−·01	−·02	18·25	49 59·91	·66	−·07
	η Geminorum ..	6 08 24·61	−·03	+·67	−·23	−·01	−·02	24·99	6 09 06·55	·56	+·03

$a = -{}^{s}\cdot689 \qquad c = +{}^{s}\cdot213$

Chronometer correction at $4^h\ 54^m = +41^s\cdot586 \pm {}^{s}\cdot014$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : WELLINGTON. Date, January 11th, 1904. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = −·012	s.		h. m. s.	s.	s.
E	γ Geminorum...	6 31 29·21	+·03	+·66	+·10	+·01	−·02	29·99	6 32 11·52	+41·53	−·01
	α Pictoris..	46 34·34	+·10	−·56	+·20	·00	−·03	34·05	47 15·57	·52	·00
	δ Canis Majoris.	7 03 49·06	+·05	+·22	+·10	·00	−·02	49·41	7 04 30·96	·55	−·03
	β Canis Minoris.	21 16·04	+·03	+·58	+·09	·00	−·02	16·72	21 58·21	·49	+·03
W	ξ Argûs	44 35·25	+·22	+·24	−·10	·00	−·02	35·59	45 17·11	·52	·00
	γ Argûs	8 05 55·34	+·31	−·11	−·14	−·01	−·02	55·37	8 06 36·89	·52	00

$a = -{}^{s}\cdot754 \qquad c = +{}^{s}\cdot093$

Chronometer correction at $7^h\ 15^m = +41^s\cdot521 \pm {}^{s}\cdot008$

Hence the weighted mean, King anticipates Klotz ${}^{s}\cdot257 \pm {}^{s}\cdot045$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 22nd, 1904. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·14	s.		h. m. s.	m. s.	s.
E	201	15 15 24·42	− ·06	+ ·03	− ·55	+ ·07	− ·02	23·89	15 11 39·88	−3 44·01	+ ·02
	203	24 40·21	− ·05	− ·18	−1·50	+ ·06	− ·05	38·49	20 54·52	43·97	− ·02
	205	27 38·81	− ·01	+ ·04	− ·53	+ ·04	− ·02	38·33	23 54·26	44·07	+ ·08
	206	31 15·42	+ ·01	+ ·01	− ·61	+ ·03	− ·02	14·84	27 30·80	44·04	+ ·05
	593	33 56·21	+ ·01	+ ·11	− ·47	+ ·03	− ·02	55·87	30 11·87	44·00	+ ·01
	212	43 18·88	+ ·04	+ ·08	− ·46	·00	− ·01	18·53	39 34·62	43·91	− ·08
W	217	51 12·67	− ·07	+ ·38	+2·23	− ·01	− ·07	15·13	47 31·16	43·97	− ·02
	221	16 09 30·30	+ ·04	·00	+ ·65	− ·06	− ·02	30·91	16 05 46·90	44·01	+ ·02
	222	13 05·02	+ ·02	− ·11	+ ·46	− ·07	− ·01	05·31	09 21·35	43·96	− ·03
	223	17 00·56	+ ·03	− ·11	+ ·46	− ·07	− ·01	00·86	13 16·98	43·88	− ·11
	225	21 27·09	+ ·05	− ·07	+ ·49	− ·08	− ·02	27·46	17 43·39	44·07	+ ·08
	473	24 45·19	+ ·05	− ·08	+ ·47	− ·09	− ·02	45·52	21 01·47	44·05	+ ·06

$a_1 = +^{s}\cdot121 \quad a_2 = -^{s}\cdot146 \quad c = -^{s}\cdot460$

Chronometer correction at $15^h\ 45^m = -3^m\ 43^s\cdot993 \pm {}^{s}\cdot014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	229	16 31 55·52	+ ·15	− ·02	+1·07	+ ·07	− ·04	56·75	16 28 12·76	−3 43·99	− ·10
	230	34 46·33	+ ·08	·00	+ ·52	+ ·06	− ·02	46·97	31 02 78	44·19	+ ·10
	231	41 25·98	+ ·07	·00	+ ·45	+ ·04	− ·02	26·52	37 42·44	44·08	− ·01
	232	43 22·17	+ ·08	·00	+ ·50	+ ·04	− ·02	22·77	39 38·59	44·18	+ ·09
	478	51 28·60	+ ·05	+ ·01	+ ·40	+ ·02	− ·02	29·06	47 45·00	44·06	− ·03
	233	56 53·44	+ ·05	+ ·01	+ ·39	+ ·01	− ·01	53·89	53 09·87	44·02	− ·07
E	234	17 00 23·71	+ ·15	·00	− ·45	·00	− ·02	23·39	56 39·36	44·03	− ·06
	598	08 39·67	+ ·07	+ ·01	− ·40	− ·02	− ·02	39·31	17 04 55·12	44·19	+ ·10
	236	12 18·13	+ ·31	− ·01	− ·94	− ·03	− ·04	17·42	08 33·37	44·05	− ·04
	238	14 52·23	+ ·14	·00	− ·42	− ·03	− ·02	51·90	11 07·73	44·17	+ ·08
	241	34 15·59	+ ·12	+ ·01	− ·39	− ·08	− ·02	15·23	30 31·18	44·05	− ·04

$a = +^{s}\cdot015 \qquad c = -^{s}\cdot384$

Chronometer correction at $17^h\ 00^m = -3^m\ 44^s\cdot095 \pm {}^{s}\cdot016$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 22nd, 1904. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r= − ·14	s.		h. m. s.	m. s.	s.
E	201	15 15 23·01	·00	+ ·16	+ ·42	+ ·07	− ·02	23·64	15 11 39·88	-3 43·76	− ·09
	203	24 38·22	+ ·08	−1·01	+1·15	+ ·06	− ·05	38·45	20 54·52	·93	+ ·08
	205	27 37·37	+ ·04	+ ·22	+ ·40	+ ·04	− ·02	38·05	23 54·26	·79	− ·06
	206	31 13·94	+ ·05	+ ·07	+ ·47	+ ·03	− ·02	14·54	27 30·80	·74	− ·11
	593	33 54·74	+ ·03	+ ·61	+ ·36	+ ·03	− ·02	55·75	30 11·87	·88	+ ·03
	212	43 17·73	+ ·04	+ ·43	+ ·36	·00	− ·01	18·55	39 34·62	·93	+ ·08
W	217	51 19·60	− ·99	−1·79	−1·71	− ·01	− ·07	15·03	47 31·16	·87	+ ·02
	221	16 09 31·58	− ·35	+ ·01	− ·50	− ·06	− ·02	30·66	16 05 46·90	·76	− ·09
	222	13 05·37	− ·16	+ ·51	− ·35	− ·07	− ·01	05·29	09 21·35	·94	+ ·09
	223	17 00·95	− ·16	+ ·53	− ·35	− ·07	− ·01	00·89	13 16·98	·91	+ ·06
	225	21 27·68	− ·23	+ ·32	− ·37	− ·08	− ·02	27·30	17 43·39	·91	+ ·06
	473	24 45·63	− ·21	+ ·36	− ·36	− ·09	− ·02	45·31	20 01·47	·84	− ·01

$a = +^{s}\cdot685$ $c = +^{s}\cdot352$

Chronometer correction at $15^{h}\ 45^{m} = -3^{m}\ 43^{s}\cdot855 \pm {}^{s}\cdot016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	229	16 31 59·09	− ·53	− ·67	− ·99	+ ·07	− ·04	56·93	16 28 12·76	-3 44·17	+ ·14
	230	34 47·44	− ·32	+ ·04	− ·48	+ ·06	− ·02	46·72	31 02·78	43·94	− ·09
	231	41 26·80	− ·27	+ ·17	− ·41	+ ·04	− ·02	26·31	37 42·44	43·87	− ·16
	232	43 23·23	− ·30	+ ·08	− ·46	+ ·04	− ·02	22·57	39 38·59	43·98	− 05
	478	51 29·28	− ·21	+ ·32	− ·37	+ ·02	·00	29·04	47 45·00	44·04	+ ·01
	233	56 54·12	− ·19	+ ·36	− ·36	+ ·01	− ·01	53·93	53 09·87	44·06	+ ·03
E	234	17 00 22·72	+ ·08	+ ·18	+ ·41	·00	− ·02	23·37	56 39 36	44·01	− ·02
	598	08 38·33	+ ·04	+ ·55	+ ·37	− ·02	− ·02	39·25	17 04 55 12	44·13	+ ·10
	236	12 16·95	+ ·16	− ·52	+ ·87	− ·03	− ·04	17·39	08 33·37	44·02	− ·01
	238	14 51·07	+ ·07	+ ·24	+ ·39	− ·03	− ·02	51·72	11 07·73	43·99	− ·04
	241	34 14·58	+ ·06	+ ·34	+ ·36	− ·08	− ·02	15·24	30 31·18	44·06	+ ·03
	600	35 51·41	+ ·04	+ ·55	+ ·37	− ·08	− ·02	52·27	32 08·19	44·08	+ ·05

$a = +^{s}\cdot607$ $c = +^{s}\cdot354$

Chronometer correction at $17^{h}00^{m} = -3^{m}\ 44^{s}\cdot033 \pm {}^{s}\cdot017$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 23rd, 1904. Observer : F. W. O. WERRY.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
		h. m. s.	s.	s.	s.	s. r = − ·14	s.		h. m. s.	m. s.	s.
E	182..	13 53 55·41	− 06	+ ·10	− ·10	+ ·07	− ·02	55·40	13 50 08·45	-3 46·95	− ·03
	183.	14 00 34·36	− ·06	+ ·15	− ·09	+ ·06	− ·01	34·41	56 47·49	46·92	− ·06
	184.............	05 35·98	− ·09	− ·17	− ·21	+ ·04	− ·04	35 51	14 01 43·40	47 11	+ ·13
	458.	09 49·88	− ·03	+ ·08	− ·10	+ ·04	− ·02	49·85	06 02·91	46·94	− ·04
	185....	11 35·40	− ·02	+ ·19	− ·09	+ ·03	− ·02	35·49	07 48·52	46·97	− ·01
	186.............	14 47·63	− ·03	+ ·17	− ·09	+ ·02	− ·01	47·69	11 00·80	46·89	− ·09
	188.............	16 32·66	− ·01	− ·01	− ·13	+ ·02	− ·02	32·51	12 45·53	46·98	·00
W	191......	27 04·14	+ ·02	+ ·16	+ ·09	·00	− ·01	04 40	23 17·40	47·00	+ ·02
	192....	31 30·19	+ ·02	+ ·07	+ ·10	− ·02	− ·02	30·34	27 43·27	47·07	+ ·09
	194.............	40 01·55	+ ·03	+ ·11	+ ·09	− ·03	− ·02	01·73	36 14·78	46·95	− ·03
	196..	41 48·98	+ ·02	+ 17	+ ·09	− ·04	− ·01	49·21	38 02·18	47·03	+ ·05
	197....	45 12·65	+ ·02	+ ·15	+ ·09	− ·05	− ·02	12·84	41 25·77	47·07	+ ·09
	198..........	54 47·21	+ ·10	− ·41	− ·31	− ·07	− ·06	47·11	51 00.20	46·91	− ·07

$a = +^{s}\cdot223 \qquad c = -^{s}\cdot09$

Chronometer correction at $14^{h}\ 25^{m} = -3^{m}\ 46^{s}\cdot983 \pm {}^{s}\cdot014$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	r.
W	465...	15 04 08·92	+ ·06	− 01	− ·10	+ ·07	− ·02	09·12	15 00 21·83	-3 47·29	+ ·08
	201.	15 26·91	+ ·08	− ·01	+ ·11	+ ·04	− ·02	27·11	11 39·87	·24	+ ·03
	203.............	24 41·10	+ ·22	+ ·05	+ ·30	+ ·02	− ·05	41·64	20 54·47	·17	− ·04
	205.............	27 41·31	+ ·08	− ·01	+ ·11	− ·02	− ·02	41·49	23 54·25	·24	+ ·03
	206	31 17·88	+ ·12	·00	− ·11	+ ·01	− ·02	18 10	27 30·80	·30	+ ·09
E	212.	43 21·80	+ ·11	− ·02	− ·09	− ·01	− ·01	21·78	39 34·61	·17	− ·04
	213.............	45 34·84	+ ·13	− ·01	− ·10	− ·03	− ·0[illegible]	34·81	41 47·60	·21	·00
	215....	48 14·47	+ ·13	− ·01	− ·10	− ·03	− ·02	14 44	44 27·29	·15	− .06
	217.	51 18·23	+ ·57	+ ·08	− ·45	− ·04	− ·07	18·32	47 31·10	·22	+ ·01
	221.............	16 09 34·10	+ ·21	·00	− ·13	− ·08	− ·0[illegible]	34·08	16 05 46·89	·19	− ·02
	222.............	13 08·58	+ ·10	− ·02	− ·09	− 08	− ·01	08·48	09 21·34	·14	− ·07

$a = -^{s}\cdot030 \qquad c = -^{s}\cdot093$

Chronometer correction at $15^{h}\ 30^{m} = -3^{m}\ 47^{s}\cdot210 \pm {}^{s}\cdot012$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 23rd, 1904. Observer : OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·14	s.		h. m. s.	m. s.	s.
E	183.	14 00 33·77	+ ·04	+ ·52	+ ·03	+ ·06	− ·01	34·41	13 56 47·49	-3 46·92	+ ·05
	184.	05 35·71	+ ·11	− ·59	+ ·07	+ ·04	− ·04	35·30	14 01 48·40	·90	+ ·03
	458.	09 49·35	+ ·06	+ ·29	+ ·03	+ ·04	− ·02	49·75	06 02·91	·84	− 03
	185.	11 34·71	+ ·03	+ ·63	+ ·03	+ ·03	− 02	35·41	07 48 52	·89	+ ·02
	186.	14 47·07	+ ·04	+ ·59	+ ·03	+ ·02	− ·01	47·74	11 00·80	·94	+ ·07
	188.	16 32·21	+ ·10	− ·02	+ ·04	+ ·02	− ·02	32 33	12 45·53	·80	− ·07
W	191.	27 03·85	− ·12	+ ·55	− ·03	·00	− ·01	04.24	23 17·40	·84	− 03
	192.	31 30·20	− ·22	+ ·23	− ·03	− ·01	− ·02	30·15	27 43·27	·88	+ ·01
	194.	40 01·39	− ·16	+ ·38	− ·03	− ·03	− ·02	01·53	36 14 78	·75	− ·12
	196.	41 48·72	− ·11	+ ·59	− ·03	− ·04	− ·01	49·12	38 02·18	·94	+ ·07
	197.	45 12·38	− ·13	+ ·51	− ·03	− ·05	− ·02	12·66	41 25·77	·89	+ ·02
	198	54 49·27	− ·57	−1·37	− ·11	− ·07	− 06	47·09	51 00·20	·89	+ ·02

$a = +^{s}\cdot755$ $c = +^{s}\cdot027$

Chronometer correction at $14^{h}\ 25^{m} = -3^{m}\ 46^{s}\cdot872 \pm {}^{s}\cdot013$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	199.	15 02 08·65	− ·23	+ ·09	+ ·02	+ ·07	− ·02	08·58	14 58 21·56	-3 47·02	− ·05
	465.	04 08·70	− ·18	+ ·29	+ ·02	+ ·07	− ·02	08·88	15 00 21·83	·05	− ·02
	201.	15 26·88	− ·20	+ ·20	+ ·02	+ ·04	− ·02	26·92	11 39·87	·05	− ·02
	203.	24 43·30	− ·51	−1·23	+ ·05	+ ·02	− ·05	41·58	20 54·47	·11	+ ·04
	205.	27 41 20	− ·19	+ ·27	+ ·02	+ ·02	− ·02	41·30	23 54·25	·05	− ·02
	206.	31 17·98	− .23	+ ·08	+ ·02	+ ·01	− 02	17·84	27 30·80	·04	− ·03
E	212.	43 21·14	+ ·11	+ ·52	− ·02	− ·01	− ·01	21·73	39 34·61	·12	+ ·05
	213.	45 34·20	+ ·12	+ ·42	− ·02	− ·03	− 02	34·67	41 47·60	.07	·00
	215.	48 13·87	+ ·13	+ ·40	− ·02	− ·03	− ·02	14·33	44 27·29	·04	− ·03
	217	51 19·96	+ ·55	−2·18	− ·08	− ·04	− ·07	18·14	47 31·10	·04	− ·03
	222.	16 13 07·91	+ ·09	+ ·62	− ·02	− ·08	− ·01	08·51	16 09 21·34	·17	+ ·10

$a = +^{s}\cdot834$ $c = -^{s}\cdot016$

Chronometer correction at $15^{h}\ 30^{m} = -3^{m}\ 47^{s}\cdot073 \pm {}^{s}\cdot010$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 24th, 1904. Observer : F. W. O. WERRY

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v
		h. m. s.	s.	s.	s.	s. r = − ·14	s.		h. m. s.	m. s.	s.
E.	182..	13 53 58·65	− ·08	+ ·07	− ·09	+ ·07	− ·02	58·60	13 50 08·44	-3 50·16	− ·10
	183............	14 00 37·69	− ·05	+ ·10	− ·09	+ ·06	− ·01	37·70	56 47·48	·22	− ·04
	184..	05 39·18	− ·12	− ·11	− ·21	+ ·05	− ·04	38·75	14 01 48·36	·39	+ ·13
	458.............	09 53·22	− ·02	+ ·06	− ·10	+ ·04	− ·02	53·18	06 02·90	·28	+ ·02
	185.....	11 38·66	− ·02	+ ·12	− ·09	+ ·03	− ·02	38·68	07 48·51	·17	− ·09
	186.......... ...	14 51·00	− ·01	+ ·11	− ·09	+ ·02	− ·01	51·02	11 00·80	·22	− ·04
W	192..	31 33·55	− ·08	+ ·04	+ ·10	− ·01	− ·02	33·58	27 43·26	·32	+ ·06
	194.....	40 04·91	− ·06	+ ·07	+ ·09	− ·03	− ·02	04·96	36 14·78	·18	− ·08
	196...........	41 52·38	− ·03	+ ·11	+ ·09	− ·04	− ·01	52·50	38 02·17	·33	+ ·07
	197.............	45 15·97	− ·03	+ ·10	+ ·09	− ·05	− ·02	16·06	41 25·76	·30	+ ·04
	590.............	49 26·65	− ·02	+ ·13	+ ·09	− ·06	− ·02	26·77	45 36·38	·39	+ ·13
	198..	54 50·50	− ·09	− ·27	+ ·34	− ·07	− ·06	50·35	51 00·14	·21	− ·05

$a = +^{s}\cdot146$ $c = -^{s}\cdot088$

Chronometer correction at $14^{h}\ 25^{m} = -3^{m}\ 50^{s}\cdot266 \pm {}^{s}\cdot016$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v
W	465.......	15 04 12·25	− ·02	+ ·06	+ ·11	+ ·09	− ·02	12·47	15 00 21·82	-3 50·65	+ ·06
	201.......	15 30·25	− ·01	+ ·04	+ ·10	+ ·07	− ·02	30·43	11 39·86	·57	− ·02
	467........... ..	17 24·26	·00	− ·18	+ ·23	+ ·06	− ·04	24·33	13 33·81	·52	− ·07
	202........... ..	24 44·19	·00	+ ·03	+ ·11	+ ·04	− ·02	44·35	20 53·73	·62	+ ·03
	205.....	27 44·58	·00	+ ·06	+ ·10	+ ·04	− ·02	44·76	23 54·24	·52	− ·07
	206....	31 21·36	·00	+ ·02	+ ·11	+ ·03	− ·02	21·50	27 30·79	·71	+ ·12
E	212..	43 25·15	+ ·07	+ ·12	− ·09	·00	− ·01	25·24	39 34·61	·63	+ ·04
	213..	45 38·15	+ ·08	+ ·09	− ·09	·00	− ·02	38·21	41 47·60	·61	+ ·02
	215.............	48 17·85	+ ·08	+ ·09	− ·09	− ·01	− ·02	17·90	44 27·28	·62	+ ·03
	217.......	51 22·22	+ ·37	− ·48	− ·42	− ·02	− ·07	21·60	47 31·03	·57	− ·02
	597......	16 35 45·46	+ ·06	+ ·15	− ·09	− ·12	− ·02	45·44	16 31 54·98	·46	− ·13
	232..	43 29·27	+ ·15	+ ·03	− ·11	− ·14	− ·02	29·18	39 38·58	·60	+ ·01

$a = +^{s}\cdot184$ $c = -^{s}\cdot087$

Chronometer correction at $15^{h}\ 40^{m} = -3^{m}\ 50^{s}\cdot589 \pm {}^{s}\cdot015$

PERSONAL EQUATION.

TRANSIT OBSERVATIONS.

Station : OTTAWA. Date, June 24th, 1904. Observer: OTTO KLOTZ.

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
		h. m. s.	s.	s.	s.	s. r = − ·14	s.		h. m. s.	m. s.	s.
E	182	13 53 58·05	+·16	+·39	−·06	+·07	−·02	58·59	13 50 08·44	−3 50·15	−·05
	183	14 00 37·02	+·13	+·57	−·06	+·06	−·01	37·71	56 47·48	·23	+·02
	184	05 38·91	+·44	−·65	−·13	+·05	−·04	38·58	14 01 48·36	·22	+·01
	458	09 52·58	+·22	+·32	−·06	+·04	−·02	53·08	06 02·90	·18	−·03
	185	11 37·99	+·12	+·69	−·06	+·03	−·02	38·75	07 48·51	·24	+·03
	186	14 50·28	+·14	+·65	−·06	+·02	−·01	51·02	11 00·80	·22	+·01
W	192	31 33·29	−·16	+·25	+·07	−·01	−·02	33·42	27 43·26	·16	−·05
	194	40 04·59	−·13	+·42	+·06	−·03	−·02	04·89	36 14·78	·11	−·10
	196	41 51·87	−·09	+·65	+·06	−·04	−·01	52·44	38 02·17	·27	+·06
	197	45 15·55	−·11	+·57	+·06	−·05	−·02	16·00	41 25·76	·24	+·03
	198	54 52·26	−·47	−1·51	+·21	−·07	−·06	50·36	51 00·14	·22	+·01
	199	15 02 11·92	−·19	−·09	+·07	−·08	−·02	11·79	58 21·55	·24	+·03

$a = +^{s}\cdot831$ $c = -^{s}\cdot057$

Chronometer correction at $14^{h}\ 25^{m} = -3^{m}\ 50^{s}\cdot206 \pm {}^{s}\cdot011$

Clamp.	Star.	Transit over mean of threads.	Level and inequality of pivots.	Azimuth.	Collimation.	Rate.	Aberration.	Seconds of corr. transit.	R. A.	Chronometer correction.	v.
W	465	15 04 11·94	−·10	+·30	+·03	+·09	−·02	12·24	15 00 21·82	−3 50·42	·00
	201	15 30·12	−·11	+·21	+·04	+·07	−·02	30·31	11 39·86	·45	+·03
	467	17 25·28	−·24	−·86	+·08	+·06	−·04	24·28	13 33·81	·47	+·05
	202	24 44·02	−·12	+·15	+·04	+·04	−·02	44·11	20 53·73	·38	−·04
	205	27 44·40	−·11	+·27	+·03	+·04	−·02	44·61	23 54·24	·37	−·05
	206	31 21·19	−·13	+·09	+·04	+·03	−·02	21·20	27 30·79	·41	−·01
E	212	43 24·42	−·18	+·54	−·03	·00	−·01	25·10	39 34·61	·49	+·07
	213	45 37·46	+·21	+·44	−·03	·00	−·02	38·06	41 47·60	·46	+·04
	215	48 17.20	+·21	+·41	−·03	−·01	−·02	17·76	44 27·28	·48	+·06
	217	51 23.00	+·93	−2·25	−·15	−·02	−·07	21·44	47 31·03	·41	−·01
	597	16 35 44·70	+·13	+·72	−·03	−·12	−·02	45·38	16 31 54·98	·40	−·02
	232	43 28·68	+·29	+·12	−·04	−·14	−·02	28·89	39 38·58	·31	−·11

$a = +^{s}\cdot858$ $c = -^{s}\cdot030$

Chronometer correction at $15^{h}\ 40^{m} = -3^{m}\ 50^{s}\cdot426 \pm {}^{s}\cdot012$

PERSONAL EQUATION.

KLOTZ—WERRY.

Date.	Clock Correction.				K − W
	Klotz.		Werry.		
1904.	m. s.	s.	m. s.	s.	s.
June 22	−3 43·855	±·016	−3 43·993	±·014	+·138
" 22	44·033	±·017	44·095	±·016	+·062
" 23	46·872	±·013	46·983	±·014	+·111
" 23	47·073	±·010	47·210	±·012	+·137
" 24	50·206	±·011	50·266	±·016	+·060
" 24	50·426	±·012	50·589	+·015	+·163

	s.	s.
Weighted mean	+·116	±·011
Klotz transit west of Werry's	+·008	
Klotz anticipates Werry	·124	±·011

DIFFERENCE OF LONGITUDE.

From the preceding observations and their clock corrections combined with the times of exchange, we obtain the following differences of longitude between the successive stations, and subsequent final values.

The Canadian longitude values are based on the longitude of

Montreal. . . . . $4^{h.}$ $54^{m.}$ $18·634^{sec.} \pm ·049^{sec.}$

Ottawa was connected in 1896 with Montreal, the observers, Dr. King and Prof. McLeod, exchanging stations and the value obtained

Ottawa. . . . . $5^{h.}$ $02^{m.}$ $50·022^{sec.} \pm ·049^{sec.}$

In 1900 Vancouver was connected by a direct circuit of 3,000 miles with Ottawa. The observers, Dr. King and Dr. Klotz, exchanging stations also.

Vancouver. . . . . $8^{h.}$ $12^{m.}$ $28·368^{sec.} \pm ·050^{sec.}$

This last value is the initial one for the Transpacific longitudes

DIFFERENCE OF LONGITUDE.

VANCOUVER—FANNING.

Date.	Direction.	Sidereal Time. Bamfield.	Sidereal Time. Vancouver.	Difference.	Relative rate per hour.	Transmission time.	Chronometer Correction. Vancouver.	Chronometer Correction. Fanning.	Difference from Bamfield Chronometer.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	m. s.	h. m. s.
April 15	B. to V.........	12 13·98	12 11·80	-0 02 10·585					
	V. to B	12 15·59	12 13·41	10·672	.....	·039			
	Mean...........	12 14 79	12 12·61	0 02 10 629					
	B. to V	12 48·70	12 46·50	0 02 10·771					
	V. to B...... .	12 49·90	12 47·70	10·891	......	·056			
	Mean	12 49 30	12 47 10	0 02 10·831					
	General Mean	12 32·05	12 29·85	0 02 10·730	·351				
	*	12 28·55	....	0 02 10·710	. ..	.....	-47·253	....	-0 02 57·963
		Bamfield.	Fanning.						
	B. to F.........	12 27·40	9 58·10	2 29 19·073					
	F. to B.	12 29·70	10 00·40	19 771	·410	·341			
	Mean...........	12 28·55	9 59·25	2 29 19·422	.. ..	....	....	+1 15·780	+2 28 03·642

h. m. s.
Difference of longitude, Vancouver-Fanning...... .... +2 25 05·679

* Note.—As explained in the text, Bamfield was simply used as an exchange station and no observations were made there. The exchange Bamfield-Vancouver was over a land line, while Bamfield-Fanning was over the cable. The difference of the two exchanges Bamfield-Vancouver, made before and after the Fanning exchange, was reduced to the mean time of exchange with Fanning by applying the rates of the Bamfield and Vancouver chronometers, the latter was known from the observations, while the former was obtained from the differential rate, shown by the two exchanges, and the Vancouver rate.

Date.	Direction.	Sidereal Time. Bamfield.	Sidereal Time. Vancouver.	Difference.	Relative rate per hour.	Transmission time.	Chronometer Correction. Vancouver.	Chronometer Correction. Fanning.	Difference from Bamfield Chronometer.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	s.	h. m. s.
April 16	B. to V	12 12·78	12 10·46	0 02 19·029					
	V. to B	12 14 50	12 12·30	19·132	......	·047			
	Mean....	12 13·64	12 11·38	0 02 19·081					
	B. to V	12 50·50	12 48·20	0 02 19·211					
	V. to B.........	12 51·94	12 49·62	19·310	......	·046			
	Mean..........	12 51·22	12 48·91	0 02 19·261					
	General Mean	12 32·43	12 30·15	0 02 19 171	·286				
		12 42·33	....	0 02 19·218	....	......	-45·624	....	-0 03 04 842
		Bamfield.	Fanning.						
	B. to F.........	12 41·25	10 11 70	2 29 29·688					
	F. to B..	12 43·40	10 13·90	30·372	·419	·335			
	Mean....	12 42·33	10 12·80	2 29 30·030	.....	......	....	+1 19·622	+2 28 10·408

h. m. s.
Difference of longitude, Vancouver-Fanning..... .... +2 25 05·566

Date.	Direction.	Sidereal Time. Bamfield.	Sidereal Time. Vancouver.	Difference.	Relative rate per hour.	Transmission time.	Chronometer Correction. Vancouver.	Chronometer Correction. Fanning.	Difference from Bamfield Chronometer.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	m. s.	h. m. s.
April 18	B. to V	12 13·95	12 11·40	0 02 33·577					
	V. to B	12 15 60	12 13·05	33·677	....	·047			
	Mean	12 14·78	12 12·23	0 02 33·627					
	B. to V	12 45·85	12 43·30	0 02 33·709					
	V. to B	12 47·11	12 44·55	33·801	...	·039			
	Mean....	12 46·48	12 43·93	0 02 33·755					
	General Mean	12 30 63	12 28·08	0 02 33·691	·241				
		12 36·55	....	0 02 33 714	.....	....	−43·349	....	−0 03 17·063
		Bamfield.	Fanning.						
	B. to F	12 35·50	10 04·80	2 30 48·373					
	F. to B	12 37·60	10 06·80	49·046	·434	·329			
	Mean..	12 36·55	10 05·80	2 30 48·710	......	....	....	+2 26·102	+2 28 22·608

h. m. s,
Difference of longitude, Vancouver-Fanning. .... +2 25 05·545

Date.	Direction.	Sidereal Time. Bamfield.	Sidereal Time. Vancouver.	Difference.	Relative rate per hour.	Transmission time.	Chronometer Correction. Vancouver.	Chronometer Correction. Fanning.	Difference from Bamfield Chronometer.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	s.	h. m. s.
April 23	B. to V	12 28·90	12 25·70	0 03 11·912					
	V. to B'...	12 30·30	12 27·10	12·027	...	·054			
	Mean	12 29·60	12 26·40	0 03 11·970					
	B. to V.........	12 50·30	12 47·10	0 03 12·025					
	V. to B	12 51·80	12 48·60	12·127	......	·048			
	Mean.... ...	12 51·05	12 47·85	0 03 12·076					
	General Mean	12 40·33	12 37·13	0 03 12·023	·297				
		12 40·35	....	0 03 12·023	.. .	...	−34·541	....	−0 63 46·564
		Bamfield.	Fanning.						
	B. to F.........	12 39·40	10 09·80	2 29 37·974					
	F. to B.........	12 41·30	10 11 70	38·682	·386	·348			
	Mean	12 40·35	10 10 75	2 29 38·328	....	......	....	+46·272	+2 28 52·05

h. m. s.
Difference of longitude, Vancouver-Fanning....... .... +2 25 05·492

Date.	Direction.	Sidereal Time. Bamfield.	Sidereal Time. Vancouver.	Difference.	Relative rate per hour.	Transmission time.	Chronometer Correction. Vancouver.	Chronometer Correction. Fanning.	Difference from Bamfield Chronometer.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	s.	h. m. s.
April 26	B. to V	13 05·97	13 02·42	0 03 33·040					
	V. to B	13 07·30	03·74	33·137	......	·045			
	Mean	13 06·64	13 03·08	0 03 33·089					
	B. to V	13 29·50	13 25·94	0 03 33·157					
	V. to B	13 30·90	27·34	33·228	....	·032			
	Mean	13 30·20	13 26·64	0 03 33·193					
	General Mean	13 18·42	13 14·86	0 03 33·141	·265				
		13 19·00	....	0 03 33·143	....	..	−29·390	....	−0 04 02·533
		Bamfield.	Fanning.						
	B. to F	13 18·00	10 47·90	2 30 06·793					
	F. to B.......	13 20·00	10 49·90	07·519	·331	·357			
	Mean	13 19·00	10 48·90	2 30 07·156	. .	....	....	+59·140	+2 29 08·016

	h. m. s.
Difference of longitude, Vancouver–Fanning......	+2 25 05·483

VANCOUVER–FANNING.

1903.		h. m. s.	s.
April 15	Difference of longitude.........	2 25 05·679±	·019
" 16	"	5·566±	·016
" 18	"	5·545±	·025
" 23	"	5·492±	·010
" 26	"	5·483±	·015
	Weighted Mean	2 25 05·530±	·021
	Personal Equation............	−·124	
	Difference of Longitude..........	2 25 05·406±	·021
	Vancouver	8 12 28·368±	·050
	Longitude of Fanning.......	10 37 33·774±	·054

FANNING—SUVA.

Date.	Direction.	Sidereal Time. Fanning.	Sidereal Time. Suva.	Difference.	Relative rate per interval.	Transmission time.	Chronometer Correction. Fanning	Chronometer Correction. Suva.	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	m. s	h. m. s.
June 2, 3	F. to S......	15 43·5	14 18·0	1 25 29·641					
	S. to F......	15 45·9	14 20·4	30·196	+ ·007	·281			
	Mean.....	15 44·7	14 19·2	1 25 29·919	......	.....	−14·333	−3 28·085	1 28 43·671
" 3, 4	F. to S......	15 49·9	14 24·5	1 25 24·605					
	S. to F......	15 51·8	14 26·4	25·134	+ ·008	·269			
	Mean.....	15 50·85	14 25·45	1 25 24·870	...	......	−12·328	−3 31·132	43·674
" 8, 9	F. to S......	15 56·6	14 31·6	1 25 02·034					
	S. to F......	15 58·7	14 33·7	02·585	+ ·008	·280			
	Mean.....	15 57·65	14 32·65	1 25 02·310	......	.. ...	− 3·691	−3 45·124	43·743
" 9, 10	F. to S. ...	15 36·4	14 11·4	1 24 58·577					
	S. to F... .	15 38·2	14 13·2	59·157	+ ·006	·293			
	Mean.....	15 37·3	14 12·3	1 24 58·867	.. ...	......	− 2·541	−3 47·425	43·751
" 10, 11	F. to S.....	16 05·5	14 40·6	1 24 54·401					
	S. to F.....	16 07·5	14 42·6	54·962	+ ·007	·284			
	Mean.....	16 06·5	14 41·6	1 24 54·682	......	......	− 0·926	−3 49·954	43·710
" 15, 16	F. to S... .	16 46·1	15 21·5	1 24 34·187					
	S. to F.....	16 48·6	15 24·0	34·766	+ ·004	·291			
	Mean.....	16 47·35	15 22·75	1 24 34·477	......	... ..	+ 6·716	−4 02·519	43·712
" 21, 22	F. to S.. ..	16 47·1	15 22·9	1 24 12·284					
	S. to F. ...	16 48·9	15 24·7	12·812	+ ·004	·266			
	Mean.....	16 48·0	15 23·8	1 24 12·548	......	.... .	+14·836	−4 16·375	43·759
" 23, 24	F. to S.....	16 59·9	15 35·8	1 24 04·826					
	S. to F.....	17 01·7	15 37·6	05·400	+ ·006	·290			
	Mean....	17 00·8	15 36·7	1 24 05·113	......	......	+17·842	−4 20·767	43·722

Fanning—Suva.

		h. m. s.	s.
1903,			
June 2, 3..	Difference of longitude	1 28 43·671	± ·016
" 3, 4..	"	43·674	± ·013
" 8, 9..	"	43·743	± ·019
" 9, 10..	"	43·751	± ·017
" 10, 11..	"	43·710	± ·014
" 15, 16..	"	43·712	± ·016
" 21, 22..	"	43·759	± ·017
" 23, 24..	"	43·722	± ·021
	Weighted mean..	1 28 43·713	± ·008
	Personal equation....	+ ·124	
	Difference of longitude......	1 28 43·837	± .008
	Fanning....	10 37 33·774	± ·054
	Longitude of Suva	12 06 17·611	± ·055
	or east......	11 53 42·389	± ·055

SUVA—NORFOLK.

Date.	Direction.	Sidereal Time. Suva.	Sidereal Time. Norfolk.	Difference.	Relative rate.	Transmission time.	Chronometer Correction. Suva.	Chronometer Correction. Norfolk.	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	m. s.	m. s.
Aug. 14	N. to S.....	19 15·7	18 34·2	0 41 28·261					
	S. to N.....	19 17·5	18 36·0	27·994	+·006	·137			
	Mean. ...	19 16·6	18 35·1	41 28·128	......	......	−26·307	− 59·614	42 01·435
" 17	N. to S.....	19 09·0	18 27·8	41 09·356					
	S. to N....	19 11·0	18 29·9	9·060	+·003	·149			
	Mean.....	19 10·0	18 28·85	41 09·208	.....	.. .	−31·304	−1 23·475	01·379
" 19	N. to S.....	19 14·8	18 33·9	40 56·028					
	S. to N..	19 17·4	18 36·5	55·767	+·011	·136			
	Mean.....	19 16·1	18 35·2	40 55·898	.. ...	.....	−34·307	−1 39·750	01·341
" 22	N. to S	19 38·7	18 58·1	40 38·245					
	S. to N.....	19 40·7	19 00·1	37·978	+·006	·137			
	Mean.....	19 39·7	18 59·1	40 38·112	.....	.....	−38·877	−2 02·145	01·380
" 23	N. to S. .	20 03·8	19 23·3	40 32·221					
	S. to N.....	20 05·7	19 25·2	31·951	+·008	·139			
	Mean....	20 04·75	19 24·25	40 32·086	......	.....	−40·377	−2 09·653	01·362
" 27	N. to S.....	20 14·5	19 34·4	40 03·871					
	S. to N.....	20 16·5	19 36·4	03·581	+·009	·149			
	Mean....	20 15·5	19 35·4	40 03.726	. ...	.....	−42·931	−2 40·528	01·323

Suva—Norfolk.

		h. m. s. s.
1903.		
Aug. 14..	Difference of longitude	0 42 01·435 ± ·017
" 17..	"	01·379 ± ·018
" 19..	"	01·341 ± ·019
" 22..	"	01·380 ± ·014
" 23..	"	01·362 ± ·024
" 27..	"	01·323 ± ·013
	Weighted mean	0 42 01·367 ± ·011
	Personal equation	− ·124
	Difference of longitude	0 42 01·243 ± ·011
	Suva	11 53 42·389 ± ·055
	Longitude of Norfolk	11 11 41·146 ± ·055

NORFOLK—SOUTHPORT.

Date.	Direction.	Sidereal Time. Norfolk.	Sidereal Time. Southport	Difference.	Relative rate.	Transmission time.	Chronometer Correction. Norfolk.	Chronometer Correction. Southport	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	m. s.	m. s.	m. s.
Oct. 1	N. to S....	23 21·4	22 23·3	0 58 05·322					
	S. to N...	23 23·8	22 25·7	05·506	+·010	·097			
	Mean ...	23 22·6	22 24·5	58 05·414	.....	.....	− 27·353	− 23·174	58 01·235
" 3	N. to S....	22 54·9	21 57·0	57 55·332					
	S. to N....	22 56·5	21 58·6	55·524	+·003	·098			
	Mean....	22 55·7	21 57·8	57 55·428	.....	......	− 42·317	− 48·083	01·194
" 11	N. to S...	23 20·0	22 22·4	57 38·363					
	S. to N....	23 21·6	22 23·95	38·567	+·006	·105			
	Mean....	23 20·8	22 23·18	57 38·465	......	......	−1 54·659	−2 17·430	01·236
" 12	N. to S....	23 26·7	22 29·2	57 33·158					
	S. to N....	23 28·12	22 30·56	33·362	+·003	·104			
	Mean....	23 27·41	22 29·88	57 33·260	....	......	−2 01·112	−2 29·084	01·232
" 16	N. to S....	23 34·5	22 37·3	57 13·983					
	S. to N....	23 35·9	22 38·7	14·165	+·006	·094			
	Mean....	23 35·2	22 38·0	57 14·074	......	...	−2 27·886	−3 15·089	01·277

Norfolk–Southport.

1903.		h. m. s.	s.
Oct. 1	Difference of longitude	0 58 01·235±	·018
" 3	"	·194±	·019
" 11	"	·236±	·013
" 12	"	·232±	·014
16	"	·277±	·013
	Weighted Mean	0 58 01·240±	·008
	Personal Equation	+ ·124	
	Difference of Longitude	0 58 01·364±	·008
	Norfolk	11 11 41·146±	·056
	Longitude of Southport	10 13 39·782±	·056

SOUTHPORT—SYDNEY.

Date.	Direction.	Sidereal Time. South-port.	Sidereal Time. Sydney.	Difference.	Relative rate.	Transmission time.	Chronometer Correction. South-port.	Chronometer Correction. Sydney.	Personal Equation. K–R	Personal Equation. K–L	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	m. s.		s.	s.	m. s.
Sept. 29	Sy. to S..	22 49·4	22 40 6	0 08 50·208	− ·041	·142		Sydney Observatory applied its clock correction to time of exchange, and is included in column 'Difference'.			
	S. to Sy..	22 44 0	22 35·2	49·883							
	Mean..	22 46·7	22 37·9	8 50·046	....	......	+ 0·485		....	− ·018	8 50·513
Oct. 2	Sy. to S..	22 40·2	22 30·8	9 25·887	− ·050	·137					
	S. to Sy..	22 35·6	22 26·2	25·563							
	Mean..	22 37·9	22 28·5	9 25·725	...	...	− 35·181		+ ·067	...	50·611
" 3	Sy. to S..	22 52·42	22 42·76	9 39·158	− ·042	·146					
	S. to Sy..	22 47·85	22 38·20	38·824							
	Mean..	22 50·14	22 40·48	9 38·991	......	....	− 48·506		+ ·067	....	50·552
" 6	Sy. to S..	23 11·11	23 00·95	10 11·567	− ·061	·126					
	S. to Sy..	23 03·00	22 52·80	11·254							
	Mean..	23 07·06	22 56·87	10 11·410	....	....	− 1 20·948		....	− ·018	50·444
" 7	Sy. to S..	23 11·0	23 00·64	10 22·141	− ·041	·145					
	S. to Sy..	23 05·6	22 55·24	21·811							
	Mean..	23 08·3	22 57·94	10 21·976	......	....	− 1 31·543		+ ·067	......	50·500
" 8	Sy. to S..	23 22·15	23 11·60	10 33·821	− ·048	·141					
	S. to Sy..	23 16·88	23 06·32	33·492							
	Mean..	23 19·52	23 08·96	10 33·657	.....	......	− 1 43·281		+ ·067	.....	50·443

SOUTHPORT–SYDNEY.

1903.		h. m. s.	s.
Sept. 29..	Difference of longitude	0 08 50·513 ±	·029
Oct. 2..	"	·611 ±	·024
" 3..	"	·552 ±	·015
" 6..	"	·444 ±	·016
" 7..	"	·500 ±	·013
" 8..	"	·443 ±	·013
	Weighted Mean	0 08 50·495 ±	·016
	Southport	10 13 39·782 ±	·056
	Longitude of Sydney	10 04 49·287 ±	·058

SOUTHPORT—BRISBANE.

Date.	Direction.	Sidereal Time. South-port.	Sidereal Time. Brisbane.	Difference.	Relative rate.	Transmission time.	Chronometer Correction. South-port.	Chronometer Correction. Brisbane.	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	m. s.	s.	m. s.
Sept. 29	S. to B	21 57·63	21 55·33	0 02 18·607					
	B. to S	22 02·10	21 59·80	18·609	− ·031	neg.			
	Mean	21 59·87	21 57·57	2 18·608	....	......	·805	+45·726	1 33·688
Oct. 2	S. to B ..	22 07·60	22 04·66	2 55·699					
	B. to S	22 09·30	22 06·40	55·715	·017	·000			
	Mean	22 08·45	22 05·53	2 55·707	....	.....	− 34·882	+47·207	33·6
" 3	S. to B	22 08·30	22 05·15	3 09·733					
	B. to S ..	22 10·33	22 07·15	9·763	− ·016	·007			
	Mean	22 09·32	22 06·15	3 09·748	......	....	− 48·176	+47·963	33·609
" 6	S. to B	22 20·40	22 16·70	3 44·796					
	B. to S	22 25·78	22 22·03	44·829	·035	·000			
	Mean	22 23·09	22 19·37	3 44·813	....	...	1 20·656	+50·637	33·520
" 7	S. to B	22 33 86	22 29·92	3 56·396					
	B. to S	22 36·60	22 32 70	56·431	− ·019	·008			
	Mean	22 35·23	22 31·31	3 56·414	......	....	− 1 31·328	+51·504	33·582

Southport-Brisbane.

1903.		h. m. s.	s.
September 29..	Difference of longitude	0 01 33·688±	·018
October 2..	"	·618±	·015
" 3..	"	·609±	·013
" 6..	"	·520±	·011
" 7..	"	·582±	·013
	Weighted Mean	0 01 33·585±	·018
	Personal Equation	+ ·153±	·044
	Difference of Longitude	0 01 33·738±	·047
	Southport	10 13 39·782±	·056
	Longitude of Brisbane	10 12 06·044±	·073

NORFOLK—DOUBTLESS BAY.

Date.	Direction.	Sidereal Time. Doubtless Bay.	Sidereal Time. Norfolk.	Difference.	Relative rate.	Transmission time.	Chronometer Correction. Doubtless Bay.	Chronometer Correction. Norfolk.	Difference of Longitude.
1903.		h. m.	h. m.	h. m. s.	s.	s.	m. s.	m. s.	m. s.
Dec. 5	N. to D.B..	2 23·7	2 01·5	0 22 14·386					
	D.B. to N.	2 25·4	2 03·2	14·255	–·004	·067			
	Mean....	2 24·55	2 02·35	22 14·321	......	.. ..	– 17·342	– 18·073	22 15·052
" 9	N. to D.B.	2 34·9	2 12·3	22 37·132					
	D.B. to N..	2 36·4	2 13·8	37·027	–·005	·055			
	Mean....	2 35·65	2 13 05	22 37·080	. .	......	–1 06·460	– 44·527	15·147
" 10	N. to D.B.	2 35·1	2 12·4	22 42·160					
	D.B. to N..	2 36·6	2 13·9	42·101	–·004	·032			
	Mean....	2 35·85	2 13·15	22 42·131	....	......	–1 18·274	– 51·215	15·072
" 11	N. to D.B..	2 55·5	2 32·7	22 47·251					
	D.B. to N..	2 57·1	2 34·3	47·131	–·005	·062			
	Mean....	2 56·3	2 33·5	22 47·191	......	.....	–1 29·662	– 57·545	15·074
" 17	N. to D.B..	3 15·8	2 52·5	23 18·124					
	D.B. to N..	3 17·3	2 54·0	18·018	–·002	·054			
	Mean....	3 16·55	2 53·25	23 18·071	...	.....	–2 39·513	–1 36·667	15·225
" 18	N. to D.B.	3 12·4	2 49·0	23 21·872					
	D.B. to N..	3 13·8	2 50·4	21·738	–·003	·068			
	Mean ...	3 13·1	2 49·7	23 21·805	.....	...	–2 50·020	–1 43·443	15·228

NORFOLK-DOUBTLESS BAY.

1903.		h. m. s.	s.
December 5..	Difference of longitude	0 22 15·052	± ·020
" 9..	"	·147	± ·020
" 10..	"	·072	± ·014
" 11.	"	·074	± ·015
" 17.	"	·225	± ·020
" 18..	"	·228	± ·017
	Weighted Mean	0 22 15·124	± ·021
	Personal Equation	– ·124	
	Difference of Longitude	0 22 15·000	± ·021
	Norfolk	11 11 41·146	± ·056
	Longitude of Doubtless Bay	11 33 56·146	± ·060

DOUBTLESS BAY—WELLINGTON.

Date.	Direction.	Sidereal Time. Wellington.	Sidereal Time. Doubtless Bay.	Difference.	Relative rate.	Transmission time.	Chronometer Correction. Wellington.	Chronometer Correction. Doubtless Bay.	Difference of Longitude
1903.		h. m.	h. m.	h. m. s.	s.	s.	s.	m. s.	m. s.
Dec. 6	W. to D.B. .	3 20·67	3 15·96	0 04 42·655	+ ·347	·019			
	D.B. to W. .	2 44·47	2 39·74	43·039					
	Mean	3 02·57	2 57·85	4 42·847	.....	......	−5·189	−31·573	5 09·231
" 7	W. to D.B. .	3 27·24	3 22·77	4 28·059	+ ·096	·018			
	D.B. to W. .	3 16·17	3 11·70	28·191					
	Mean	3 21·70	3 17·23	4 28·125	... .	....	−3·180	−44·255	09·200
" 11	W. to D B. .	3 31·66	3 28·02	3 38·167	+ ·076	·026			
	D.B. to W. .	3 23·39	3 19·76	38·296					
	Mean.....	3 27·53	3 23·89	3 38·232	..	......	+1·119	1 29·874	09·225
" 12	W. to D.B. .	3 41·72	3 38·32	3 24·142					
	D.B. to W. .	4 01·58	3 58·18	24·018	+ ·171	·024			
	Mean.....	3 51·65	3 48·25	3 24·080	...	.....	+3·530	−1 41·546	09·156
" 17	W. to D.B. .	4 05·70	4 03·27	2 25·720	+ ·144	·041			
	D.B. to W. .	4 26·16	4 23·73	25·659					
	Mean.....	4 15·93	4 13·50	2 25·690	.....	......	+3·702	−2 39·818	09·210
" 18	W. to D.B. .	3 52·85	3 50·61	2 14·365	+ ·083	− ·010			
	D.B. to W. .	3 42·20	3 39·95	14·428					
	Mean	3 47·53	3 45·28	2 14·397	......	......	+4·582	−2 50·220	09·199

DOUBTLESS BAY—WELLINGTON.

		h. m. s.	s.
Dec. 6	Difference of longitude	0 05 09·231	± ·027
" 7	"	·200	± ·018
" 11	"	·225	± ·032
" 12	"	·156	± ·021
" 17	"	·210	± ·032
" 18	"	·199	± ·020
	Weighted mean	0 05 09·198	± ·007
	Personal equation	− ·257	± ·045
	Difference of longitude	0 05 08·941	± ·045
	Doubtless Bay	11 33 56·146	± ·060
	Wellington	11 39 05·087	± ·075

CLOSING ERRORS.

Fanning.—Reducing the longitude given on Admiralty Chart 2971, for 'Observation Spot' at English Harbour, by scaling to that of the observatory we obtain for the latter:—

	159°	23′	27″
The Canadian value is..	159°	23′	26″·61

that is, the values are practically identical, which speaks volumes for the accuracy of the hydrographic survey, which is principally dependent upon the transport of chronometers for the determination of longitude.

Captain Fanning writes, p. 225, in the work cited, 'These islands are situate in latitude 3° 51′ 30″ north, longitude 159° 12′ 30″ west.' The description is rather vague, but the position in longitude by a trading vessel, as Fanning's was, is pretty good for the year 1798.

Suva.—On Admiralty Chart 1660 of Suva Harbour, the longitude of 'Observation Spot,' south end of Walou bridge, is given as 178° 26′ 00″ E.; the observatory at the Cable station is 14″·21 west thereof, so that the longitude of the latter, based on the former becomes:—

	178°	25′	45″·79 E.
The Canadian value is	178°	25′	35″·84
Difference. ..			9″·95 = ·663$^{sec.}$ or 960 feet = 320 yards.

It may be interesting here to quote a paragraph of the opening address by the late Rear-Admiral, Sir W. J. L. Wharton, president of Section E., Geography, at the British Association meeting in South Africa last August. After speaking of the great merit of the sextant and chronometer for the determination of longitude at sea, he says: 'To give an idea of the comparative accuracy of the chronometer (transport of) method, I may mention that in taking at hazard eleven places distributed all over the world at great distances from England, the longitudes of which have been recently determined by means of the electric telegraph and elaborate series of observations, I find that the average difference between the chronometer and the telegraphic positions is 700 yards.'—So that the accordance at Suva is quite satisfactory.

Norfolk.—On Admiralty Chart 1110, 'Norfolk and Philip Islands' the longitude of 'Observation Spot' at the foot of Boat Harbour, Sydney Bay, is given as 167° 58′ 06″. Reducing this to the position, by scaling from the chart, of the observatory at the Cable station, Anson Bay, at the northwestern part of the island we obtain for the longitude of the observatory:—

	167°	55′	47″
The Canadian value is..	167°	55′	17″·19
Difference..			29″·81 = 1·99$^{sec.}$

This is undoubtedly a large difference. The Admiralty determination is an old one, having been made by Captain Denham, R.N., in 1855, and measured through Lord Howe island from Garden island, Sydney, the latter being then not well determined.

Southport.—Southport, Queensland, is undoubtedly of the three Australian longitudes obtained by the Canadian connection, the best determined. In the first place the other two Australian stations—Sydney and Brisbane—are dependent upon it, and hence must necessarily have less weight, being an additional link in the chain; in the next place the personal equation is more thoroughly and satisfactorily eliminated for Southport than for the other two stations. As already stated the number of stations across the Pacific is an odd number—five—and as the observers occupied alternate stations from Vancouver to Southport, the personal equation even as an unknown quantity, which it is not, disappears in the value for Southport. And furthermore, the longitude work up to Southport (and Doubtless Bay also) was homogeneous in every respect, the instruments, apparatus, methods of the two observers were identical, so that the value for Southport deserves *a priori* a high degree of confidence.

There is however, no value for Southport, based by triangulation on the Brisbane longitude, available for comparison with the Canadian value. A comparison with Australian values we obtain, however, at Sydney and at Brisbane.

Sydney.—We have for Sydney, six independent determinations for difference of longitude with Southport, together with observations for personal equation between the observers, Mr. Lenehan and Mr. Raymond at Sydney, and Dr. Klotz at Southport.

In the following table is given the comparison between the longitude of Sydney as brought from Madras and Singapore and that *via* Canada and the British Pacific Cable.

In the reduction (1885) of the Australian longitudes, the longitude of Madras was accepted as:—

$5^{h.}\ 20^{m.}\ 59^{s}\cdot42$,*

and the derived value of Sydney was:—

$10^{h.}\ 04^{m.}\ 49^{s}\cdot54$.

In making the comparison, the best and most recent available data are utilized for the longitude of Madras. The values for the various links or arcs between Madras and Sydney have not been re-determined since 1882-84, so that they will be adopted now as then.

For arriving at the longitude of Madras, we have the following data:—

Arc.	Difference of Longitude.	Probable Error.	Authority.
	h. m. s.	s.	
Greenwich—Potsdam	0 52 16·051	± ·0030	Professor Albrecht.[1]
Potsdam—Tehran	2 33 24·228	± ·0068	Major Burrard.[2]
Tehran—Bushire	0 02 21·443	± ·0083	"
Bushire—Karachi	1 04 44·787	± ·0073	"
Karachi—Bombay	0 23 12·196	± ·0129	"
Bombay—Bolarum	0 22 48·801	± ·0061	"
Bolarum—Madras	0 06 54·615	± ·0085	"

Station.	Longitude East.	Probable Error.
	h. m. s.	s.
Potsdam	0 52 16·051	± ·0030
Tehran	3 25 40·279	± ·0074
Bushire	3 23 18·836	± ·0111
Karachi	4 28 03·623	± ·0133
Bombay	4 51 15·819	± ·0185
Bolarum	5 14 04·620	± ·0195
Madras	5 20 59·235	± ·0213

* Report on the Telegraphic Determination of Australian longitudes, 1886, p. 31.
[1] Bestimmung der Längendifferenz Potsdam-Greenwich, 1903.
[2] Great Trigonometrical Survey of India, Vol. XVII, p. XIV.

Applying now the published values for the arcs between Madras and Sydney, we obtain the following series:—

Arc.	Difference of Longitude.	†Probable Error.	Authority.
	h. m. s.	s.	
Madras	5 20 59·235	±·0213	
Madras—Singapore	1 34 25·58	±·0270	Davis and Norris (U.S. Navy).*
Singapore—Flagstaff	−0 00 01·50		
Flagstaff—Capt. Darwin's Station	+0 00 01·51		
Capt. Darwin's Station	6 55 24·825	±·0344	
Darwin's Station—Port Darwin	1 47 57·48	±·0310	
Port Darwin	8 43 22·305	±·0463	
Port Darwin—Adelaide	0 30 57·81	±·0277	
Adelaide	9 14 20·115	±·0540	
Adelaide—Melbourne	0 25 33·84	±·0337	
Melbourne	9 39 53·955	±·0636	
Melbourne—Sydney	0 24 55·40	±·0614	
Sydney	10 04 49·355	±·0884	
Canadian value	10 04 49·287	±·058	
**Difference	·068 = 1″.02 = 84 feet.		

† The probable errors given for difference of longitude are taken from Appendix, Table I, p. 23 of P. Baracchi's report 'On the most Probable Value and Errors of Australian Longitudes,' 1895.

* Telegraphic Determination of Longitude in the East Indies, China and Japan, 1881–2.

** Since the above result was obtained, Astronomische Nachrichten, No. 3993, has appeared, containing 'Ausgleichung des Zentraleuropäischen Längennetzes' by Professor Th. Albrecht. The adjustment of the net involved 176 differences of longitude between 79 stations. In the final values Potsdam is given as $52^m\ 16^s{\cdot}063 \pm {}^s{\cdot}0135$ for the same meridian as given in the above table as $52^m\ 16^s{\cdot}051 \pm {}^s{\cdot}003$. That is, the adjusted longitude of Potsdam is greater than the direct measure of Prof. Albrecht and Mr. Wanach in 1903 by ${}^s{\cdot}011$. If we adopt the adjusted value for Potsdam, the longitude of Madras will be increased by ${}^s{\cdot}011$, that is, becomes $5^h\ 20^m\ 59^s{\cdot}246$, and similarly that of Sydney, $10^h\ 04^m\ 49^s{\cdot}366$. Differing from the Canadian value by ${}^s{\cdot}079$.

In the above-mentioned Astron. Nach. pp. 153-154, are given the results of the 1902 campaign for the arc Greenwich-Paris. The two Greenwich observers (with exchange of stations for eliminating personal equation) obtained the value of $9^m\ 20{\cdot}976^{sec} \pm {\cdot}011^{sec}$ in the spring, and in the autumn $9^m\ 20{\cdot}911^{sec} \pm {\cdot}004^{sec}$, giving a difference of ${\cdot}065^{sec}$ between the two independent determinations. Similarly the French observers obtained the values of $9^m\ 20{\cdot}932^{sec}$ and $9^m\ 21{\cdot}029^{sec}$, showing a difference of ${\cdot}097^{sec}$.

That is, the first girdle of the world closed within 84 feet. Apparently the weakest link in the girdle is the arc, Madras-Singapore, since no observations for personal equation were made at the time by Lieut. Commander C. H. Davis and Lieut. S. A. Norris, the observers respectively at Madras and Singapore.

However in the United States Navy Report quoted, Lieut. Commander F. M. Green says, p. 18, 'By means of the repeated use of the personal equation machine of Professor Eastman, at the Naval Observatory, it was found that the habitual errors of the observers engaged in this measurement had all the same sign; that is, they habitually observed the transit of a star a few hundredths of a second after its occurrence, but their respective differences were so small that it seemed evident that to introduce results so minute as corrections would not increase the trustworthiness of the result.'

This is important testimony and written at the time with reference to the Madras-Singapore arc. If it does not wholly dispose of the differential personal equation involved, it gives assurance of its very small magnitude.

In Mr. Barrachi's report quoted, he is slightly in error when speaking of the above arc; he says: 'Their personal equation was continuously tested by absolute personal equation instruments, each observer being provided with one.'

The difference of longitude Madras-Singapore as determined by Davis and Norris was, after due consideration and discussion, accepted by the Australian astronomers—Ellery, Todd and Russell—for the determination of Australian longitudes.

Brisbane.—The position of the observatory here is given in the Nautical Almanac as $10^{h.}$ $12^{m.}$ $06{\cdot}40^{sec.}$ The derivation of this value becomes apparent from the following extract from the Annual Report of the Department of Public Lands for the year 1891, Queensland.

Under sub-division 'Trigonometrical Survey' the Surveyor General under date of April 8, 1892, p. 10, says: 'Additional care was bestowed upon the determination of Burketown, as opportunity was taken there, with the kind permission of Mr. Russell, the Government Astronomer of New South Wales, of bringing Sydney Observatory into the telegraphic circuit, and of thus determining, not only the longitude of Burketown, but the difference of longitude between Sydney and Brisbane, both by direct and indirect means. The results so obtained, together with a previous determination made in 1884, and a subsequent one in the present year, have been investigated both by Mr. Russell and ourselves, and are as follows:—

	m.	s.	
1884.	7	16·81	diff. Brisbane-Sydney.
1891.	7	16·87	
1891.	7	16·88	
1892.	7	16·88	

'Considering that different observers and different methods were employed upon these determinations, the resulting mean of $7^{m.}$ $16{\cdot}86^{sec.}$ must be looked upon as possessing a very high degree of accuracy, and as Brisbane is on the initial meridian from which all our differences of longitude have been reckoned, the result is very gratifying. Assuming the longitude of Sydney Observatory to be $10^{h.}$ $4^{m.}$ $49{\cdot}54^{sec.}$, and the difference of longitude between Sydney and Brisbane observations to be $7^{m.}$ $16{\cdot}86^{sec.}$, the resulting longitude of Brisbane Observatory is $10^{h.}$ $12^{m.}$ $6{\cdot}40^{sec.}$'

Through the longitude determinations of Professor Albrecht and Major Burrard, Madras has suffered a correction of $-{\cdot}185^{sec.}$, as already shown. Hence the value of Brisbane, dependent upon Madras and Sydney becomes:—

	$10^{h.}$	$12^{m.}$	$06^{s}{\cdot}215$
The Canadian value is	$10^{h.}$	$12^{m.}$	$06^{s}{\cdot}044$
Difference.... ..			$^{s}{\cdot}171 = 2''{\cdot}565 = 231$ feet.

Taking the Canadian values for Sydney and Brisbane we find the difference of longitude between these two places:—

	$7^{m.}$	$16^{s}{\cdot}757$
While the Australian value is.	$7^{m.}$	$16^{s}{\cdot}86$
Difference.		$^{s}{\cdot}103$

It must be remarked that the above comparison is not quite as satisfactory as desired, on account of the value of the differential personal equation obtained three weeks after the longitude campaign.

Mr. T. D. Fraser laboured considerably under a mental and physical strain, on account of very serious illness in his family during the observations. He obtained little rest during the 24 hours for several weeks, and was conscious when observing that he was not in normal condition. He gave little weight to his observations at Southport, although when computed the probable error of the time determination was satisfactory, $\pm{\cdot}014^{sec.}$, the same as that for his Brisbane observations.

A chain of triangles extends southward from Brisbane to the vicinity of Southport, some fifty miles, so that it will be easy to effect a geodetic connection between the observation stations at Brisbane and Southport, and free from any uncertainty in the differential personal equation.

Doubtless Bay.—The connection between the observatory at the Cable station and the trigonometrical survey of New Zealand was made by Government Surveyor Vincent J. Blake, under instructions of the Surveyor General. The triangulation was extended from Station 20 on the west side of the mouth of Mangonui river westward about two and a half miles to Station A (the magnetic station), and thence to the near-by observatory.

The geographic position of station 20 was furnished by Mr. J. W. A. Marchant, Surveyor General.

We have then:—

Longitude Station 20.. ..	173° 31′ 37″·1
Station 20—Sta. A... ..	− 2′ 24″·1
Station A..	173° 29′ 13″·0
Sta. A—Observatory.. ..	− 3″·66
Observatory..	173° 29′ 09″·34
	= $11^{h.}$ $33^{m.}$ $56·623^{sec.}$
Canadian value is..	$11^{h.}$ $33^{m.}$ $56·146^{sec.}$
Difference..	= $·477^{sec.}$ = 7″·15 = 595 feet.

It may be remarked that the position of Station 20 is dependent upon the initial station, Mt. Cook at Wellington, through a chain of triangles about seven hundred miles long. From the roughness of the country it was expedient to carry on a network of triangulation for land survey and settlement purposes, and the refinements of a primary triangulation were not aimed at.

In the closing for Wellington it will be found that the difference is $·038^{sec.}$ or ″·57, and of the same sign as the above, making thereby the difference between the telegraphic determination Wellington-Doubtless Bay, and the one obtained by triangulation $·439^{sec.}$, equivalent to 549 feet at the latitude of Doubtless Bay.

What was said with reference to Southport of the relative value of the longitude determination there, is equally applicable to Doubtless Bay, as the latter station occupies the same position in the series of stations with reference to personal equation as does the former.

Wellington.—The derivation of the value for the longitude of the Wellington Observatory has already been shown as:—

$11^{h.}$ $39^{m.}$ $05·31^{sec.}$

This requires the correction of − $·185^{sec.}$, the same as applied to Sydney for the adopted value of Madras, dependent upon the work of Prof. Albrecht and Major Burrard.

We have then for the value of Wellington via Madras and Sydney:—

	$11^{h.}$ $39^{m.}$ $05·125^{sec.}$
Canadian value is..	$11^{h.}$ $39^{m.}$ $05·087^{sec.}$
Difference..	$·038^{sec.}$ = ″·57

It will be noticed that the difference between the closing at Sydney and at Wellington is $·030^{sec.}$, the Canadian values being in each case less than the ones via Madras. This quantity, $·030^{sec.}$, apparently represents the accordance between the direct determination of the Sydney-Wellington arc in 1883 and the indirect one via Southport and Doubtless Bay in 1903.

Although observations were made for personal equation by the two observers, yet the conditions under which they were made were not the most favourable. It was impracticable to mount the portable transit at the Wellington observatory, so that the observations were all made with the Wellington instrument, Mr. T. King observing by 'eye and ear,' as is his custom, and Dr. Klotz recorded, as is his custom, electrically, in this case, however, with a specially made make-circuit key for embossing, by means of the style, the paper fillet of the Morse register—the chronograph of the Wellington observatory. Retardation and parallax of the two styles of the register—the one for the clock and the other for the transits—were carefully determined and applied.

FINAL LONGITUDE VALUES.

Station.	Longitude.							
	Time.			Probable Error.	Arc.			Probable Error.
	h.	m.	s.	s.	°	′	″	″
Vancouver	8	12	28·368	± ·050	123	07	05·520 W	± ·75
Fanning	10	37	33·774	± ·054	159	23	26·610 W	± ·81
Suva	11	53	42·389	± ·055	178	25	35·835 E	± ·82
Norfolk	11	11	41·146	± ·055	167	55	17·190 E	± ·82
Southport	10	13	39·782	± ·056	153	24	56·730 E	± ·84
Sydney	10	04	49·287	± ·058	151	12	19·305 E	± ·87
Brisbane	10	12	06·044	± ·073	153	01	30·660 E	±1·09
Doubtless Bay	11	33	56·146	± ·060	173	29	02·190 E	± ·90
Wellington	11	39	05·087	± ·075	174	46	16·305 E	±1·12

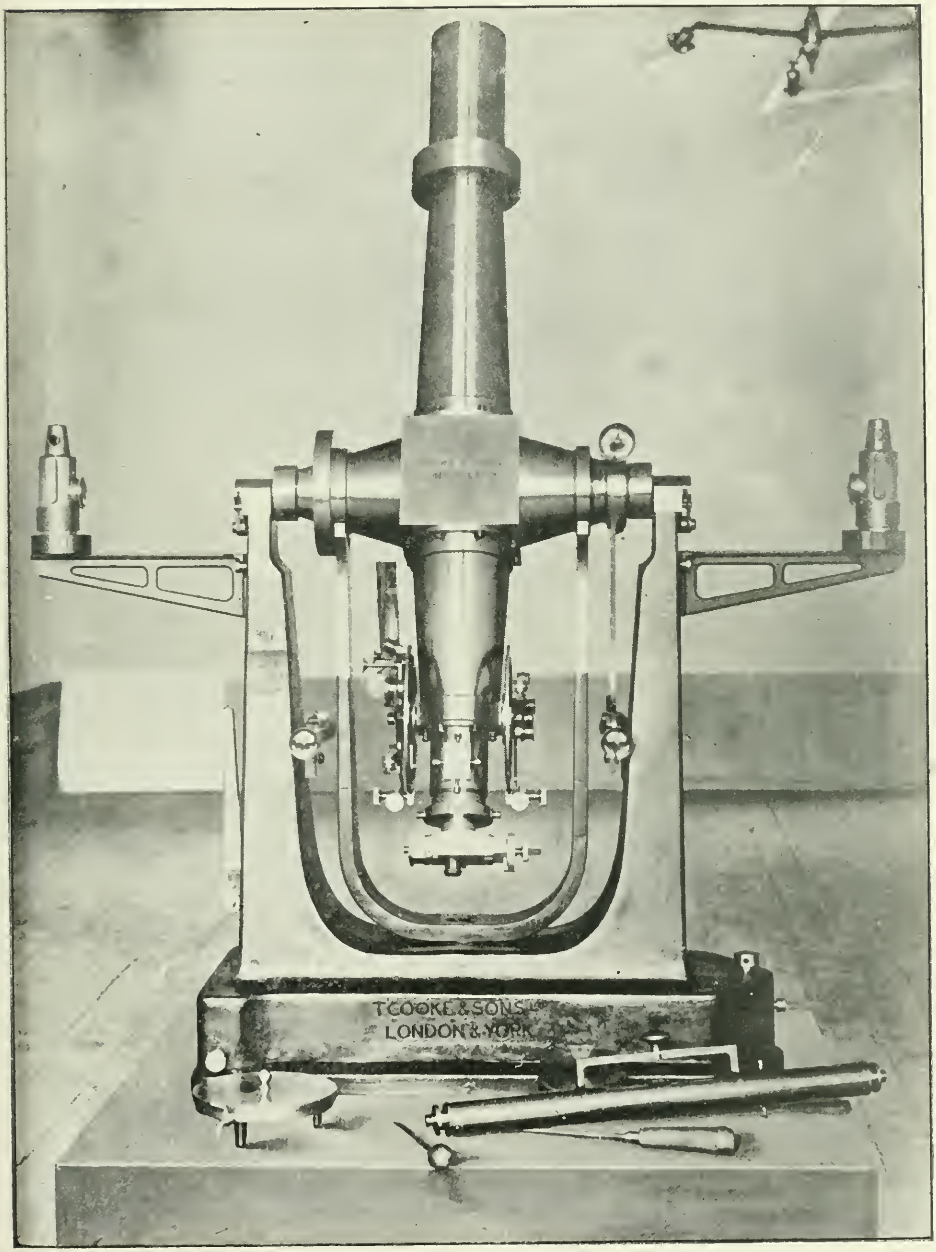


Fig. 1.—Transit.

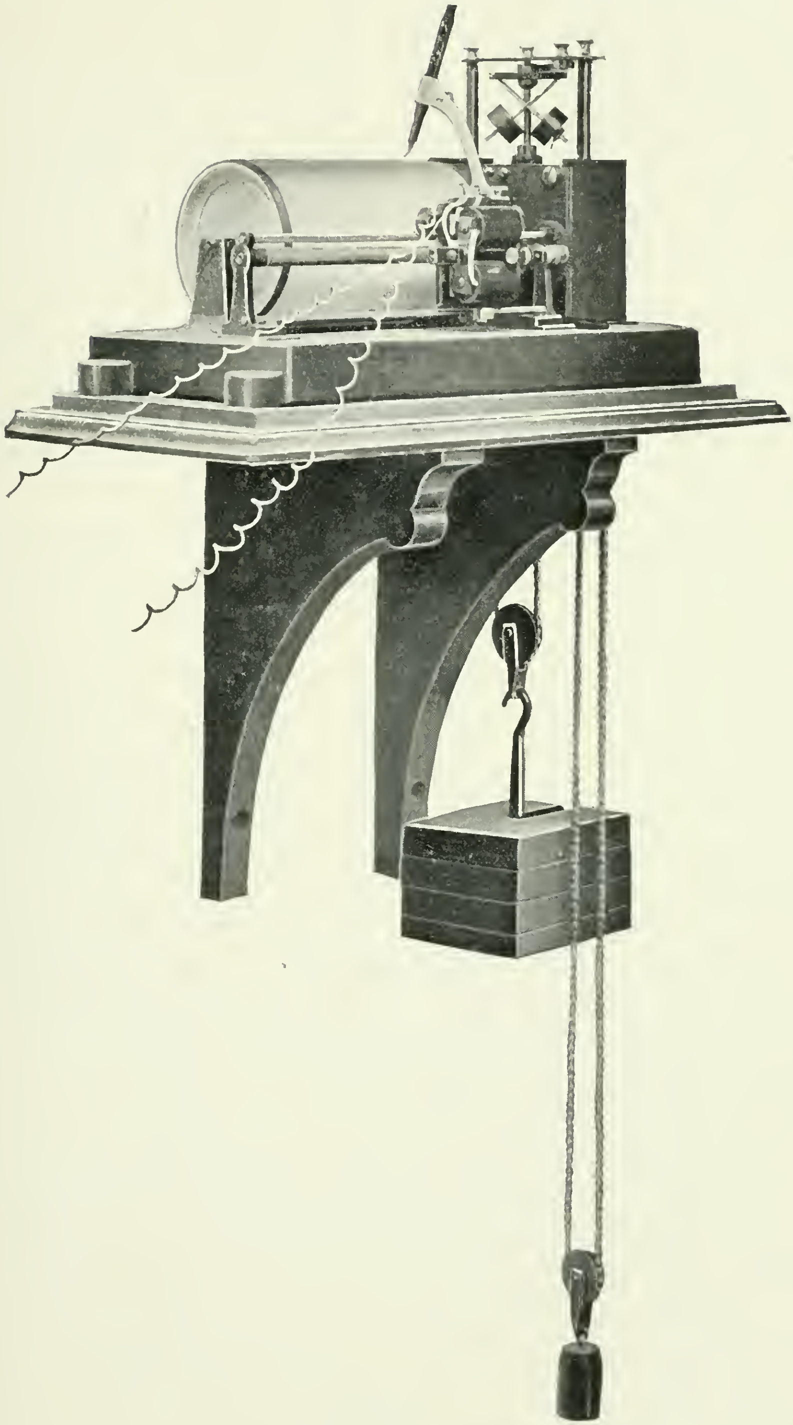


Fig. 2.—Chronograph.

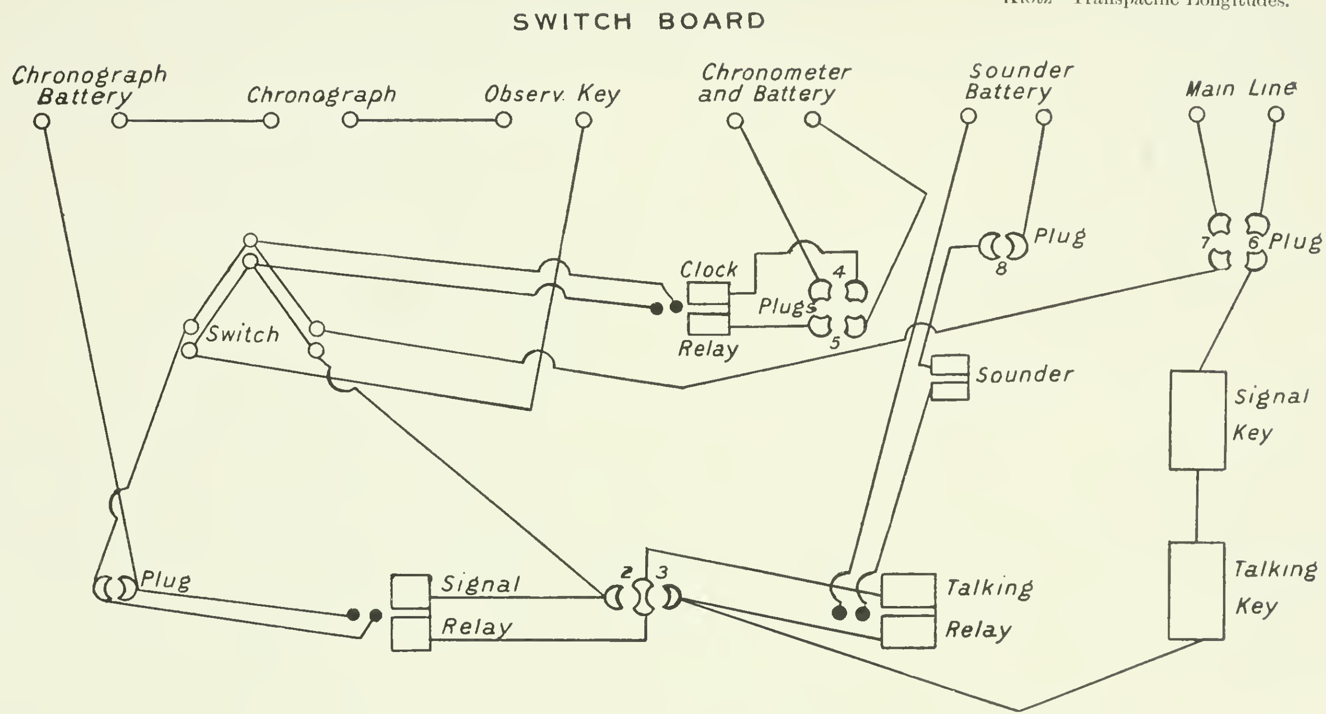

SWITCH BOARD
Chronograph Battery
Chronograph
Observ. Key
Chronometer and Battery
Sounder Battery
Main Line
Plug
Plug
Clock
Plugs
Relay
4
5
6
7
8
Switch
Sounder
Signal Key
Talking Key
Plug
Signal
Relay
2
3
Talking
Relay

Fig. 3.

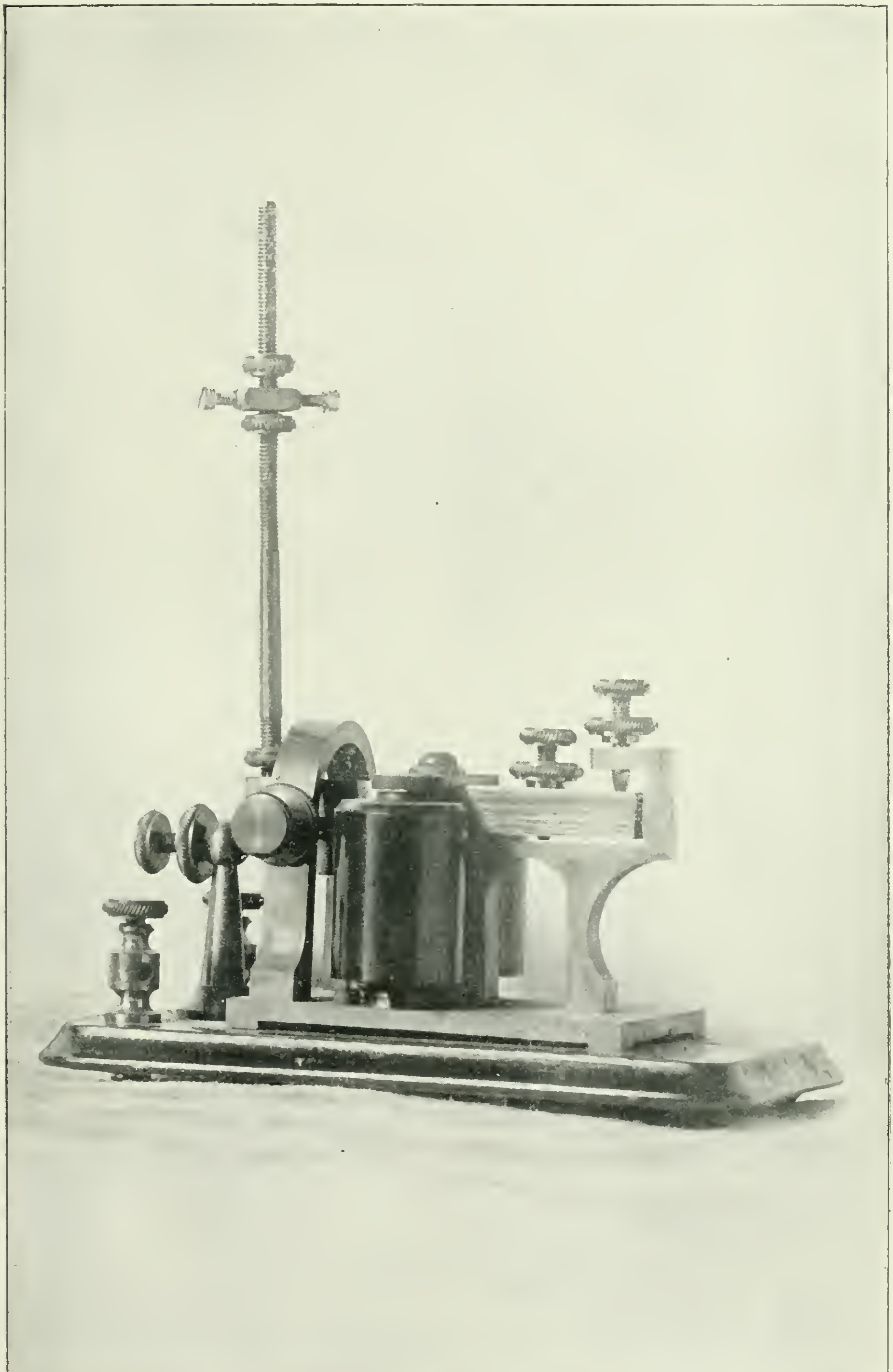


Fig. 4.—Sounder for Clock Cable Siphon.

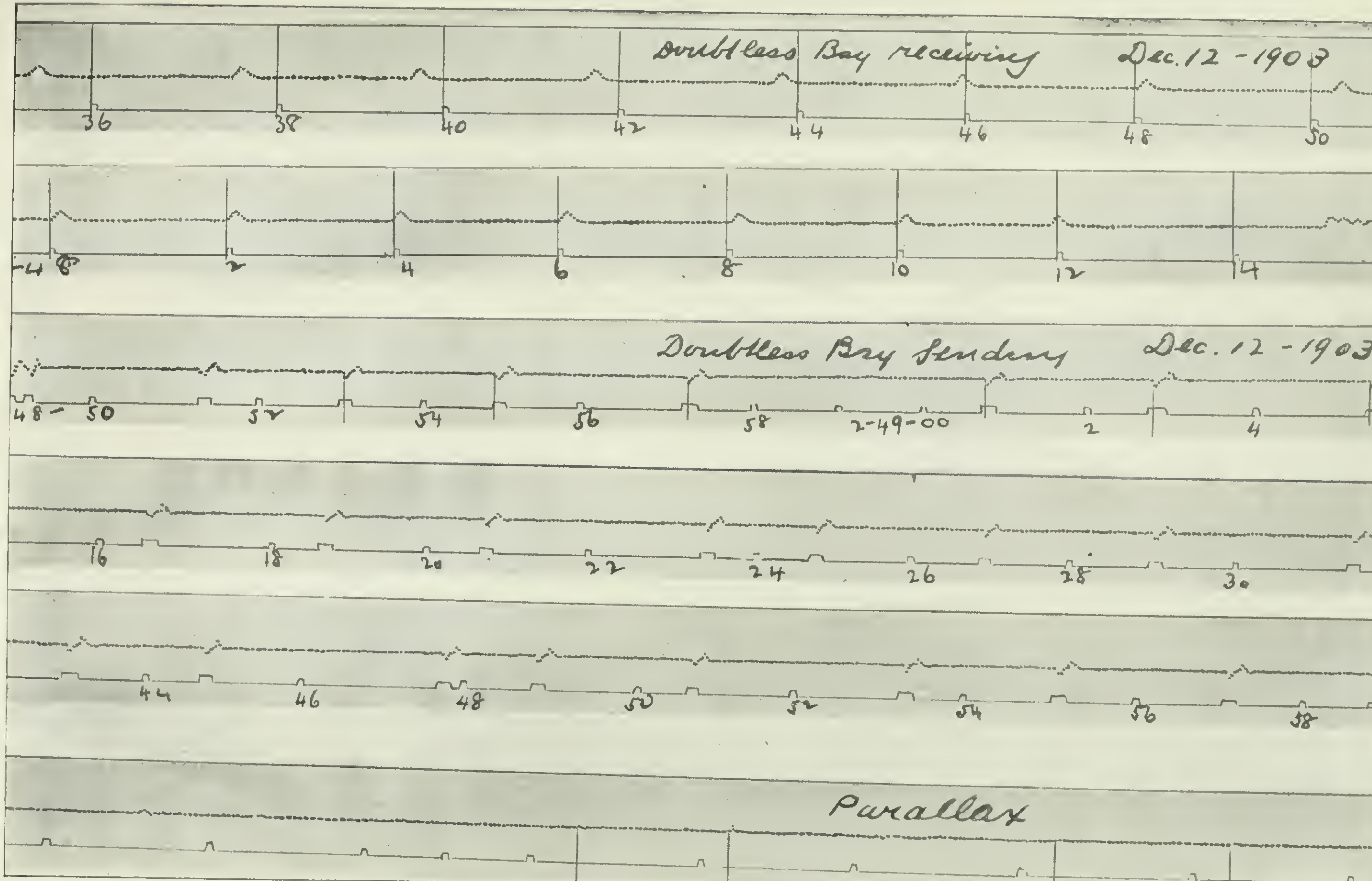


Fig. 5.—Comparison of Chronometers by Cable.

ELECTRICAL CONNECTIONS AT WELLINGTON OBSERVATORY

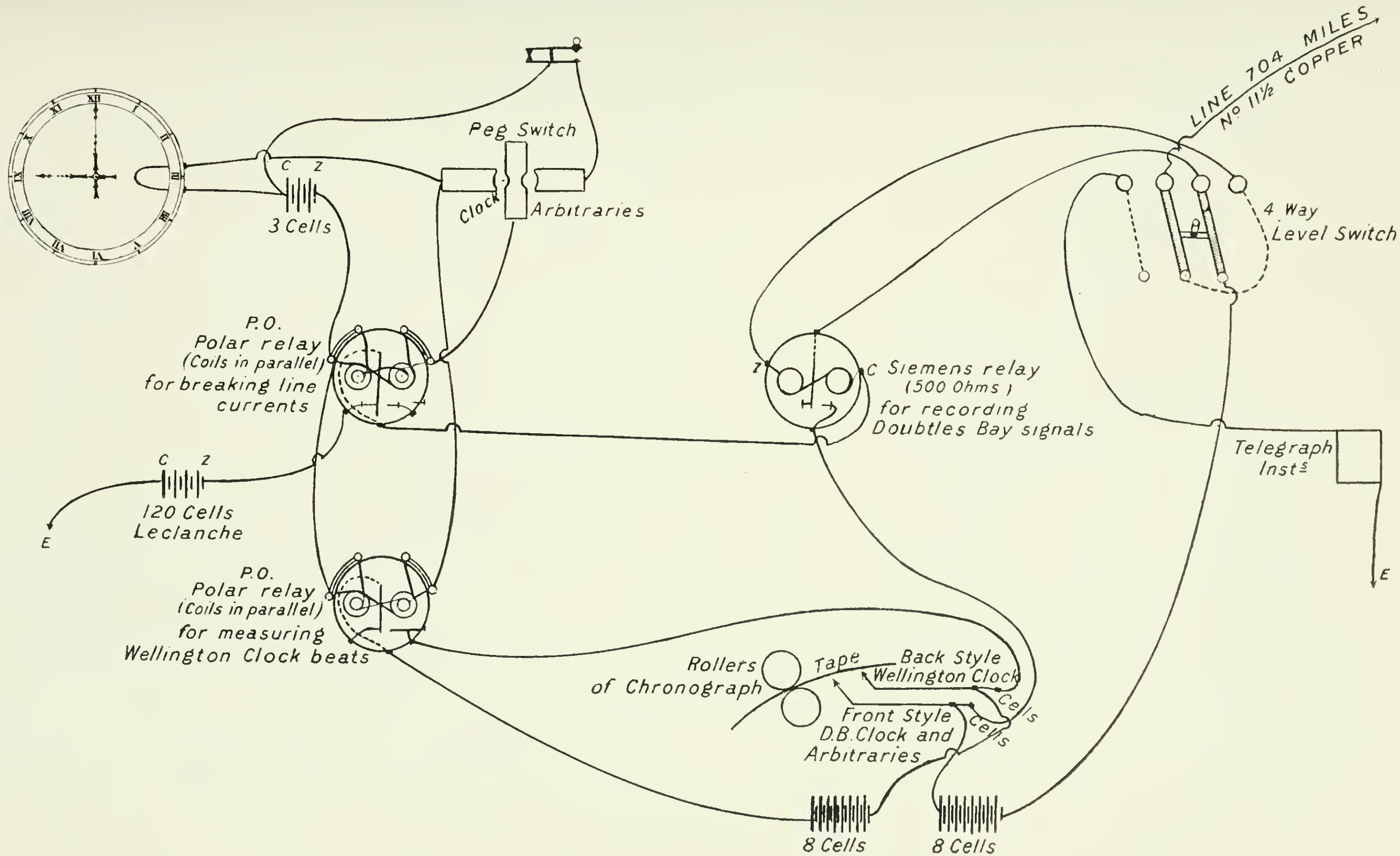


Fig. 6.

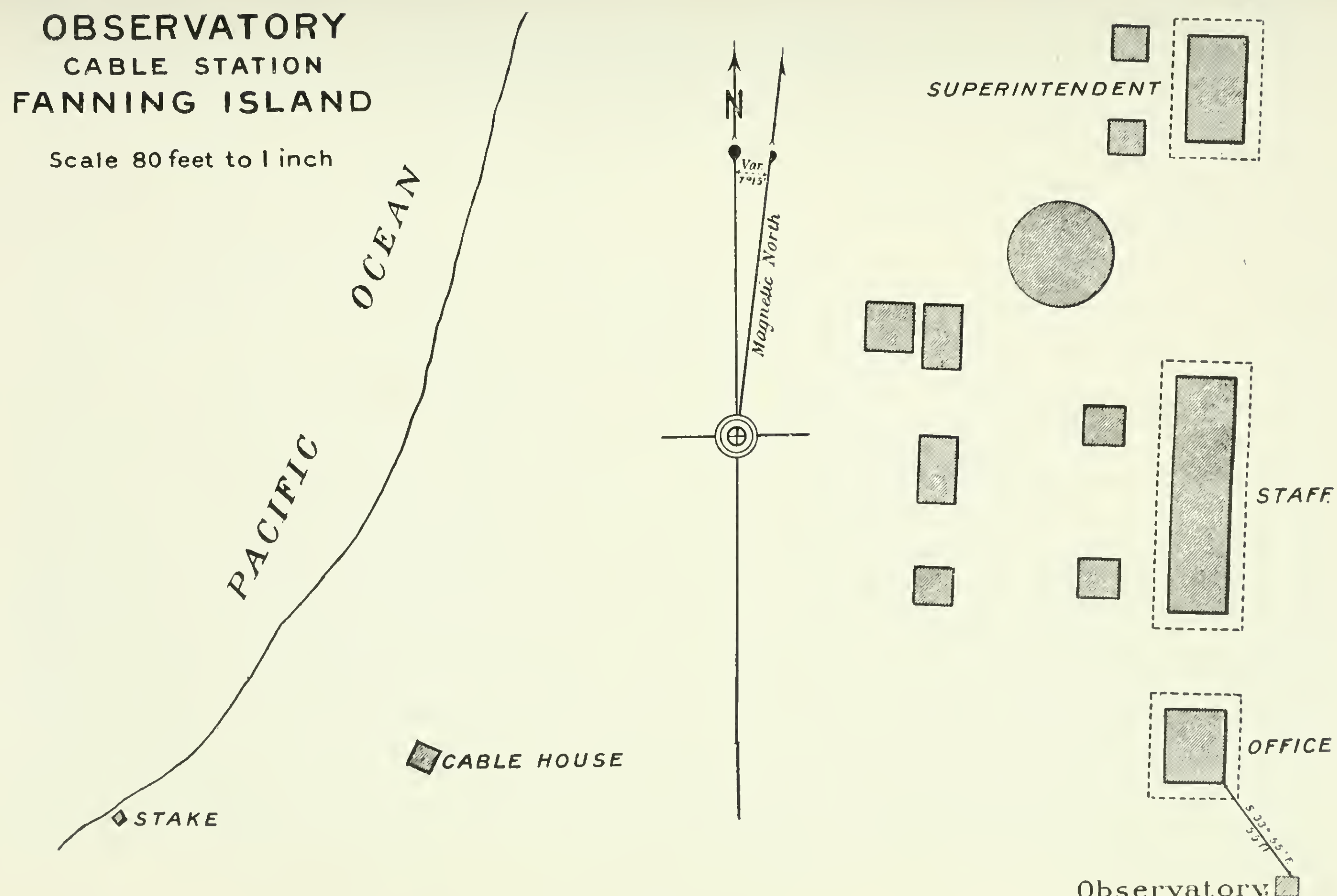

OBSERVATORY
CABLE STATION
FANNING ISLAND
Scale 80 feet to 1 inch
PACIFIC OCEAN
STAKE
CABLE HOUSE
N
Var. 7°15'
Magnetic North
SUPERINTENDENT
STAFF
OFFICE
Observatory

Fig. 7.

Fig. 8.—Observatory at Suva, Fiji.

Photo by Otto Klotz

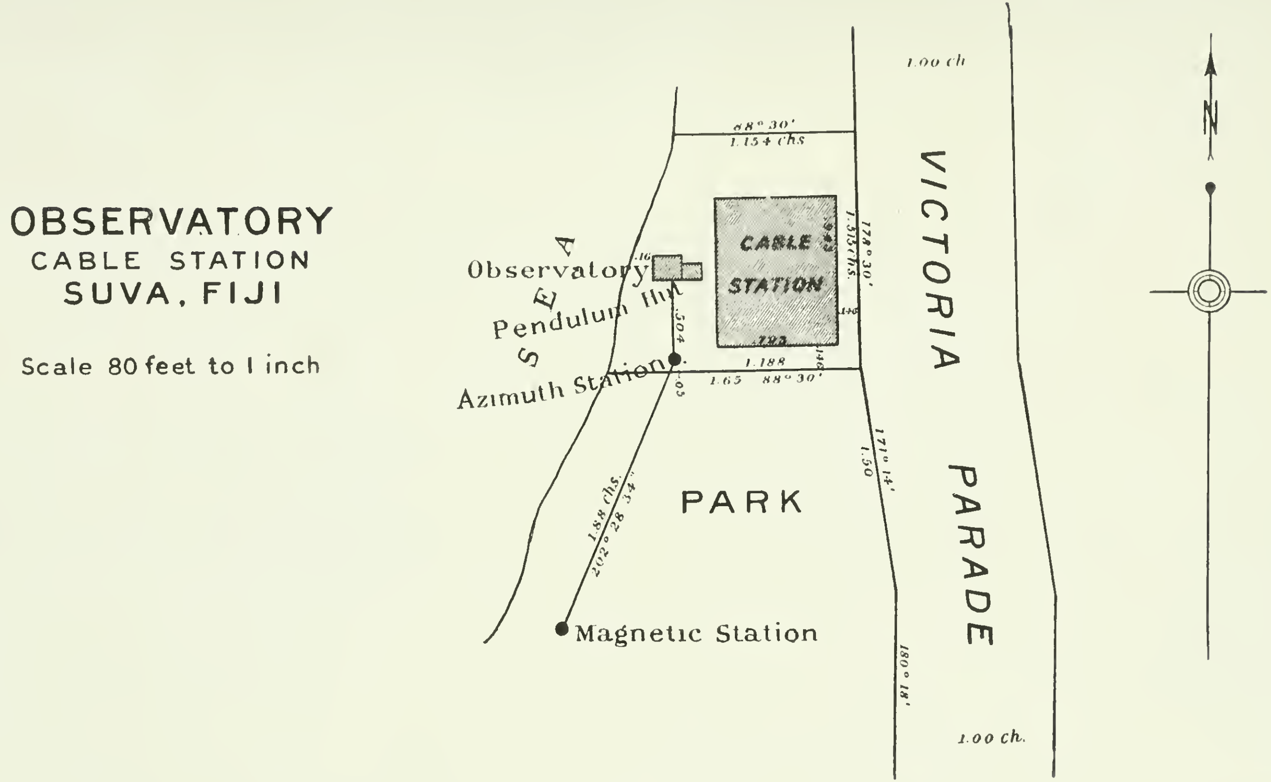

OBSERVATORY
CABLE STATION
SUVA, FIJI
Scale 80 feet to 1 inch
VICTORIA PARADE
PARK
SEA
CABLE STATION
Observatory
Pendulum Hut
Azimuth Station
Magnetic Station
88° 30'
1.154 chs
178° 30'
1.515 chs.
1.188
1.65
171° 14'
1.50
180° 18'
1.00 ch
1.00 ch.
1.88 chs.
202° 28' 34"
.504
N

Fig. 9.

Fig. 10—Pacific Cable Station, Suva, Fiji.

Photo by Otto Klotz.

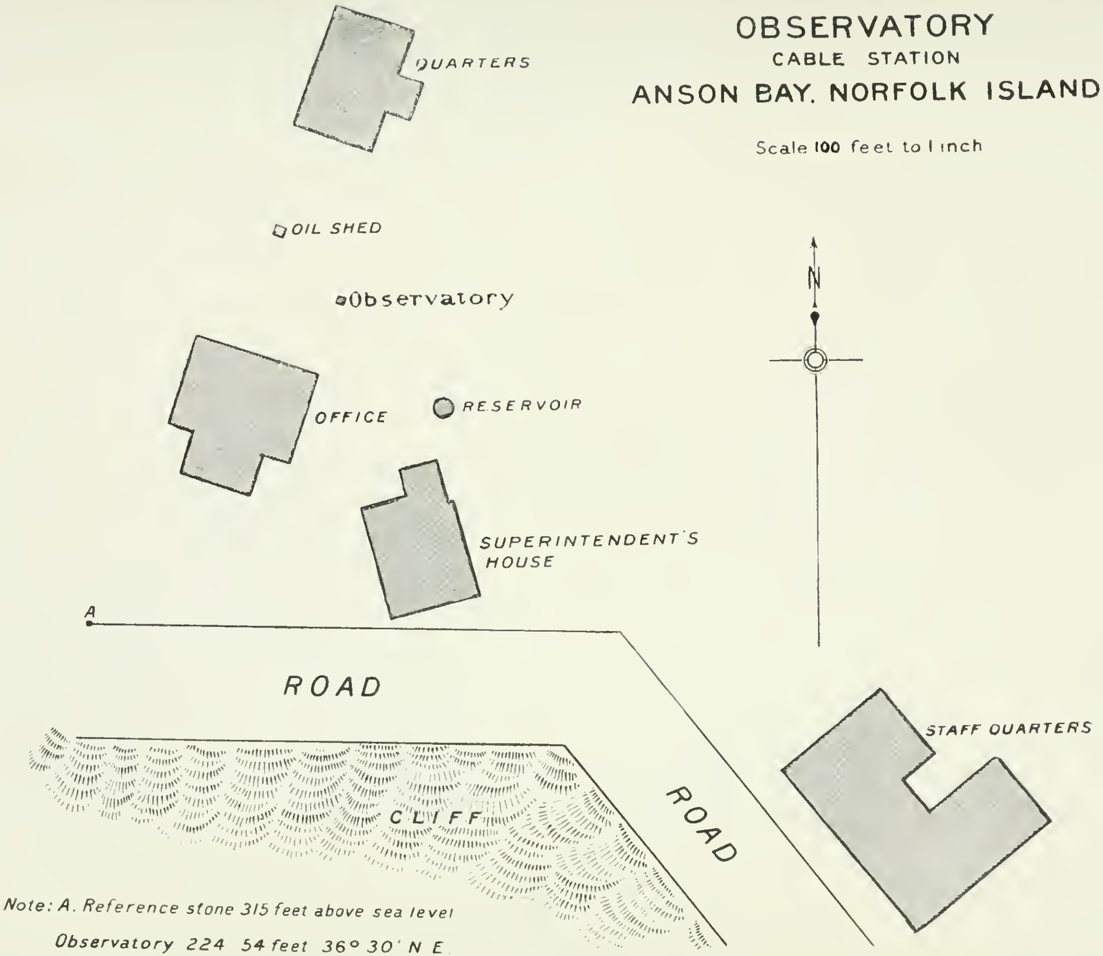

OBSERVATORY
CABLE STATION
ANSON BAY, NORFOLK ISLAND
Scale 100 feet to 1 inch
N
QUARTERS
OIL SHED
Observatory
OFFICE
RESERVOIR
SUPERINTENDENT'S HOUSE
A
ROAD
ROAD
STAFF QUARTERS
CLIFF
Note: A. Reference stone 315 feet above sea level
Observatory 224 54 feet 36° 30' N E

Fig. 11.

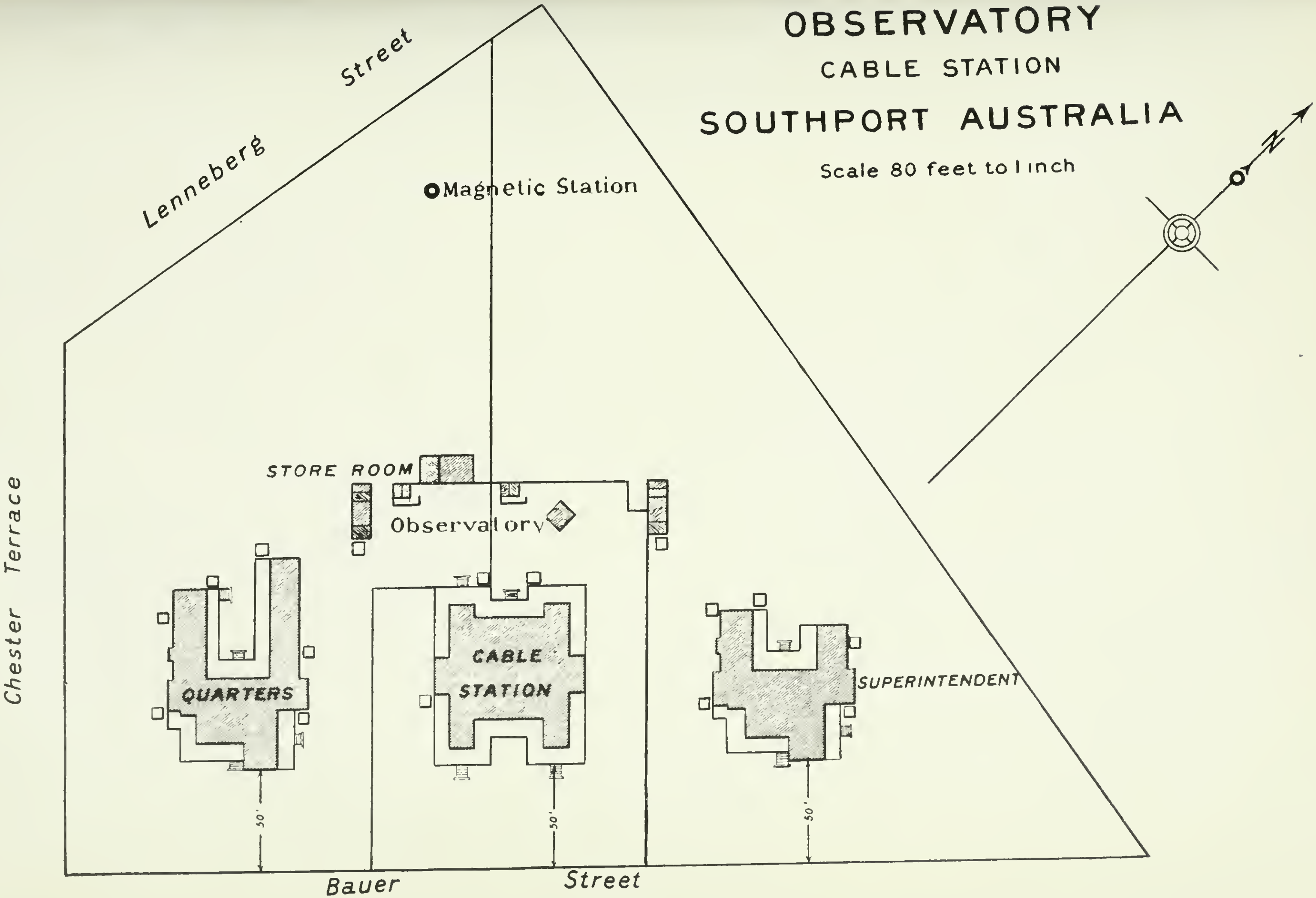

OBSERVATORY
CABLE STATION
SOUTHPORT AUSTRALIA
Scale 80 feet to 1 inch
N
Lenneberg Street
Magnetic Station
STORE ROOM
Observatory
Chester Terrace
QUARTERS
CABLE STATION
SUPERINTENDENT
50'
50'
50'
Bauer Street

Fig. 12.


N
DOUBTLESS
BAY
Lat. 34° 58' 48".34
P
Pendulum Station
From Taipa
283° 36' 56" True
282° 51' 14"
6.28 chs
Road 1 chain wide
Lat. 34° 58' 49".26
A
78° 19' 24"
79° 05' 06" True
Magnetic Station
4.905 chs.
37088
CABLE
STATION RESERVE
CABLE
STATION
PLAN No. 1
Scale 80 feet to 1 inch
249° 37' 24"
250° 23' 06" True
Observatory
Lat. 34° 58' 50".37
To Mangonui
35 ac 3 r. 28 p
From C 22° 48' 14"
23° 31' 58" True
OBSERVATORY
CABLE STATION
DOUBTLESS BAY, NEW ZEALAND

Fig. 13.

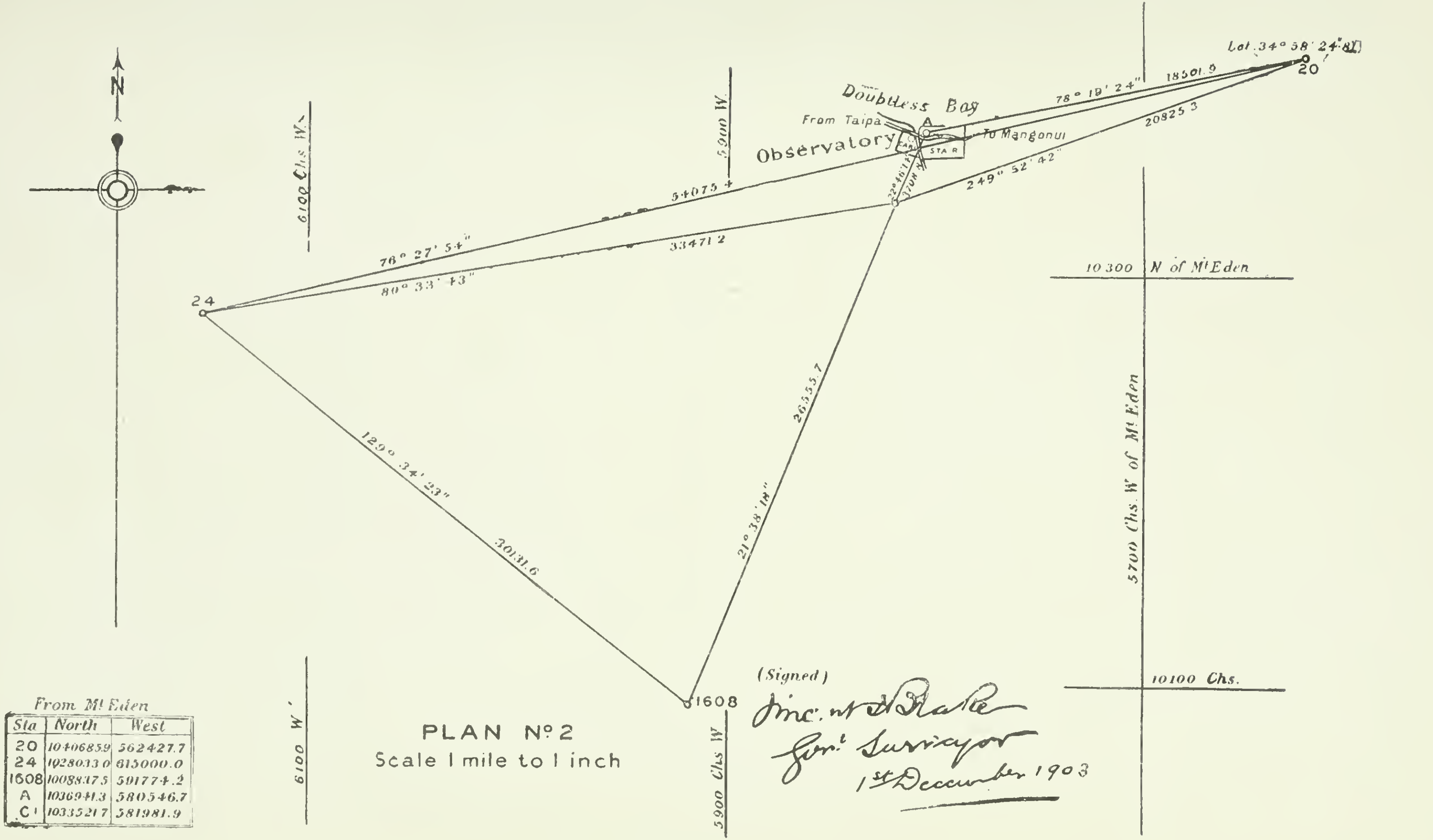

N
Lat. 34° 58′ 24″.8
20
18501.9
78° 19′ 24″
20825.3
249° 52′ 42″
Doubtless Bay
From Taipa
To Mangonui
A
Observatory
STA R
54075.4
33471.2
76° 27′ 54″
80° 33′ 43″
24
129° 34′ 23″
30131.6
26555.7
21° 38′ 18″
1608
6100 Chs W.
5900 W.
6100 W.
5900 Chs W
10300 N of Mt Eden
5700 Chs W of Mt Eden
10100 Chs.
PLAN No. 2
Scale 1 mile to 1 inch
(Signed)
1st December 1903
From Mt Eden
Sta North West
20 10406859 562427.7
24 10280330 615000.0
1608 10088175 591774.2
A 10369413 580546.7
C 10335217 581981.9

Fig 14.

APPENDIX 4

REPORT OF THE CHIEF ASTRONOMER, 1905.

OBSERVATORY BUILDING

AND

INSTRUMENTAL EQUIPMENT

BY

J. S. PLASKETT, B.A.

CONTENTS

ILLUSTRATIONS.

APPENDIX 4.

OTTAWA, CAN., October 31, 1905.

W. F. KING, Esq., B.A., LL.D., D.T.S., &c.,
Chief Astronomer,
Department of the Interior,
Ottawa.

SIR,—In accordance with your instructions, I submit herewith a description of the observatory building, electrical installation and instrumental equipment.

I have the honour to be, sir,
Your obedient servant.

J. S. PLASKETT.

DESCRIPTION OF BUILDING.

The observatory building, recently completed, and occupied by the staff of the astronomical branch since April, 1905, is situated on the Central Experimental Farm.

The site is near the north gate of the farm, about half a mile northwest of the farm offices, and is two miles and a half south southwest from the parliament buildings.

The building itself, which is constructed in a very substantial manner of grey sandstone with red sandstone trimmings, consists, as the plans and photographs show, (see figs. 1 to 6) of a central octagonal-shaped tower surmounted by a revolving hemispherical dome, which forms the covering for the equatorial telescope. The wings on each side of this tower recede at an angle of 15 degrees, and the one to the left or west side faces due south. The transit house, an extension of the west wing, one story in height, and now in course of construction, is for the purpose of housing the meridian circle and transit instruments used for the determination of time, longitude and star positions.

On entering the main door, which is surmounted by a fine coat of arms, carved from the red sandstone, one passes either to right or left around a circular wall of pressed brick which encloses, but is entirely separated from, the circular concrete pier, 9½ feet in diameter, which rises, from a stone foundation below the basement, nearly to the floor of the equatorial room, and forms the support for the telescope. The central hall, directly to the north of the circular entrance hall, leads east and west by corridors, to the rooms and offices in the wings, while the main staircase, of iron with slate treads rises to a landing and from thence back to the first floor. All the corridors and halls are faced with pressed brick and paved with tile, and the whole building is of a thoroughly fire-proof construction.

In the east wing on the ground floor the director's room, at the southeast corner of the building, overlooking the farm and the city, is very conveniently situated, being directly across the corridor from the library and reading room, and communicating with the secretary's (Mr. Simpson's) office, which in turn opens into the messenger's room, where the stationery supplies are kept. The reading room, in which the principal astronomical and scientific periodicals are kept on file, opens into the library which is fitted with steel bookcases with adjustable shelves and sliding plate glass doors.

In the west wing, besides an astronomer's (Dr. Klotz's) and computing offices, is the time service room in the northwest corner of the building. The switch-board and appliances, from which the electrically actuated dials not only in the observatory but in the central and departmental blocks are controlled and regulated, are placed in this room which opens through a small room used for chronographs into the transit house. The whole instrumental equipment for maintaining and communicating standard time, which is fully described in another section of this report, is thus controlled from this room, while the time itself is determined in the transit house entered from this room through the chronograph room where the transits are recorded. The transit house, which is now approaching completion, has piers for two transit instruments, the westerly one, provided with subsidiary piers for collimating telescopes, is to hold the standard transit instrument, the easterly one to be used for the field instruments in determining personal equation. Beyond the transit instruments, in the westerly section of the building, a 6-inch meridian circle by Troughton & Simms is to be installed.

Proceeding to the first floor by the main staircase in the central hall a somewhat similar plan, corridors running east and west, is here met with. To the south of the central hall is the staircase leading to the midway and equatorial floors, and directly over and of the same shape as the entrance hall is a circular room fitted with concentric steel cases for the storage of instruments and apparatus. In the west wing on the south side of the corridor is a large room extending the whole length of the wing intended for public lectures and demonstrations on astronomical and scientific subjects. Water supply and electrical connections are provided with a view to convenience in arranging experiments and demonstrations. A large draughting room at the end of the corridor has provision for the storage of the various maps and plans used in connection with boundary surveys.

In the east wing besides a draughting room, an astronomer's (Mr. Plaskett's) and the chief computer's (Mr. Macara's) offices, is the photographic room, at the end of the corridor and extending across the whole width of the wing. A large skylight at the north end of the room gives light not only for printing purposes but also to a 16-inch by 20-inch copying camera placed on casters so as to be readily wheeled to the most evenly lighted position. The dark and enlarging rooms are placed overhead in the southerly half of the room, and are reached by a stairway on the west side. The ceiling of the photographic room is of sufficient height to allow about 7½ feet headroom in these rooms, and 6½ feet in the space below, which is not partitioned off from the rest of the room, and is used for the storage of negatives, for printing when direct sunlight is required, for mounting and other purposes. The enlarging room to the south is fitted with cameras for enlarging and reducing by either day or artificial light. The dark room is entered from the enlarging room, has four large sinks for developing and washing purposes, benches, shelves, cupboard and all the necessary appliances for working plates and paper up to 30 inches by 40 inches in size.

The central tower and a square portion behind it to carry the stairs and landings are the only parts of the building rising above the first floor. The midway floor is on the same level as the roof of the main building which is flat, of tar and gravel, and surrounded by a stone parapet. The roof is of such a solid construction that many observations may be conveniently conducted upon it and the instruments, when not in actual use, may be carried into the midway floor landing.

A circular room, like the instrument room and directly above it, is reached from this landing and has a small room at the north partitioned off and fitted with sink and shelves for use as a dark room for developing the plates used in the photographic and spectroscopic attachments of the equatorial telescope. At the west side is a large tank for storage of water, while the south and east are occupied by a concave grating spectroscope placed on stands of such height as to use sunlight reflected through the south window by a heliostat placed on the balcony outside.

The circular form of the telescope pier is changed at this floor level to a rectangular section about 5 feet by 7 feet and capped by a stone 10 inches thick upon which at the ceiling level rest the adjusting blocks and column of the telescope. The circular surrounding wall also ends at the same level, and the floor of the equatorial room above is supported by eight iron columns. The space between these columns and the rectangular pier is to be used for the storage of astronomical negatives.

The equatorial room directly above is also circular in shape, about 30 feet in diameter, and is covered with a hemispherical dome which revolves on a circular track 9 feet above the floor, laid on and securely bolted down to the stone walls. The dome, which is constructed of steel ribs covered with wood and sheathed with copper, is built upon a rigidly braced steel ring, to which the running gear is attached (as shown in figs. 8 and 9) and is easily turned by pulling an endless rope running over a pulley, geared to the turning mechanism. The shutter which is in two halves opening apart, and which extends from the bottom to about ten degrees beyond the zenith, giving an opening 5 feet wide, is also easily opened and closed by another endless rope, which causes wire cables to roll the halves apart or together on rails at the top and bottom. The room is lighted by ten windows, five each to the east and west, the south being occupied by the tower clock and the north by the stairs and two cupboards for the storage of accessories to the telescope.

In the basement which only remains to be described are some rooms worthy of mention. The clock room to the north of the telescope pier is in no part nearer than 10 feet to the external walls and is therefore well adapted for being maintained at constant temperature, a necessary provision for accurate time-keeping. In this room are the standard sidereal and mean time clocks which, as before stated, can be compared and controlled from the time service room. In the other sections of the annulus around the pier is a room for pendulum observations and the determination of gravity, and another for the storage and rating of chronometers. The workshop situated in the east wing contains a motor generator furnishing power to run the machine tools and to convert alternating current into direct current for charging accumulators and for experimental work. The switch-board, besides the motor generator (both shown in fig. 7), controls the lighting, experimental and battery charging circuits, but the electrical installation and the machine tools will be more fully described later on. The battery room in the west wing contains a large cupboard for the storage batteries, and a switch-board for connecting any of the batteries to any circuit. Beyond this is a small chemical laboratory and, in the corner under the time service room, a room for solar research.

The tube of a coelostat reflecting telescope to be shortly installed will come underground from the concave mirror 80 feet north to form a large image of the sun just outside the room, where it can be photographed or examined with powerful stationary spectroscopes. The seismograph room is in the centre of this wing, and like the clock room entirely away from outside walls, while the other two large rooms are to be used for standards and for experimental purposes. A passage way under the vestibule at the end of the wing leads from the two corner rooms either outside or to a room under the transit house which is to be used for the storage of the heavy field instruments and their cases.

ELECTRICAL INSTALLATION.

The building is supplied with electricity for light and power from the alternating current mains of the Ottawa Electric Company. A large transformer on a pole about one hundred feet north of the building reduces the potential to 104 volts. The current is carried from the transformer, in a lead covered cable, underground into the workshop and thence to a large double pole switch at the bottom of the switchboard. Here it is subdivided into three branches, each having a meter in circuit and controlled by a switch, one leading to the motor generator, and the others to the main lighting circuits.

The lighting and experimental wires throughout the building are carried in iron armoured conduits installed in a substantial manner and arranged for the easy drawing in of new wires or the withdrawal of any circuit needing repairs. Lights in all the rooms are controlled by press button switches placed near the doors in a most convenient position. Many of the rooms also have double pole knife switches, with binding post terminals, attached directly to the mains for power, heating, or projection purposes.

The motor generator (fig. 7), made by the Westinghouse Company, is of $7\frac{1}{2}$ K.W. capacity, the generator being wired to supply 60 amps. at 60 to 90 volts. The induction motor controlled by the switch to the left of the board is directly connected to the generator by a simple clutch coupling which can be readily thrown out of gear when the generator is not required. The mains from the generator lead through a Weston Station ammeter and a double pole switch on the front, to bus bars at the back of the board, and from these bus bars three branch circuits are run, one for experimental purposes and two for charging batteries. The experimental circuit, controlled by a switch on the front of the board, has a large adjustable rheostat from 0 to 100 ohms, and with a current carrying capacity of 60 amperes inserted in series with it and runs to double pole switch terminals in the rooms where it is likely to be used. In any of these rooms direct current may be obtained of any desired strength to 60 amps. and at potentials up to 90 volts. Each of the two battery circuits are also controlled by a switch and have an adjustable rheostat of suitable capacity in series with them. They proceed directly to the battery room, and are connected with the storage battery terminals, one to the small cells charging current 4 amperes, and one to the large cells charging current 20 amperes. A Weston volt-meter range 0 to 100 volts is placed in the upper right hand corner of the switch board and arranged with a four-point contact switch to give, as desired, the potentials of: 1, the generator; 2, the experimental circuit; 3, the large batteries; 4, the small batteries. Hence, in order to charge the batteries, it is not necessary to leave the workshop as the current and voltage can be read from the switchboard instruments. In addition, a recording volt-meter in circuit with the lighting mains gives a continuous record of the variations in the voltage, while a ground detector serves to give notice of any leak in the circuits. The arrangement of the switchboard is clearly shown in fig. 7.

The storage batteries are contained in a ventilated cupboard with glass doors and sides. The battery jars are placed on strips of plate glass, inserted on edge into wooden shelves. There are installed in this cupboard 50 type C 7 chloride accumulators, capacity 35 ampere hours, used for the time service, and 20 type E. 9 chloride accumulators, capacity 200 ampere hours, for experimental purposes. The switchboard directly opposite the battery cupboard is arranged so that any single cell or any number in series may be connected to any desired circuit, the small cells to the time service circuits and the large cells to six experimental circuits proceeding from knife switches on the board to the rooms where the current is likely to be used.

A very convenient intercommunicating telephone system is also installed in the observatory. Telephones in every important room have each a small switchboard attached with press buttons for every other telephone. All that is necessary in order to converse with any one is to press the corresponding button which will connect your telephone with his and ring his bell. The act of hanging up the receiver automatically disconnects the telephones. Moreover any other pair in the system can be used at the same time without interference.

INSTRUMENTS.

The Equatorial Telescope.

The objective of the telescope, of 15-inch aperture and 19 feet focus, was made by the Jno. A. Brashear Co., of Allegheny, Pa., while the mounting was constructed by the Warner & Swasey Co., of Cleveland, Ohio. The objective was designed by Dr. Charles S. Hastings, of Yale University, and differs from the usual type of telescope objective in having the flint element in front of the crown. One advantage of this type, besides the optical advantages claimed by the makers lies in the fact that flint glass is much less susceptible than crown to atmospheric influences, and much less likely to have moisture condense upon the surface. The mounting is of the same type as that used by Warner & Swasey in the Washington, Lick, and Yerkes refractors, which has proved so satisfactory in every respect. A description of the mounting and method of operation of the telescope will properly come first and be followed by a description of the accessories.

Two plates provided with screws for adjustment of the column in altitude and azimuth rest on the stone cap at the top of the pier about 8 inches below the floor level, and on these plates rests the hollow iron column of the telescope. This column which is in two sections as shown in figs. 8 and 9, tapers up from the base in graceful curves, ending, in the upper section, in straight lines. It is about 5 feet by 3 feet at the base and 2 feet 4 inches by 1 foot 1 inch at the top, and 9 feet high. The upper section of the column serves as clock case, access to which is given by a glass door at each side, while a door in the lower section admits to the clock weights which descend inside. The column is capped by the polar head (fig. 10), a substantial casting of neat and graceful design, which is bored to admit the polar axis at an angle equal to the latitude of the observatory about 45° 23′ 30″. In these bearings the polar axis turns, resting on a ball thrust bearing at the south end and having, on the north end, two steel rollers pressed up against the axis by an adjusting screw and lever. By forcing the rollers against the axis, the greater part of the pressure on the bearing surface can be relieved, and the friction consequently reduced until the axis with telescope attached turns very easily in its bearings.

The axis itself has an enlargement on its upper end to which the declination bush is firmly fastened by screws. The driving worm wheel is situated between the upper bearing and the bush and is loose on the slow motion sleeve, being clamped to it when required by a V-shaped block forced into a groove turned in the sleeve by a screw, connected by gearing in the declination bush with the right ascension clamp and slow motion rod on the side of the tube. Between the bearings on the polar axis are three insulated rings with brushes for transferring the illuminating current from the stationary to the moving parts, a large bevel gear for moving the telescope in right ascension by the hand wheel seen on the north of the column, and the hour circle, containing both coarse and fine graduations, the coarse to 5 minutes on the outer edge of the rim, and the fine on the lower side reading by two verniers to 2 seconds. These verniers are read through the two telescopes projecting out of the north end of the column above the dial and hand wheel, the light being carried down through the tubes by reflecting prisms to the telescopes below.

The declination bush is hollow, carrying the declination axis, which is enlarged at one end, like the polar axis, to carry the telescope tube. The axis ends before reaching the coarse declination circle which is fixed to the bush, the pointer being moved by means of intermediate gearing from the end of the axis. The fine declination circle is on the outer edge of the wheel seen close to the tube and the declination is read from the verniers to 30 seconds of arc through the two tubes above and below the telescope tube and extending down to the eye end. By this convenient arrangement of reading telescopes the hour angle of the telescope is read from the end of the column, where it is moved in right ascension, and the declination is read from the eye end where it is moved in declination. The clamp and slow motion in declination, worked from the smooth pair of knots on the inside of the telescope tube acts in the same way as the right ascension mechanism, having corrugated knobs, by forcing a V-shaped block into a groove turned in the axis. The clamp in both cases is actuated by the smaller knob which turns a steel rod inside the brass tube which is itself turned by the large knobs, and controls the slow motion mechanism, whose action will be readily understood from fig. 10.

The telescope tube, whose construction is also shown in the illustrations, consists of a central section of cast-iron 18 inches in diameter and 12 inches long, firmly screwed to the declination axis. A flange at each end of this section is firmly screwed to two brass flanges in which the eye and objective sections end. These sections 17 inches in diameter, are constructed of sheet steel $\frac{1}{8}$-inch thick in lengths of 2 feet firmly rivetted together forming a rigid and comparatively light tube about $17\frac{1}{2}$ feet long, the eye end being 6 feet and the objective end $10\frac{1}{2}$ feet long. A brass flange is screwed to the upper end for holding the objective and a cast-iron collar firmly screwed to the eye end serves to hold the telescope tail piece into which the different attachments screw. This tail piece, made of brass, is held by four capstan headed screws, and allowance for collimation adjustment is provided by four abutting screws through the collar. A hole through the tail piece $8\frac{1}{2}$ inches in diameter is threaded and then sections of the thread milled out; the corresponding male threads on the eye-piece adapter, the spectroscope adapter, and the solar camera, all of which are interchangeable in the tail piece, are treated in the same way, the result of the process being called, technically, a quartered or mutilated screw. To attach any of these pieces all that is necessary is to insert them into the tail piece, push home, and give an eighth turn which clamps them rigidly in place, unscrewing being prevented by a small pin going through the side of the tail piece, and caused, by a spring, to enter a hole in the attachment. Detachment is effected by lifting the pin, turning back one-eighth revolution and then pulling out. If the screw were complete not only would the pieces be more difficult to enter, but six or seven revolutions instead of one-eighth would be required.

The two finding telescopes, one of $2\frac{1}{2}$ inches, and the other of 4 inches aperture, are fastened to the outside of the tube by adjusting screws to admit of their axis of collimation being made parallel to that of the telescope. The eyepieces, which have cross-wires of fairly coarse wire, large enough to be visible without artificial illumination, are brought down to a convenient position, somewhat lower than the tail piece, but above the main eyepiece. Between the finders are two steel rods, screwed to the tube, carrying counterweights weighing 12 pounds each, which can be removed or added to, according to the attachment in use, to balance the tube in declination. For instance when the spectroscope is attached all the counterweights have to be removed, as it is not only much heavier than the eyepiece or micrometer, but extends beyond the focal plane. The telescope is balanced in right ascension by large weights, about 50 pounds each, screwing in and out on an extension of the declination bush so that the necessary balancing of the telescope in both directions can be readily accomplished.

The driving clock (fig. 11) which is contained in the upper section of the column, to which access is had by glass doors on each side, is of the regular type of conical pendulum clock built by Warner & Swasey. The governor balls are bored slightly out of the centre so that, by turning on their axes to a graduated scale, the effective length of the arms and consequently the rate of the clock is varied. When the speed of the balls approaches the limit, they rise from their position of rest and cause small fibre friction pads to rub on a circular brass cylinder attached to the top of the case, concentric with the spindle. The motion of the governor spindle is communicated by a train of reducing gears to the connecting rod, shown going up through the column, which in turn by a pair of mitre gears turns the worm, which gears into the driving worm wheel on the polar axis. The clock also drives, by another train of gears shown at the right of the figure, the setting circle shown on the north side of the telescope column. This consists of two concentric circles divided each into 24 hours, and each hour into 5 minute divisions. The outer circle, fixed to the column, has the 24-hour division at the top, while the inner circle turns with the clock, one complete revolution in 24 hours, by friction only so that it can be set to any desired position. The pointer of celluloid with vernier reading to minutes extends across both circles, and is attached by an independent train of gears to the polar axis. It indicates the hour angle of the telescope by its reading on the outer circle, while the inner circle shows the sidereal time. In order to set this circle correctly, when the clock is started, all that is necessary is to move it until the reading opposite 24 hours or 0 hours on the outer circle corresponds to the sidereal time at the instant of setting; or if the sidereal time is not known, turn the telescope to bring any star of known right ascension in the centre of the field and then set the dial so that the pointer shows this right ascension. After this setting is made, any star above the horizon can be brought into the field, after setting the telescope in declination, by turning the telescope by the hand wheel below the dial until the pointer indicates its tabular right ascension. All mental arithmetic and many mistakes are avoided by this simple and useful device, which answers, with the use of the coarse declination circle, for all ordinary finding purposes. The closer readings given by the verniers on the fine declination and hour circles will only be required for adjusting the telescope and similar purposes.

These readings are obtained as before stated through reading telescopes conveniently situated near the places where the separate movements are given. For work at night each vernier is illuminated by a small electric lamp which is part of a system of electric illumination fitted to the telescope. In addition to two lamps each at hour and fine declination circles, there are two at the coarse declination circle, one above the setting circle, a hand lamp at the eye end for reading the position angles of the micrometer and spectroscope, and a lamp for illuminating the wires or field of the micrometer. The wires are led up through the column, and the current is carried to the moving parts by brushes bearing on insulated rings on the polar and declination axis. A three-point switch below the setting circle controls its lamp and those of the hour and coarse declination circles, while the switch for the fine declination circle is at the eye end convenient to the reading telescopes.

The whole arrangement of moving mechanism, finding circles and electric illumination is extremely convenient and complete, while the whole mounting is constructed in the best possible manner, is a credit to the makers, and very much facilitates working with the instrument.

Telescope Accessories.

Eye-piece Adapter.

The eye-piece adapter (shown in fig. 8), which is fastened into the tail-piece of the telescope by an eighth turn of its quartered screw, has a concentric inner tube 4½ inches in diameter, moveable for adjustment to focus through a range of 9 inches by a rack and pinion. There is another quartered screw in the end of this tube 3 inches in diameter into which the micrometer and the attachment for eye-pieces, &c., fasten; while in the eye-piece attachment a second tube 2½ inches in diameter slides, into which the eye-piece tube, the solar attachment, and the registering photometer can be screwed.

Six Huyghenian eye-pieces fitting either into the eye-piece tube, the diagonal prism, or the solar attachment are supplied, with powers ranging from 125 to 750. The solar attachment is provided with a reflecting polarising arrangement, and the intensity of the image can be varied at pleasure by rotating the outer end. A wide angle eye-piece, with a power of 110, but giving a considerably larger field than the lower power eye-piece, is also provided and it screws into the same slip tube as the solar attachment. Further a diagonal prism into which the eye-pieces can be placed is also provided for convenience of observations near the zenith. The eye-pieces and photometer are clearly shown in fig. 12.

The Photometer.

The photometer, for the determinations of star magnitudes, was designed and made by Brashear and is of the wedge pattern, with a registering attachment. The essential part of the instrument is the wedge-shaped strip of dark glass, which can be moved back and forward under the eye-piece by a quick-acting rack and pinion. The amount of light absorbed by the glass depends upon its thickness, which, of course, varies directly with its distance from the thin end. The photometer is used by comparing the position on the wedge, and consequently the thickness of the dark glass, at which the light from stars becomes completely extinguished. This would have to be done, were it not for the registering attachment, by turning on the light and reading a scale between each observation. This not only takes considerable time, but also diminishes the accuracy of the observations by causing a change in the condition of the observer's eye. A reference to fig. 12 shows a rotating cylinder with a pencil above it arranged to mark on a strip of ruled paper fastened around the cylinder. When the wedge has been moved to the extinction point, a pressure on two keys causes the cylinder to move through a fortieth of a revolution, and, at the same time, presses the pencil on the paper, making a mark. The observation can be repeated and another mark made, or the telescope pointed to another star and another series of observations taken, all very quickly and without turning on the light. The whole sheet, forty readings, may be filled at one time or only a few taken as desired. The observations are readily taken from the sheet, which has a printed scale similar to the scale on the wedge, and the mean of any series easily obtained.

The Position Micrometer.

This is a very complete instrument (fig. 13) by Warner & Swasey, of the same type as that made by them for the Yerkes and Lick observatories. It is furnished with five positive eye-pieces, giving powers ranging from 200 to about 500, and with three dark glasses for solar work. It is furnished with electric illumination of field or wires, the contacts being automatically made when the micrometer is inserted, by means of an eighth turn of its quartered screw, into the eye-piece adapter. The change from the illumination of field to that of wires is made by simply turning a knurled knob, while the light can be made any desired colour by rotating a diaphragm. There is the usual arrangement of one fixed and one moveable vertical wire and a horizontal wire. The micrometer head can be moved from one side to the other by a long screw knurled at each end, while another quick-moving screw permits the eye-piece to be moved with respect to the wires. The distance between the vertical wires is read off on a large micrometer head graduated to hundredths, and readily estimated to thousandths, while the number of revolutions of the head is read off on a dial beside the head. The position circle is graduated on silver to half degrees, and is read to five minutes by two verniers. The instrument is arranged so that micrometrical work can be done with the greatest ease and convenience.

The Solar Camera.

The solar camera made by Brashear and shown beside the telescope column in fig. 9, is attached to the tail-piece of the telescope by an eighth turn of its quartered screw, in the same way as the spectroscope and eye-piece adapters. A negative lens of 3½ inches aperture and 30 inches focus is placed within the focal plane, and forms an enlarged image of the sun about 6½ inches in diameter, 42 inches beyond the focal plane. The camera part, which is connected with the lens by a conical tube of thin sheet metal, is intended for 8 by 10 plates. The lens as well as the camera back is adjusted to focus by a rack and pinion. The exposing shutter for solar work consisting of a narrow adjustable slit in a metal plate, is placed about one-third the way down from the lens, and is drawn rapidly across the beam of light by a spring. If desired to use the camera for the moon or other celestial objects, this shutter can be entirely removed and exposures made by a cap on the enlarging lens, opened and closed by a rod extending down the camera tube. The camera extends nearly 5 feet beyond the tail-piece, but is light enough to be well within the range of counterweights provided for the telescope. In fact it does not disturb the balance so much as the spectroscope which requires the removal of all the weights from the eye end and a considerable change in the balance in right ascension.

The Spectroscope.

The universal spectroscope, also by Brashear, is of a similar design to those, by the same maker, of the Allegheny and Lick observatories, and is designed for general spectroscopic work. The general design and arrangement of the spectroscope, when used with the train of three prisms, is shown in fig. 14, while the other accessories are seen beside it. The spectroscope is attached to the equatorial by the adapter, consisting of a cylindrical sleeve with a quartered screw fitting into the telescope tail piece and fastened by an eighth turn. A collar, to which are attached two tubes 31 inches long and 1⅜ inches in diameter, parallel to and equidistant from the axis, rotates upon the sleeve while a graduated circle allows it, and consequently the spectroscope, to be set to any required position angle. The frame of the spectroscope is attached in any desired position to the two tubes by four hinged clamps. The collimator tube passes through the frame of the spectroscope midway between the adapter tubes, and consequently in the optical axis of the telescope. It moves by rack and pinion longitudinally through a range of adjustment of 2 inches, and its position can be read on a millimetre scale.

The slit at the front end of the collimator tube has jaws of speculum metal, highly polished, and inclined slightly, so that light from a star may be reflected back, and to one side, out of the way of the incident light, into a telescope, forming an efficient means of guiding or keeping the star image on the slit. The slit jaws are moved apart by a screw forcing a cone between them, and are brought together by a spring, and the head of the screw is graduated indicating slit openings of thousandths of an inch. A diaphragm constructed like that used by Hartmann at Potsdam is placed close in front of the slit. It moves in a slide between adjustable stops so that any desired width of star and comparison spectra may be taken on the plate. It may readily be removed so that the whole length of the slit is unobstructed, or other diaphragms with any desired arrangement of apertures may be inserted in its place. The length of the slit can also be limited by two metal plates behind it, and the whole slit mechanism is fastened in a tube sliding within the collimator tube and focussed by rack and pinion, the position likewise being read off on a millimetre scale.

The collimator is supplied with two triple cemented objectives of 1¼-inch aperture and 15 inches focus. They were specially computed by Hastings, one being corrected for the $H\gamma$ region, to be used for radial velocity work with ordinary plates, and the other for the region around λ5600 to be used with orthochromatic plates and for visual purposes.

The three prisms in the prism train are of medium dense flint, index for $H\gamma$ about 1·64, and they give excellent definition. They are mounted on a minimum deviation device so that they may be used on any part of the spectrum, but are specially intended for the $H\gamma$ region. They are of such a size as to transmit undiminished the parallel beam of light from the collimator. The semi-circular brass box, in which they are contained, has screws passing down through its cover which may be used to exert pressure on the top of the prism cells, and prevent any movement during the long exposure required on stellar spectrograms. The prism box is rigidly fastened to the prism table and to the frame of the spectroscope, and the camera which screws into the end of the minimum deviation train by a quartered screw is braced by a pair of rods clamped firmly to it and to the frame, further stiffening the prism box and making the whole instrument thoroughly rigid, a prime necessity in line of sight work.

The camera, like the collimator, has two triple objectives of 1¼-inch aperture and 15 inches focus corrected for $H\gamma$ and λ5600. They are focussed by means of a rack and pinion and the position can be read off on a millimetre scale. The camera tube, which is of large diameter, is thoroughly diaphragmed and has a tilting back adjustable to any required inclination. The plate holders, four in number, of metal, slide into this tilting back and hold plates 2 inches by 3 inches on which a spectrum 2¼ inches long and any width to ⅝ inches may be photographed. The observing telescope screws into the same place as the camera and has an objective of about 10 inches focus. This telescope has a micrometer attachment with three eye-pieces for measuring wave lengths, the cross wires being illuminated by a small electric lamp permanently attached to the micrometer. A diaphragm with coloured glasses admits of the light being made any desired colour.

The spectroscope is provided with two single prisms of light and dense flint indexes of 1·60 and 1·73 respectively and with a Rowland plane grating of 2½-inch aperture, ruled surface 1·25 ins. by 1·9 ins. and 15,000 lines to the inch. Either of the prisms or the grating may be placed on the rotating prism table when the prism train box is removed, being held in position by two screws and covered with adjustable covers. The camera and observing telescope are, in this case, screwed into a swinging arm pivoted concentrically with the prism table to the spectroscope frame. A double graduated circle on silver provided with verniers reading to 10 seconds of arc gives the position of this arm and of the prism stand, thus allowing the instrument to be used as a spectrometer.

Numerous other accessories are provided, chief among which are: 1. Attachment for comparison spectra which fastens to one of the tubes and swings back out of the way when not in use. It is provided with terminals for metallic electrodes and a holder for vacuum tubes. 2. A cylindrical lens for visual observations of star spectra. 3 A telescope for observing the image reflected from the slit plates for guiding during exposures on stellar spectra. 4. A similar telescope attached to the prism train which receives the light reflected from the surface of the first prism, and hence guides by the light transmitted through the slit. 5. A perforated nickel-plated disc for screening part of the sun's heat from the slit mechanism. 6. A tripod stand to hold the spectroscope for laboratory purposes and other minor accessories.

For photographing stellar spectra, a correcting lens to bring the focal points for the rays of short wave length to the same point is necessary. The telescope objective is corrected for the visual rays, and the focal points for the blue and violet light are distributed over a range of about an inch. The correcting lens of three inches aperture, placed about 36 inches inside the focal plane in a tube attached to the adapter, brings the actinic rays to the same focal point, about 2 inches inside the visual focus, and allows a long range of spectrum to be photographed on the plate, while if the correcting lens were not used only a very short portion could be obtained at once. A spectrum of Arcturus, taken with the spectroscope, and with a comparison spectrum of the iron spark on each side is reproduced in fig. 15, about three and a half times enlarged.

The Stellar Camera.

For photographing stars and nebulæ, a camera with a photographic doublet of 8 inches aperture and 40 inches focus, made by Brashear, is bolted, as shown in figs. 8, 9 and 10, to the centre of the telescope tube opposite to its place of attachment to the declination axis. It takes a plate 8 inches by 10 inches in size, and gives a circular field of 8 inches in diameter or about 11° 20′. This lens gives exquisite definition over a field of 7° or 8° and by averaging may be extended a little further. The following information regarding the type and construction of the lens is given by Dr. Brashear.

'The general construction is that which was first found by Petzval years ago, and has proven itself quite the best, where great angular aperture with sharp definition is imperative. The curves have been somewhat modified from our experience in the construction of other lenses—particularly those made for Dr. Max Wolf, of Heidelberg, Germany. It departs, however, from the ordinary practice of opticians in being corrected for short wave lengths of light. This would be quite objectless in a camera which is to be used for portraits, but is not without moment in astronomical photography. The materials employed were specially chosen for their transparency, the flint being very light and the crown very white. The focal lengths of the front and rear combinations are in a ratio of about 7 to 12, while the focal length of the system is very nearly five times the aperture. The focal length you may find very slightly modified: indeed it is our custom to balance the inevitable zonal differences of magnification, which difficulty is found the most formidable to all constructors of astronomical photographic objectives.'

The camera itself consists of a metal tube, having at the front end an inner sliding nickelled tube containing the objective, which is focussed by a rack and pinion, and, when the correct focus is obtained fixed in position by a clamp screw. This position, which of course is obtained by trial, is read off on a millimeter scale. At the back of the camera is a metal frame into which the plate holder slides, being held down to the frame by springs. A metal shutter over the objective is actuated by a rod extending down the camera tube. The guiding is done by the micrometer wires in the telescope, and, owing to the much greater focal length of the telescope objective, it is easy to obtain accurate guiding. A photograph of a portion of the Milky Way taken by this camera is reproduced in fig. 16. The centre of the photograph is at R.A. 21 h. 32 m., Decl^{n} + 49° 05′. Exposure 6 hrs. 20 mins. The beautiful definition given by this objective is well shown in this photograph.

Cooke Equatorial Telescope.

A Cooke-Taylor 4½ photo visual objective of 81·8 inches focus is supplied with a very complete equatorial mounting by the same firm. A large and solidly braced tripod serves for the base of the instrument, which is of a portable character and so packed in boxes that it may be taken into the field with little more difficulty than a transit instrument. The equatorial head is adjustable for any latitude, and has hour and declination circles graduated on silver, and reading by verniers to minutes of arc. A powerful driving clock, which is mounted on a sub-base about half way down the tripod legs, is connected by an adjustable rod to the worm engaging in the worm wheel on the polar axis. The clock stand is connected to the three tripod legs thus bracing and stiffening the instrument. The telescope tube of brass, and lined with black velvet to prevent reflection, is in two sections for portability. It is supplied with four eyepieces ranging in power from 50 to about 250, and with dark glasses for solar observations. The eye end is readily detached by removing a pin and turning counter clockwise about 10°, and a camera back, with a focal plane shutter using a 4¾-inch by 6½-inch plate, is readily attached in its place. This is adjustable to focus and, owing to the property of the photo visual objective of bringing the photographic and visual light to the same focus, gives exceedingly fine definition for stellar or long-distance terrestrial photography. A negative enlarging lens, attaching inside the focal plane, can be used if desired, giving an equivalent focus of about 20 feet. At present the telescope is not mounted but it is proposed to place it on the roof of the observatory and protect it with a removable cover. It can then be used for stellar photography, and for visitors when the large equatorial is in use, or has the spectroscope or solar camera attached.

Laboratory Apparatus.

Induction Coil and Accessories.

An induction coil by Queen & Co., capable of giving a 15-inch spark, shown beside the telescope in figs. 8 and 9, is used principally for forming the spark spectra of the elements and more particularly for comparison spectra of the elements for radial velocity work with the spectroscope. A battery of six Leyden jars may be inserted to give more body to the spark, and to get rid of some of the air lines. Current to run the coil may be supplied either from the storage battery circuit, or from a motor generator set of 500 watts capacity. The coil is placed on a stand with casters, having a place for the condensers below, and may be wheeled about to suit the different positions of the telescope. In connection, there is also a complete set of vacuum tubes of the gases likely to be used in spectroscopic work, and a set of spark electrodes of the metals most suited for comparison spectra.

Concave Grating Spectroscope.

This instrument, which was made by Brashear, is installed at the midway floor. The grating is of 4 inches aperture and 10 feet radius of curvature, and is ruled with 15,000 lines to the inch. It is mounted in the Rowland method, which may be shortly described as follows: The grating, placed in an adjustable holder, and the camera box of the micrometer are mounted at the two ends of a braced tube the radius of curvature, or 10 feet apart. The tube with these attachments is placed on two two-wheeled carriages which are pivoted at their centres under the centres of the cameras and grating respectively. Each of these carriages has a grooved wheel at each end about 18 inches apart which run on ⊥ rails the upper edge of which is accurately planed to fit the groove in the wheel and to be perfectly straight and true. These two rails, each about 10 feet 6 inches long, are mounted on steel pillars about 5 feet high, so as to be on a level with the windows, and are placed end to end exactly at right angles to each other. At their intersection, and in the same horizontal plane as the camera and grating, is mounted an adjustable slit. The grating and camera are each placed normal to the line joining their centres. Light coming through the slit and incident upon the grating will be diffracted to a focus at the camera, and it is the peculiar property of this type of mounting that different parts of the same spectrum or different orders of spectra will all be brought to a sharp focus in the camera by simply sliding the tube with its carriages along the rails. Light from the sun may be reflected through the window from a heliostat placed on the balcony outside, while the spectra of the elements may be obtained by reflecting light from the arc or spark into the slit from a closed chamber near the spectroscope.

Other Laboratory Apparatus.

A good assortment of the apparatus most likely to be required in astronomical or astrophysical research is also available. It includes a Fuess heliostat; two projection lanterns with electric arc lamps and with lenses, prisms, mirrors and other accessories for optical experiments and demonstrations; an elbow polariscope and specimens for use with the lanterns; a Scheiner Toepfer sensitometer for testing photographic plates, and a Märtens polarisation photometer for measuring the densities of negatives; a Zeiss comparator with two micrometer microscopes, one reading on a silver scale and the other on the objects to be measured; a large standard resistance box and Wheatstone bridge for the measurement of electrical resistance; a sensitive aperiodic reflecting galvanometer with high and low resistance and ballistic coils; two standard cells for comparing electro motive forces; a Weston ammeter from 0 to 25 amperes, and a Weston voltmeter from 0 to 3 and from 0 to 150 volts; a Wimshurst influence machine and numerous smaller accessories and appliances including an outfit of laboratory supports and clamps.

Iced Bar Measuring Apparatus.

This apparatus made by Saegmuller of Washington and standardized by the United States Bureau of Standards has been received but is not yet in use, pending the construction of a suitable shed to contain it. It will be described in a future report when it has been installed and is in operation.

Seismograph.

This instrument by Bosch, of Strasburg, is arranged for photographic registration of earth movement, the principle being that of the oscillation of a horizontal pendulum. On two brass pillars attached to the base of the instrument, a small support is fixed so as to move forward and backward and obliquely up and down. The weight, a cylindrical metal piece, is bifilarly supported by two wires 18 cm. long which are attached to the before-mentioned support and incline out at an angle of about 20° to the vertical.

The horizontal thrust of the weight is taken by the arm of the pendulum 6 cm. long, whose point of support is nearly vertically beneath the point of suspension of the wires, and the sensitiveness can be increased or diminished by moving the point of suspension backward or forward.

The weight moves freely horizontally about the end of this arm, and directly over the point of support is fixed a concave mirror of 4 metres radius which can be adjusted about both vertical and horizontal axes, so as to send light reflected from it in any desired direction. In order to damp the oscillations of this sensitive pendulum produced by any disturbance, a light aluminum tube extends back from the weight opposite the supporting arm. This tube carries a thin aluminum vane which swings freely, but without much space, in a closed case. In consequence of the resistance of the air which this vane encounters as soon as any movement takes place, all oscillations are very soon lessened without any mechanical friction. This damping can be removed by simply taking away the glass cover of the case.

Two exactly similar instruments are installed one in the N.S. and the other in the E.W. direction, so as to obtain the two components of the disturbance, and the mirrors are so turned as to direct the light from an electric light towards the registering apparatus. This consists of a drum 90 cms. in circumference turned by clockwork once per hour and at the same time moved horizontally 4 cms. by a screw. The light from the two components makes uninterrupted traces on a piece of photographic paper wound on the drum so long as the pendulum is at rest, but any seismic disturbance causes the pendulum to oscillate, and these oscillations are at once recorded on the sheet. The clockwork runs and the sheet lasts for 24 hours, giving a continuous record of the two components during that time, and, since the velocity of the sheet is 90 cms. per hour or 1½ per minute, and the pendulum is very sensitive, the most rapid oscillations will be separated, and the faintest recorded.

Machine Tools.

The workshop, an essential part of an astronomical observatory, especially where astrophysical work is carried on, is fitted with a Hendey Norton 10-inch by 6-foot engine lathe, with all the necessary attachments including a 10-inch 4-jaw independent and a 6-inch 3-jaw universal chuck, and has a set of step-closer chucks fitted to it. It is arranged to cut threads in either English or metric pitch and is thoroughly equipped with small tools and accessories for all work within its range.

The Browne & Sharpe Universal Milling machine, No. 1½, will mill 20 inches long, 7½ wide and 18 inches high. Has index centres, with method of differential indexing that will divide any number to 389 and many beyond, so that gears may be cut or circles divided with the greatest facility. It is well stocked with arbors, milling cutters, and all necessary accessories.

The bench lathe, by the Faneuil Watch Tool Co., is of 8-inch swing, and is supplied with a 4-inch 3-jaw universal chuck, an Almond drill chuck, a set of step-closer chucks to ½-inch, and other accessories.

The shafting running at 200 revolutions per minute is driven from the motor by an intermediate countershaft at 600 revolutions per minute, is supported from the ceiling and belted to the countershafts of the machines. Owing to the low ceiling and limited space, the belts are too short for the best efficiency, but have ample power for the class of work likely to be done at the observatory.

A good birch workbench with drawers and two vices runs along the north wall of the room under the windows, and the shop is well fitted up with shelves for storage purposes.

Field Instruments.

Besides the observatory apparatus above described there is a fairly complete equipment of the field instruments required in the work of boundary surveys with others of a miscellaneous character. Their location in the instrument room, to whom and when lent, and when returned, with other details, are recorded in a card catalogue.

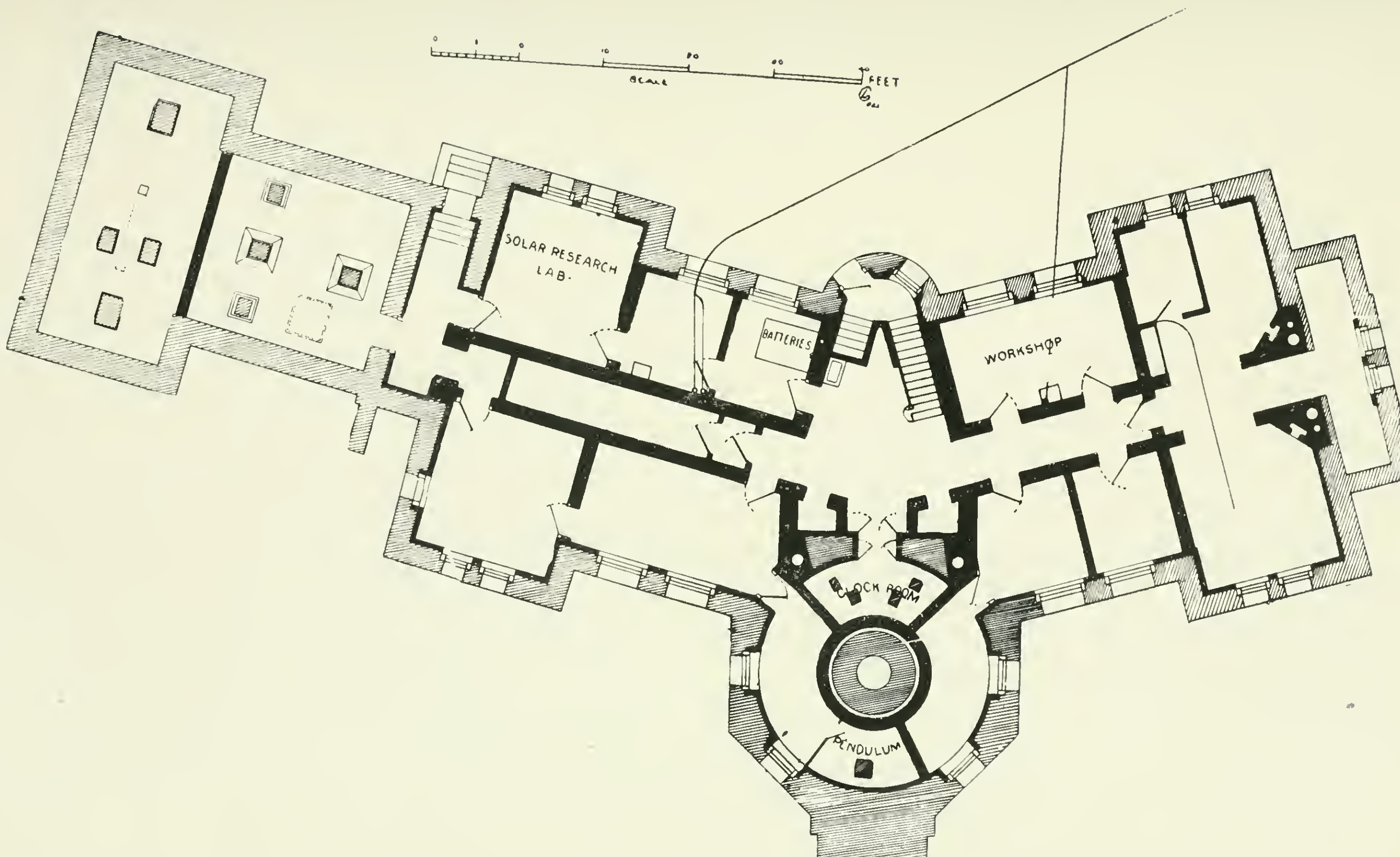


Fig. 1.—Basement of Observatory.

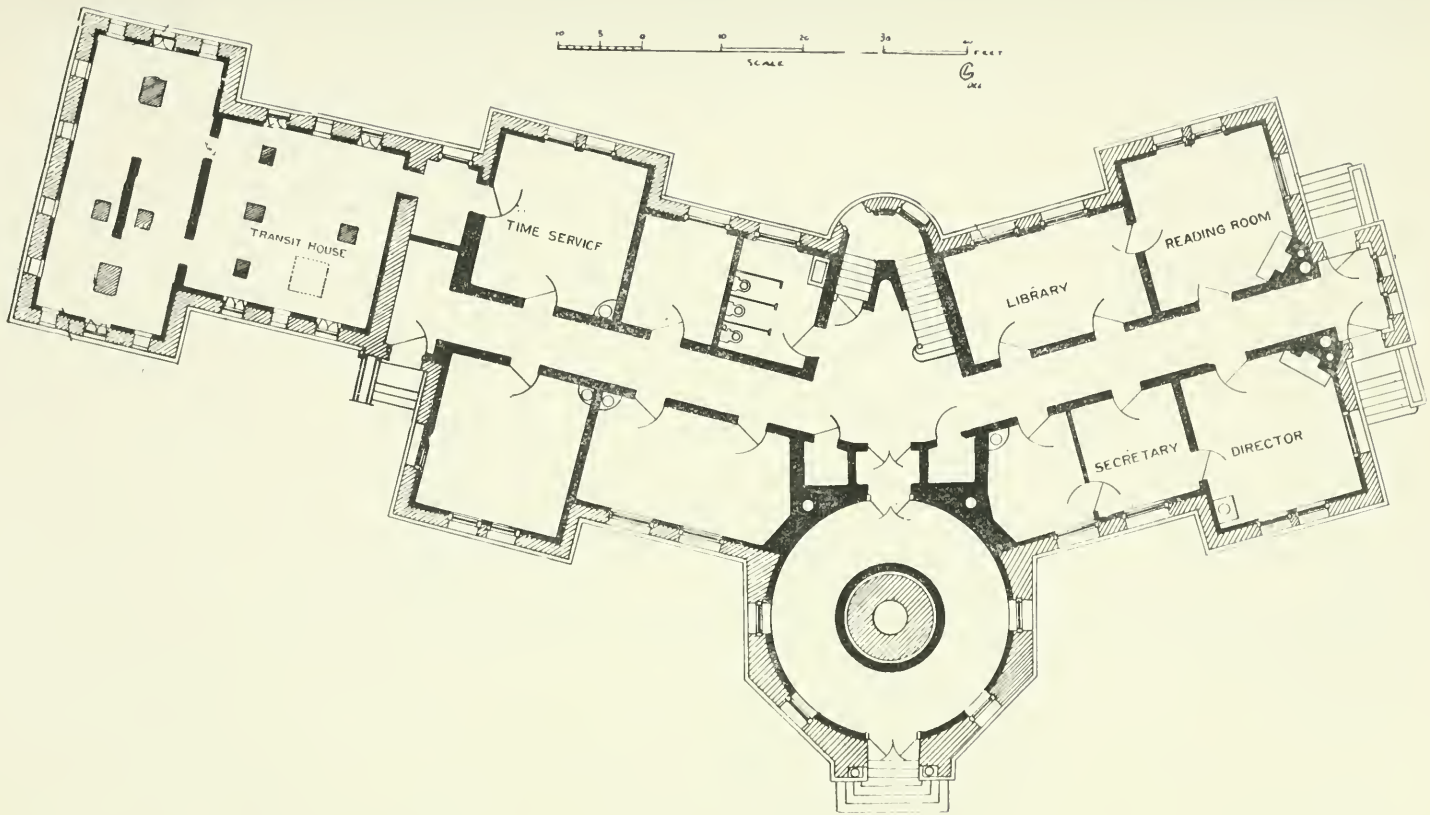


Fig. 2.—Ground Floor of Observatory.

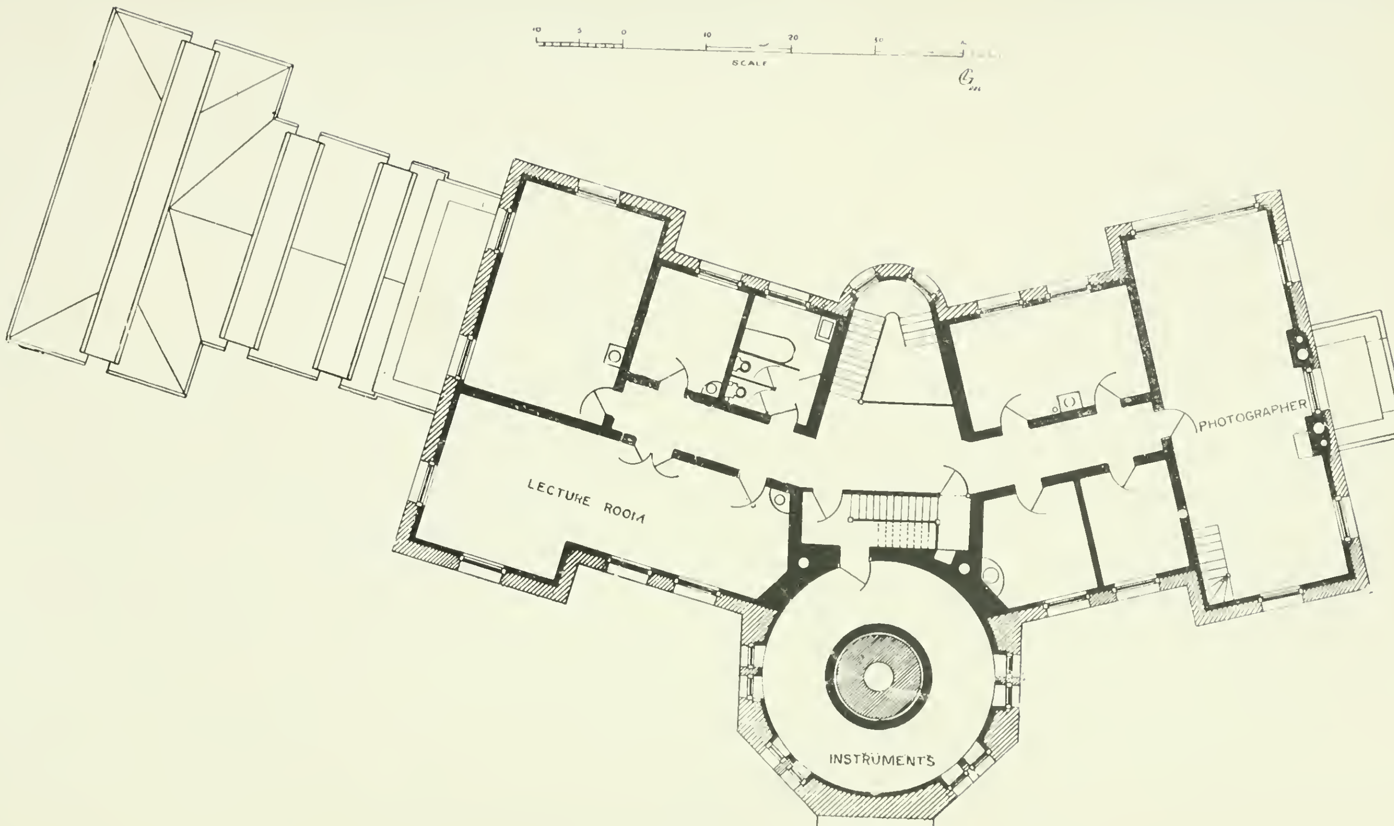
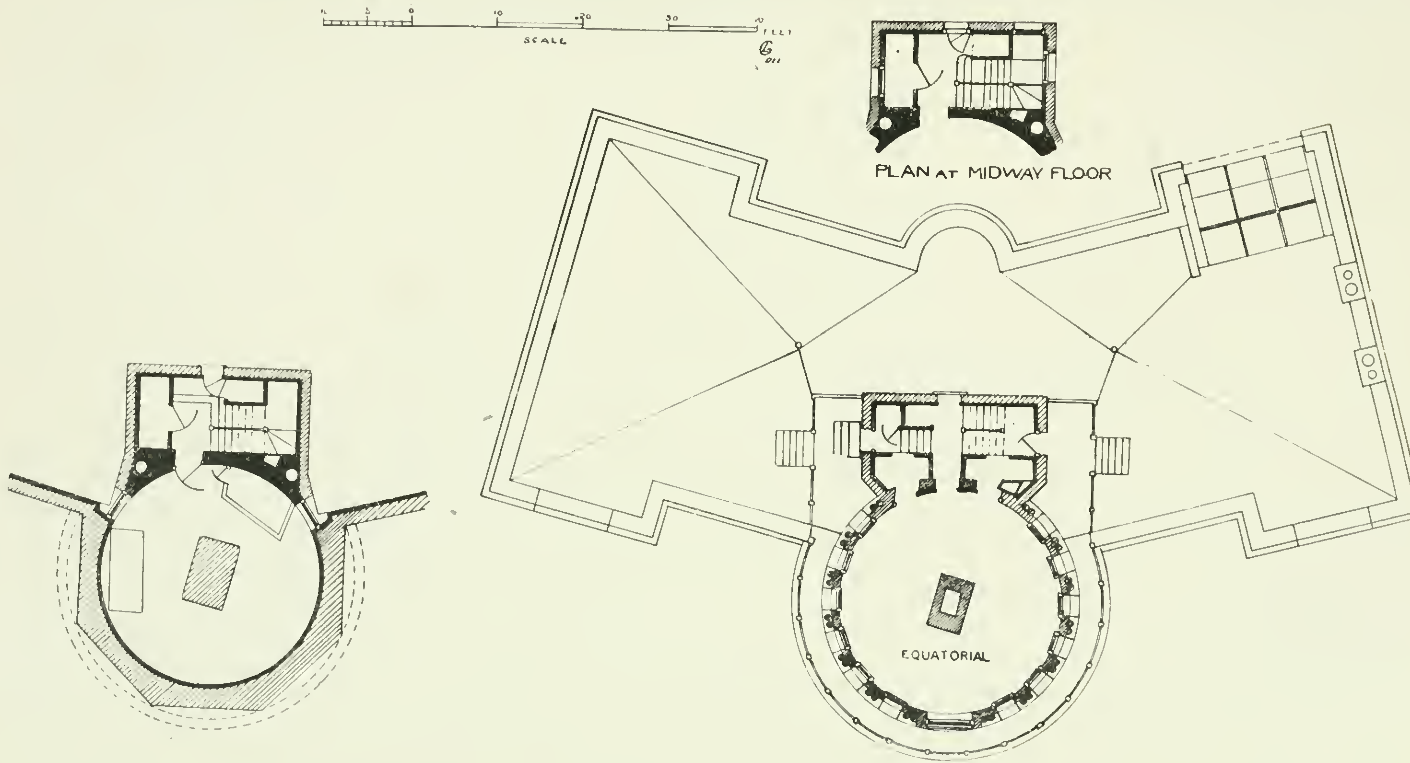


Fig. 3.- First Floor of Observatory.



Midway Floor. Fig. 4. Roof of Observatory.

Fig. 5.—Front of Observatory.

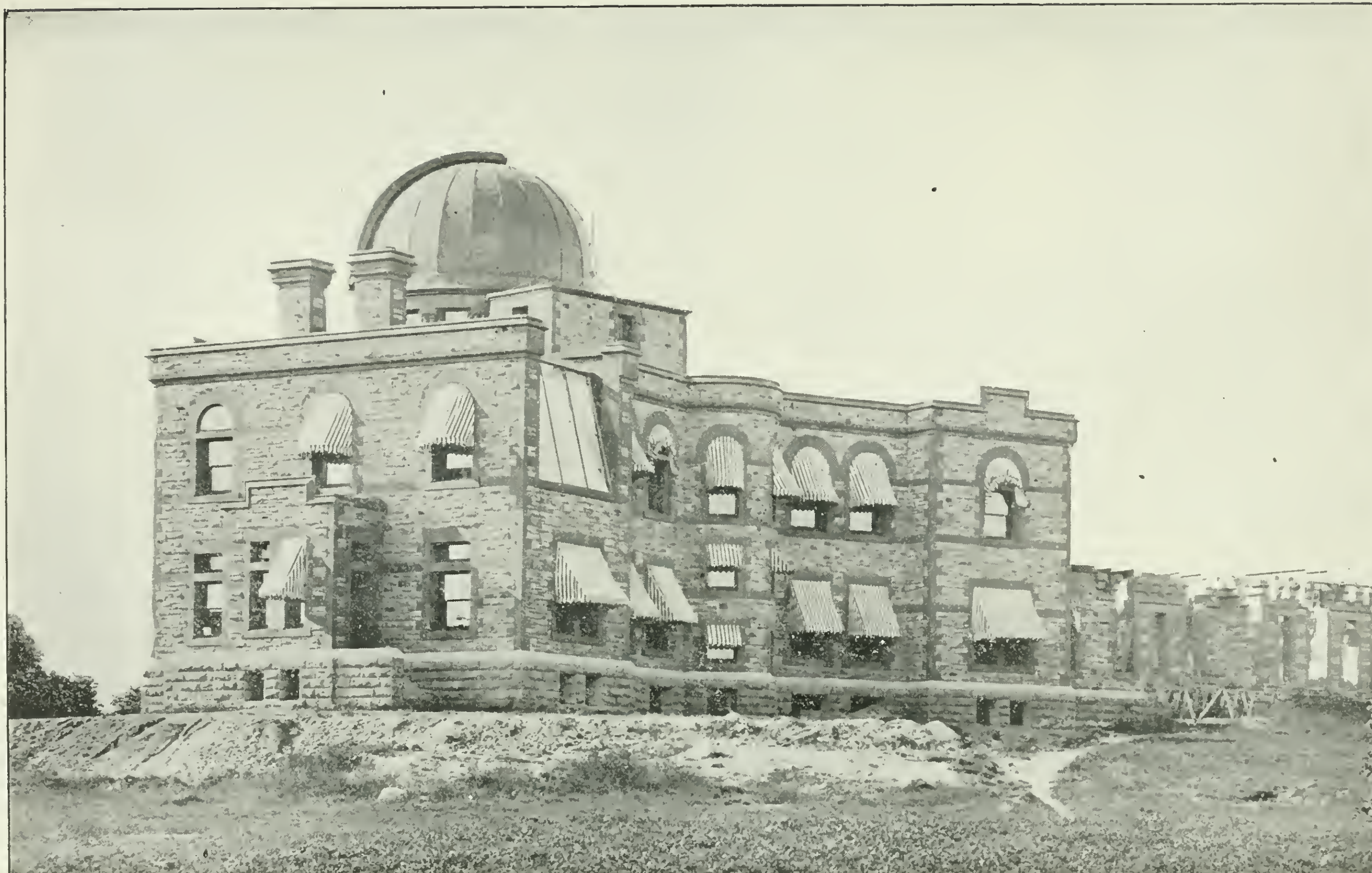


Fig. 6.—Rear of Observatory.

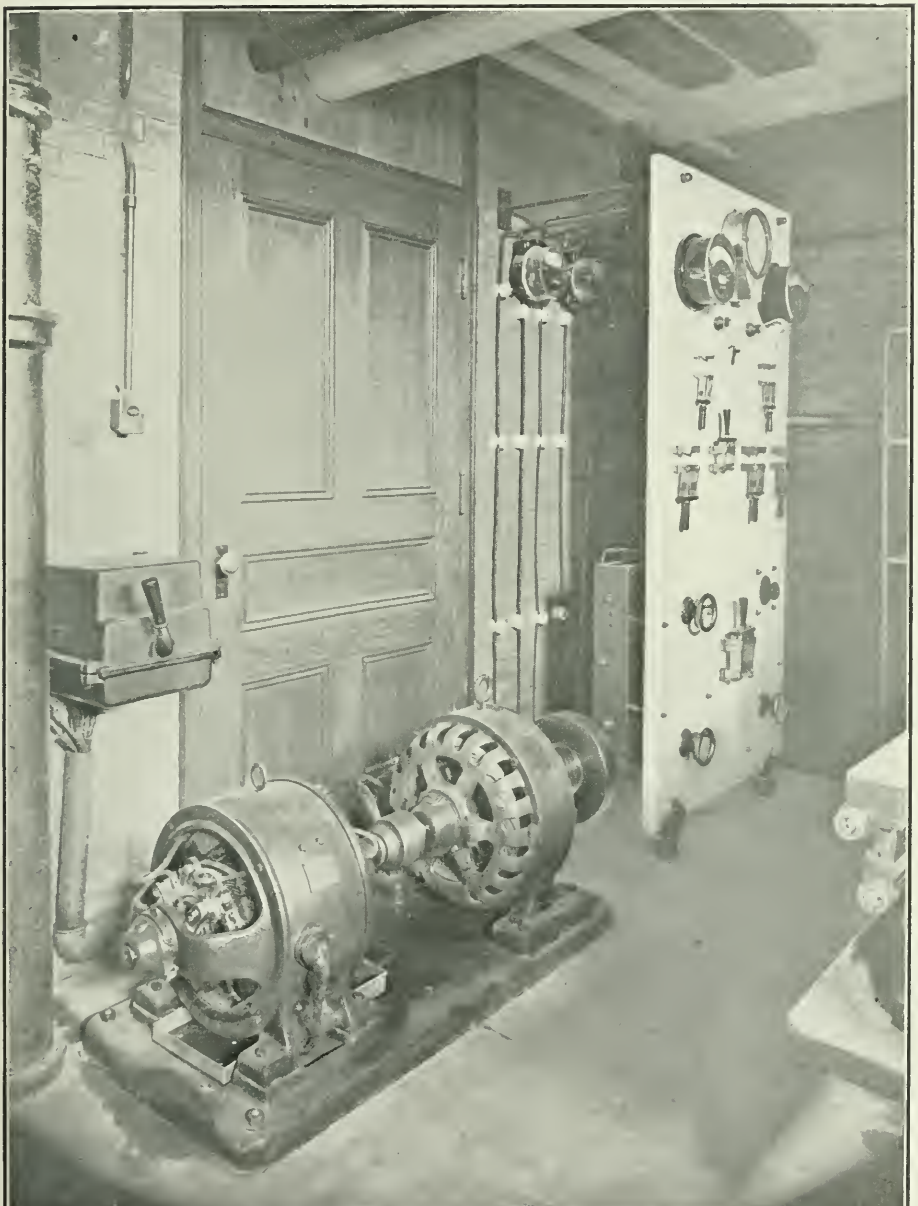


Fig. 7.—Switchboard and Motor-Generator.

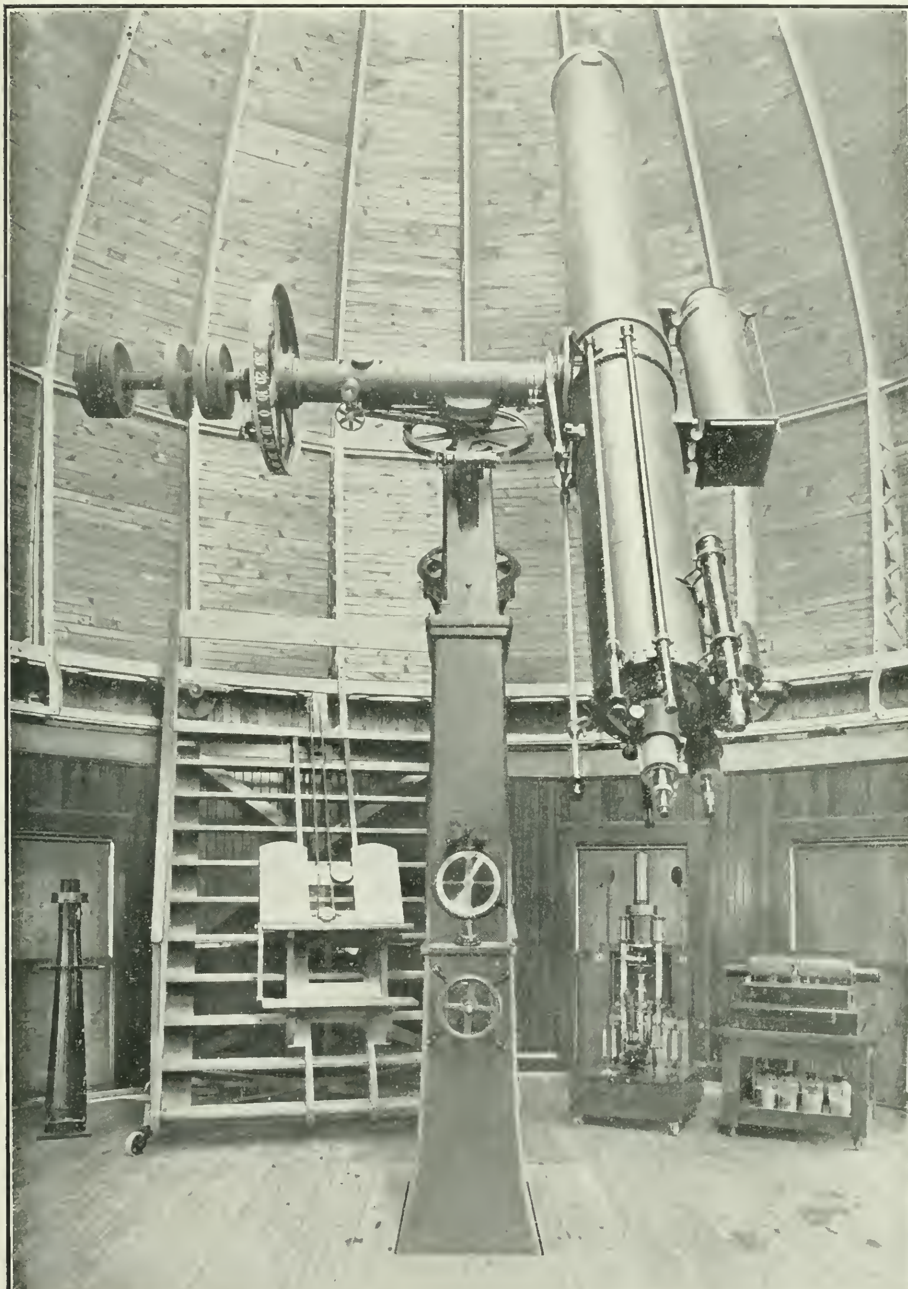


Fig. 8.—Equatorial Telescope.

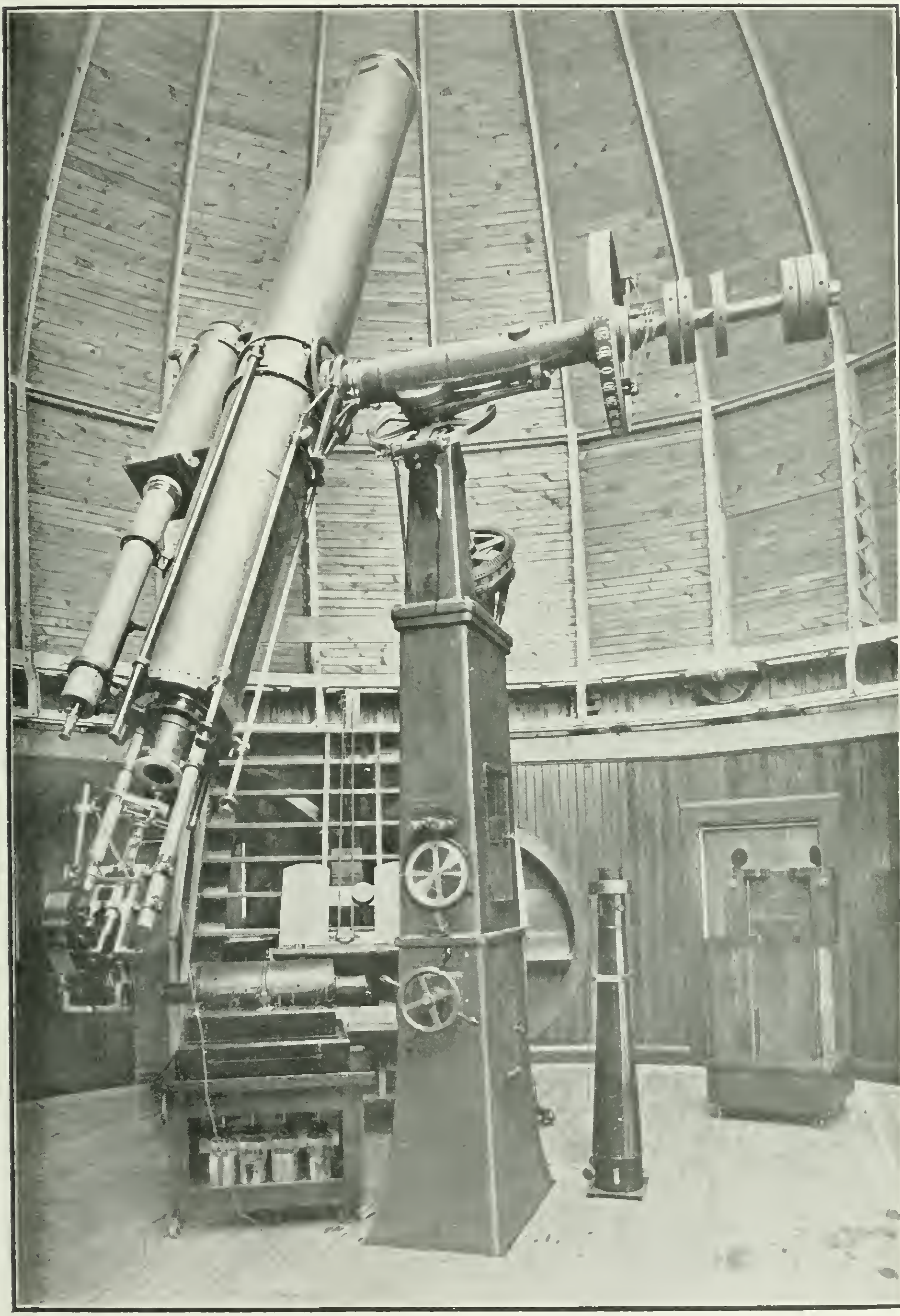


Fig. 9.—Equatorial Telescope with Spectroscope attached.

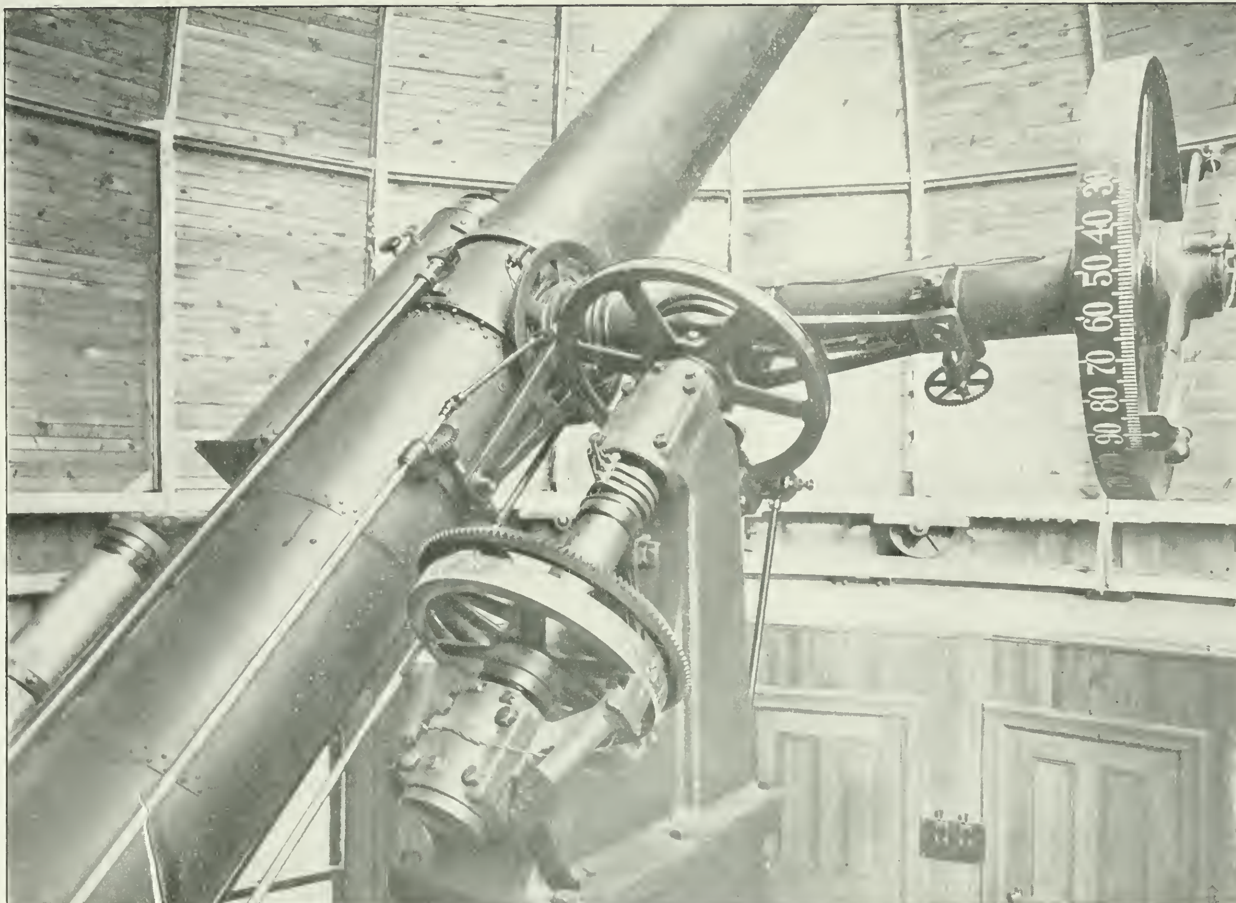


Fig. 10.—Polar Head of Equatorial Telescope.

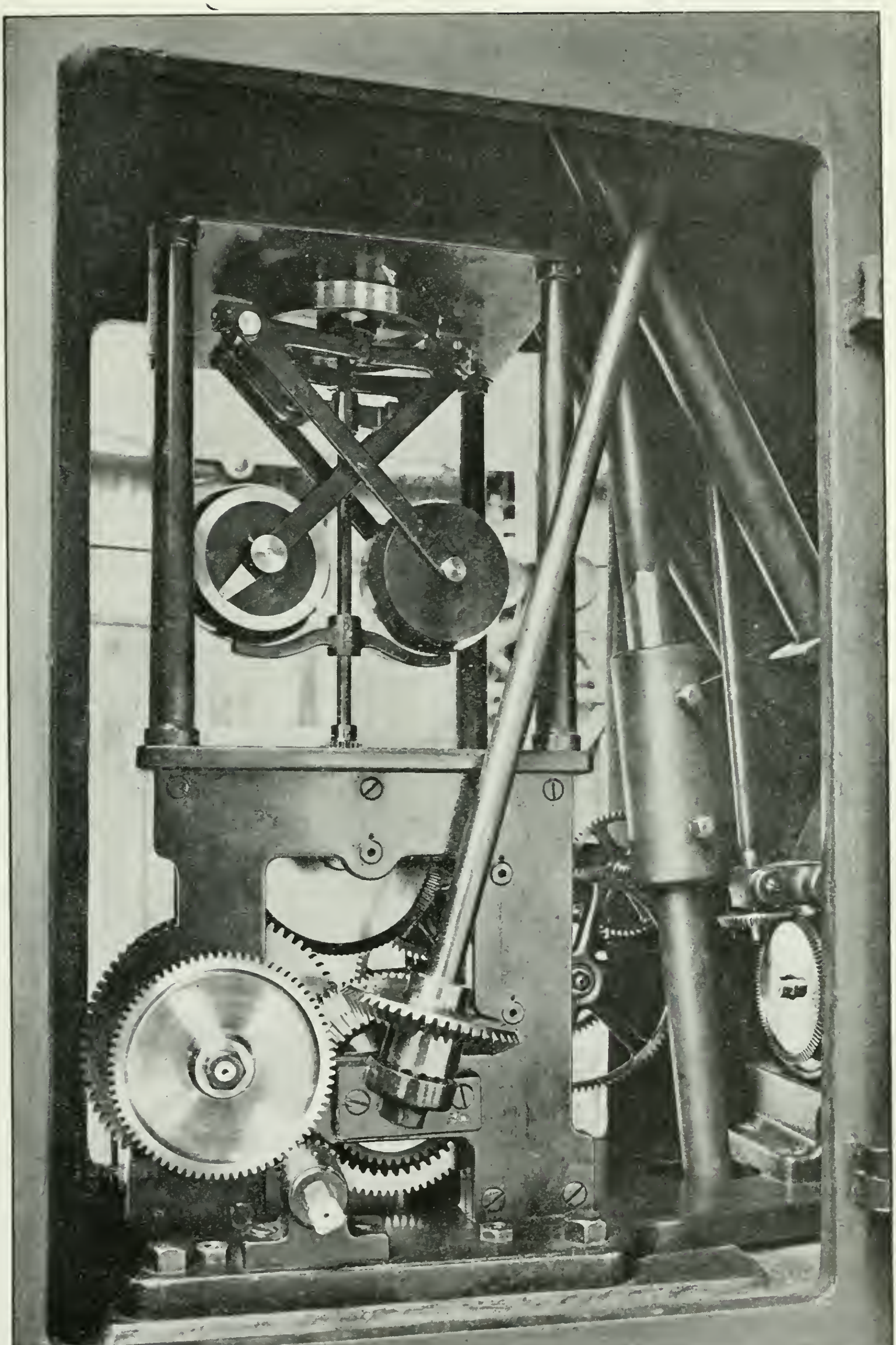


Fig. 11.—Driving Clock.

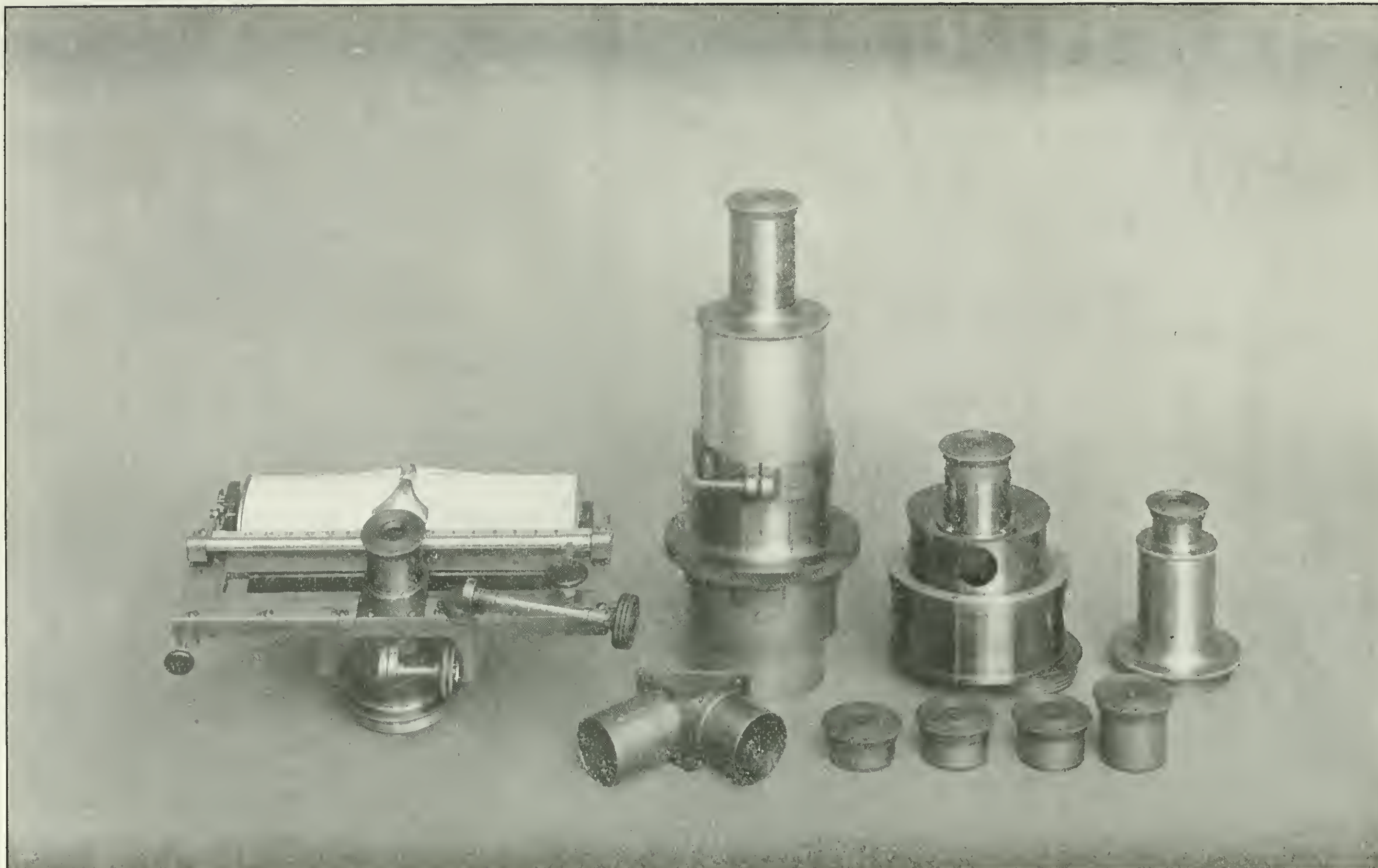


Fig. 12.—Registering Photometer and Telescope Eyepieces.

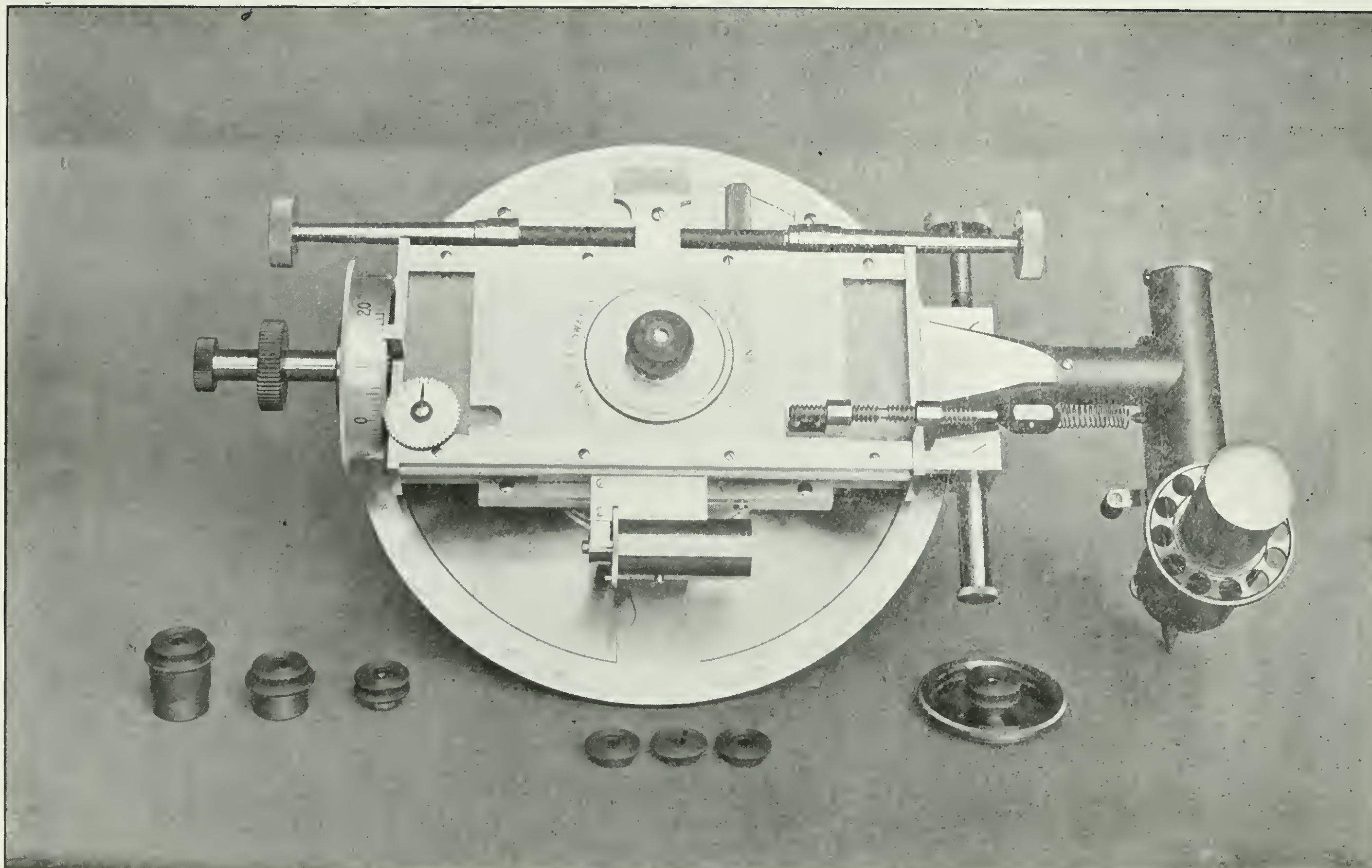


Fig. 13.—Position Micrometer with Accessories.

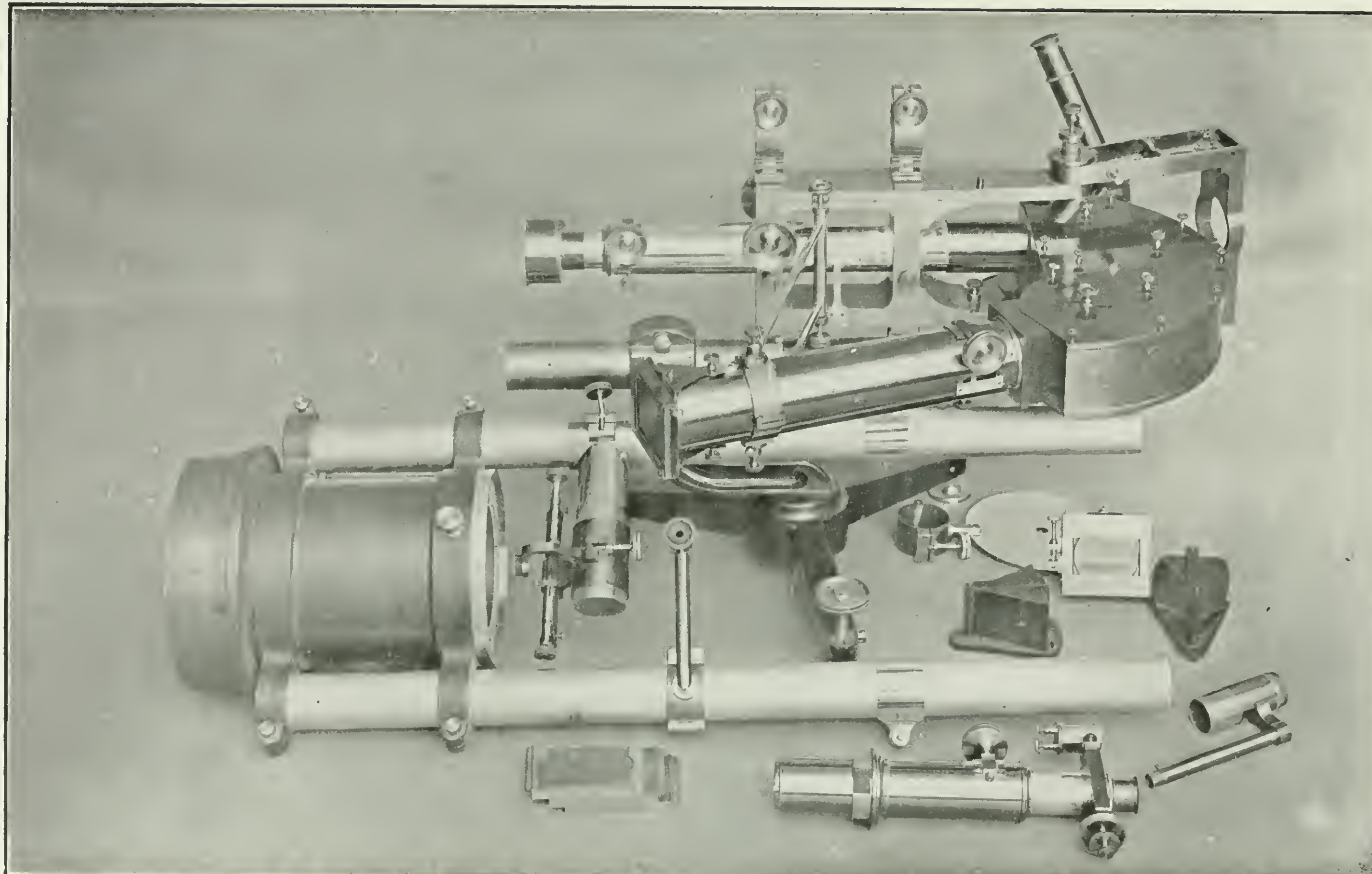


Fig. 14.—Spectroscope, Adapter, and Accessories.

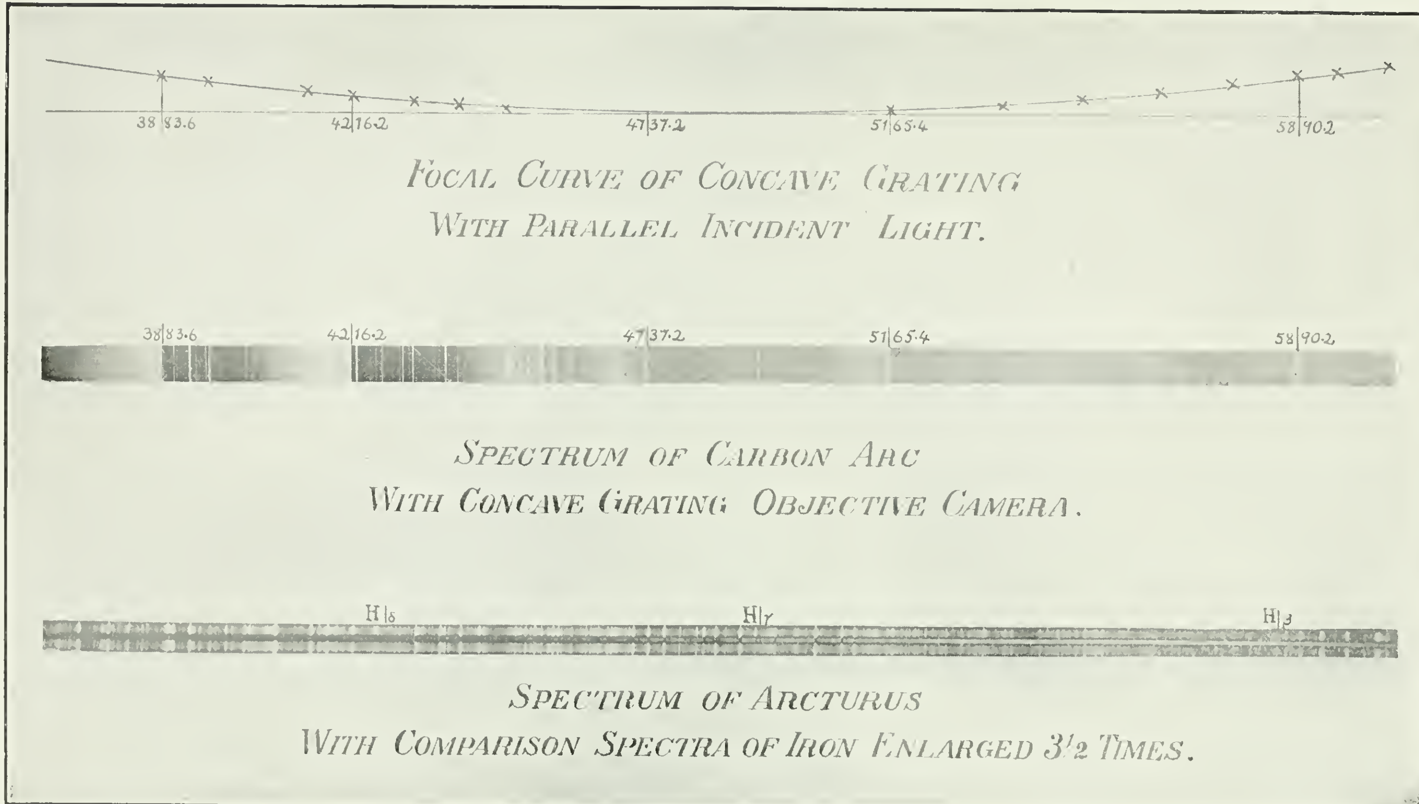

38|83.6
42|16.2
47|37.2
51|65.4
58|90.2
FOCAL CURVE OF CONCAVE GRATING
WITH PARALLEL INCIDENT LIGHT.
38|83.6
42|16.2
47|37.2
51|65.4
58|90.2
SPECTRUM OF CARBON ARC
WITH CONCAVE GRATING OBJECTIVE CAMERA.
H|δ
H|γ
H|β
SPECTRUM OF ARCTURUS
WITH COMPARISON SPECTRA OF IRON ENLARGED 3½ TIMES.

Fig. 15.

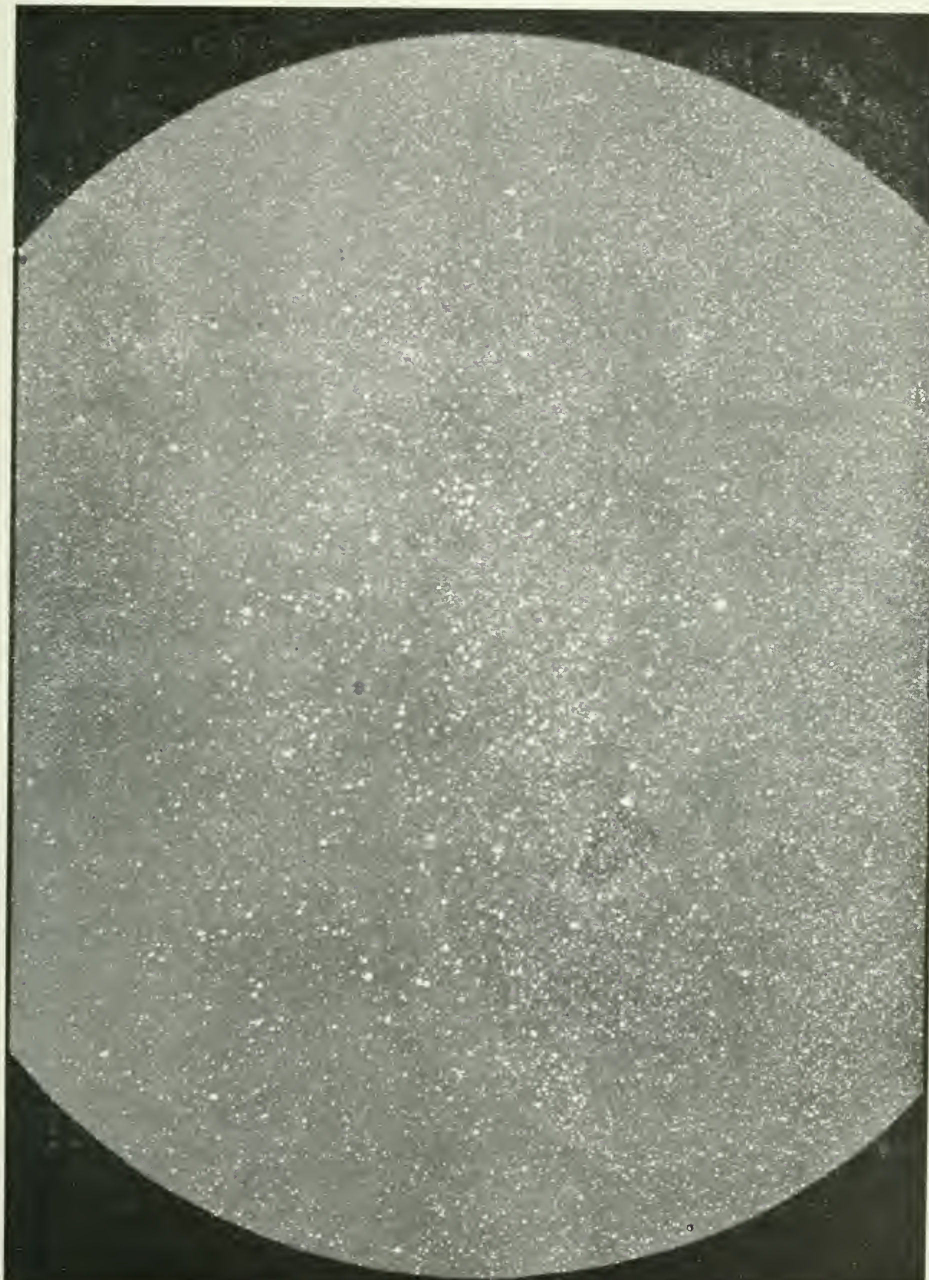


Fig. 16.—Photograph of part of Milky Way. Centre at R.A. 21h. 32m. Decln. +49° 5′.
Exposure 6hrs. 20min.

APPENDIX 5

REPORT OF THE CHIEF ASTRONOMER, 1905.

TOTAL SOLAR ECLIPSE, 1905

BY

J. S. PLASKETT, B.A.

CONTENTS

ILLUSTRATIONS.

APPENDIX 5.

W. F. King, Esq., B.A., LL.D., D.T.S.,
Chief Astronomer,
Department of the Interior,
Ottawa.

Ottawa Can., October 31, 1905.

Sir,—I have the honour to report as follows upon the observations planned for the total solar eclipse of August 30, 1905.

I have the honour to be, sir,
Your obedient servant,
J. S. PLASKETT.

REPORT ON SOLAR ECLIPSE EXPEDITION.

When I was entrusted by you with the observations to be undertaken by us, obviously the first thing to be done was to look over the work already accomplished at former eclipses and to find out what it was proposed to attempt at the present one, and then to choose some line of work which would not uselessly duplicate something already done or about to be done.

The short duration of totality in all solar eclipses, this one lasting, at the chosen station two minutes and thirty-one seconds, must necessarily confine observations of the physical phenomena connected with the eclipse, and especially those dealing with the constitution and appearance of the atmosphere surrounding the sun, to photographic records. By properly devising and arranging the apparatus a number of these may be made during totality which will be available for measurement and discussion at leisure. Visual observations and sketches of the corona and prominences, although useful in their way, can only be of a general character, and the most skilful draughtsman cannot hope to produce in his sketch one-quarter of the detail truthfully rendered by a photograph in less than one hundredth of the time. Similarly in regard to the spectra of the reversing layer and corona. The time during which the former is visible is probably not more than two or three seconds and the eye cannot do more than recognize the general character of the spectrum while there would not be time to measure the position of even one line. A photograph, on the other hand, may faithfully record the positions of a thousand lines, each of which may be much more accurately measured than one line visually.

Hence it was thought preferable to confine the observations undertaken by us entirely to photographs of the corona and prominences and to photographs of the spectra of the corona and reversing layer and to leave the visual and other observations to the amateur members of the party who would not be so well equipped for photographic work as ourselves.

PHOTOGRAPHS OF THE CORONA.

On looking over the work already accomplished in coronal photography and in ascertaining what was proposed for this eclipse, it seemed that, as far as regards photographs on ordinary plates, that is plates sensitive to light of the shorter wave lengths from λ 5000 down, the whole field was fairly well covered. When, however, it came to results obtained or even attempted on plates sensitive to the longer wave lengths, to green, yellow and red as well as blue and violet, it was quite a different story. Only very few, and, so far as I can learn, no carefully prepared attempts have been made to photograph the corona on other than the ordinary plates, that is to say by constituents of the coronal light other than the blue and violet. An analysis of the corona by the spectroscope shows, so far at any rate as the gaseous part, giving a bright line spectrum, is concerned, that the blue and violet is by no means the most important part, but that by far the brightest and most characteristic line is in the green about wave length λ 5303, a region to which ordinary plates are very, and the usual orthochromatic plates comparatively, insensitive.

Hence it seemed worth while, in view of the comparatively unoccupied field, and also on account of the previous training of the writer in orthochromatic and three-colour work, to make a carefully prepared attempt to obtain photographs of the corona by light of this wave length. Such photographs should show the distribution of the so-called coronium gas around the sun's disc and, by comparing them with ordinary photographs of the corona of the same relative exposure, allowing for the absorption of the filter or screen used, we should be able to clearly separate the part due to this hypothetical gas from that due to incandescent particles and to reflected sunlight, and thus to considerably increase our knowledge of the constitution and relative distribution of the coronal matter. Similarly photographs of the corona by red and by yellow light should also, when compared with those obtained by green light, and by blue light, show some interesting and instructive differences of structure as well as give us some idea of the relative intensities of those colours in the coronal light. Further, by properly choosing the absorptions of the screens or filters used for obtaining these monochromatic renderings, it should be quite possible to obtain a successful photograph of the corona in the natural colours by combining the photographs of the corona by red, green and blue light in the same way as in the regular three-colour process. The negatives then would serve two purposes, one to obtain the relative intensities and distribution of these colours in the corona and the other to obtain a record of the corona in its natural colours.

The objective to be used for obtaining these monochromatic and three-colour records should be one of fairly large angular aperture, since, owing to the absorptions of the screens employed, the exposures required would be considerably increased. Moreover a lens specially corrected for the red and green for which it was proposed to use this objective, would be required, so that the focus for these two colours would be the same. A 4½-inch Cooke-Taylor photo visual objective, which we already possessed, fulfilled these conditions fairly well and was accordingly chosen for this work. Its focal length of 81·8 inches gives a solar image about ⅞-inch diameter and makes the aperture ratio f18.

For the yellow and blue records there were no suitable objectives available and considerations of economy, future usefulness, size of solar image, and mirror surface required, dictated the size ordered, 4-inch aperture and 10 feet focus. Further it was deemed desirable to obtain some photographs of the corona on a fairly large scale and an objective of 5-inch aperture and 45 feet focus was added to the other two.

The programme of photographs of the corona as finally arranged for was as follows:—

1. A series of photographs of varying exposure on ordinary plates for the details of the inner corona by an objective corrected for the photographic rays, of 5 inches aperture and 45 feet focus, thus giving the image of the sun a diameter of about 5 inches.

II. A series of photographs of inner and outer corona by two objectives of 4 inches aperture and 10 feet focus giving images of the sun nearly 1⅛ inches diameter. One of these objectives corrected for photographic rays to be used with ordinary plates giving photographs by blue and violet light only; the other corrected for the yellow and yellow green light and used in conjunction with a yellow screen or orthochromatic plates to obtain photographs by yellow light only.

III. Photographs of the corona by red and green light through screens of a suitable absorption for three-colour work. Also photographs of the corona by the monochromatic coronium light of wave length λ5303 through a screen constructed so as to absorb as nearly as possible all light but that of this particular wave length. These photographs to be taken by the 4½-inch Cooke photo visual 81·8 inches focus on plates specially sensitized for the purpose.

PHOTOGRAPHS OF THE SPECTRA OF REVERSING LAYER AND CORONA.

The reversing layer, the thin shell of incandescent gases surrounding the photosphere, whose absorption produces the dark lines of the solar spectrum was first discovered by Prof. Young in 1870, but was not successfully photographed until Shackleton in Nova Zembla in 1896 succeeded in recording it upon one of his plates. Since then many photographs of this evanescent phenomenon have been obtained, but there still remains a great deal to be learned of the nature of this shell, of the gases of which it is composed, of their distribution throughout the shell, and finally of the relation between its spectrum and the corresponding dark line solar spectrum. It was hence determined to get as many photographs of its spectrum as possible. The spectrum of the corona has also been frequently photographed but the wave lengths of its bright lines are still subject to considerable uncertainty. It is desirable that they be accurately measured in order to definitely ascertain whether coronium can be identified with any known substance and further to learn whether any series relation between the lines can be discovered. It was therefore determined to obtain photographs of the corona spectrum with special reference to the wave lengths of its bright lines. For photographing the 'flash' spectrum the most suitable apparatus is a prismatic camera or an objective grating camera, while for the accurate determination of the wave lengths of the corona spectrum a slit spectroscope with a train of prisms, such as is used in radial velocity work, would give the best results. Hence the programme already given would be added to as follows, especially as the optical parts of the apparatus were already in our possession.

IV. Photographs of the spectra of the reversing layer and of the corona by a prismatic camera and also by a concave diffraction grating camera.

V. Photographs of the spectrum of the corona with special regard to accurate measurements of wave lengths by a slit spectroscope with a train of three prisms.

INSTRUMENTAL EQUIPMENT.

The programme of observations decided upon, it was deemed advisable before designing the cameras and spectroscopes to settle upon the most efficient and economical means of overcoming the diurnal motion. That such a compensation is necessary will be evident when we consider that the sun's image in any stationary camera will move the distance of its diameter every two minutes. Of the two usual methods of compensation, first, that of mounting the cameras on polar axes and driving by clock work, or second, that of reflecting the light into stationary cameras by a plane mirror moved by clock work, it was early decided that the latter would be by far the more satisfactory. The principal reasons for this decision were, the almost absolute rigidity of the camera installation by the latter method as compared with its unstable and shaky position by the former, and also the much more convenient position of the cameras, for the necessarily rapid changes of plate holders, when installed horizontally, as is easily arranged when fed by a moving mirror.

USES OF COELOSTAT OR SIDEROSTAT.

The one drawback to this method lies in the greater initial cost of the siderostat or coelostat, as such a moving mirror is called, over the equatorial mounting of the cameras. But such a consideration only properly applies when the conditions as regards usefulness for other than eclipse purposes are equal. If, however, as I shall presently show, the siderostat or coelostat may be kept in constant and useful service at the observatory while the equatorial mountings would be of little service for anything but eclipse work such an objection will have little weight and there need be no hesitation in deciding upon obtaining such an instrument.

The most important use to which such a moving mirror may be put is to form a stationary horizontal reflecting telescope of long focus which may be used to great advantage for research work upon the sun or other celestial objects. Its advantages over the ordinary equatorial telescope are numerous. The image and the axis of the cone of light are both stationary, the solar image may be of any size desired depending upon the focal length of the concave mirror, and it may be formed within a laboratory which if desired may be kept at constant temperature. Moreover the modern spectroscopes and spectroheliographs, which are too heavy and cumbersome to be successfully attached to any equatorial, may be rigidly mounted in a fixed position on piers for use with such a telescope.

The special application of such an instrumental equipment is to be found in work upon the sun. One of the most important scientific problems of the day is to determine the relation between the cyclical changes in the conditions of the sun and the meteorological and climatic conditions upon the earth. But the first step towards the discovery of this relation, which is doubtless of a very complex character, must be to understand as thoroughly as possible the constitution of the sun. This is the primary object for the formation of eclipse expeditions, and it justifies the expenditure of time and money for that purpose. But it will not suffice to confine attempts at solving this problem to the few short moments of totality. A combined and continued attack with all the forces at command is necessary, and that this is beginning to be recognized is shown by the grant of $150,000 for this year from the Carnegie Institution to a solar research observatory on Mount Wilson, California. The principal instrument in this observatory is a coelostat reflecting telescope, and the installation of such a telescope, of which the most important part is the coelostat or siderostat, and the work in which it may be used, which promises, above all other astronomical work, the most direct benefit to mankind, seem to be eminently suited to a national observatory.

These considerations, with the decided advantages of the coelostat or siderostat over the equatorially mounted cameras for eclipse work were deemed more than sufficient to compensate for its greater initial cost, and, when the matter was laid before you in this way, you decided upon purchasing such an instrument.

PRINCIPLES OF SIDEROSTAT AND COELOSTAT.

There are two general types of clockwork driven mirrors, the siderostat or heliostat, and the coelostat. In order to render the choice of the latter type intelligible, it seems preferable to explain, as briefly as possible, the principles of their action and the mechanism producing their motion.

The siderostat or heliostat, according as the clock is rated and the instrument used for the stars or sun, consists, essentially, of a plane mirror pivoted to move freely around both vertical and horizontal axes so that a rod rigidly attached normally to the back of this mirror can be made to point or move freely in any desired direction. This direction is governed by the rotation, once in 24 hours, of an axis, parallel to the axis of the earth, to the end of which is attached a rod making an angle with the polar axis corresponding to the polar distance of the celestial object. At the outer extremity of this rod a universal joint carries a collar which slides freely, yet without play, over the normal rod before-mentioned. When a simple geometrical relation between the arms of this lever system is fulfilled, the light from the celestial body is reflected in a fixed direction which may, within limits, be varied at pleasure. Theoretically the arrangement leaves nothing to be desired, but, from a mechanical standpoint, the nicety of workmanship required in the sliding collar and universal joints is so delicate, that, so far as I can learn, a smooth and even running siderostat has not yet been made. The tendency seems rather to go by jerks which, although minute, are fatal to fine definition in long exposure photographs. The siderostat possesses the further drawback of rotation of field, one point only being fixed while the rest of the field has a slow motion of rotation around this point.

The coelostat both optically and mechanically is a much simpler instrument than the siderostat. It consists of an axis, parallel to the earth's axis, having a motion of rotation once in 48 hours, and carrying a mirror with its plane in or parallel to this polar axis. Evidently the direction of the reflected light depends on the declination of the celestial body, and the instrument has the disadvantage of requiring different positions of the observing telescope for different objects, or for objects whose declination varies such as the sun. In all other respects, mechanical simplicity, no sliding collars, or universal joints, no rotation of field, the coelostat is superior to the siderostat.

The change of direction of the reflected light with the change of declination does not give rise to any difficulty in eclipse work, as the apparatus may be set to suit the declination of the sun at the eclipse. The rate of change of declination is so small as to be imperceptible in the position of the image for a much longer period than the duration of totality. By the addition of a second adjustable mirror, this drawback may be overcome and the instrument may be adapted for observatory purposes with a stationary telescope. When, in addition, the cost of the coelostat is considerably less than that of the siderostat, the question practically decided itself in favour of the former. The question of size of mirror required now comes up for consideration. Not only must the apertures of the objectives be taken into account, but also, as far as the cameras are concerned, the size of plate. Since the axes of all the instruments fed by the mirror must be parallel, the centres of the objectives cannot be placed nearer one another than the centres of their corresponding plates. It was decided, from considerations of the probable extensions of the corona, to use $4\frac{3}{4}$-inch by $6\frac{1}{2}$-inch plates for the photo-visual $6\frac{1}{2}$-inch by $8\frac{1}{2}$-inch for each of the two 10 feet focus lenses while the objective end of the 45 feet focus would require a space about 8 inches square, the grating camera about 5 inches square and the prismatic about 3 inches square. A drawing of the best possible arrangement of these instruments, and as they were finally placed, is seen in fig. 5. Allowing a little margin for the extension of the field due to the distance between mirror and objectives, and for the diminution of effective aperture, due to the inclination of the plane of the mirror at the time of eclipse, it is seen that 20 inches diameter is the minimum size that will completely fill the objectives. Since this size when used with a secondary plane mirror of the same diameter will completely fill a 15-inch concave even under unfavourable conditions, and will, during the greater part of the time it is likely to be used, nearly fill an 18-inch concave, it was decided to obtain a coelostat with a 20-inch mirror.

It is unnecessary here to go into the motives that governed the general design of the coelostat, as the instrument has proved very suitable for the work required of it, and as the details appear in the description of the instrument. One essential point, however, was that no part should much exceed two hundred pounds in weight owing to difficulty of transport in a rough country. This stipulation was adhered to except in the case of the lower section of the column, which weighed about 350 pounds, but was not essential to the working of the instrument, and could be left at home if desired.

DESCRIPTION OF COELOSTAT.

The photograph, fig. 2, exhibits fairly well the general design of the instrument. The mirror, not shown in the photograph, is about $20\frac{1}{2}$ inches diameter and $3\frac{1}{2}$ inches thick, silvered on both front and back surfaces. It rests in a circular cast-iron cell provided, as shown, with Ritchey's system of counterpoises for preventing flexure. This cell has at each end of a diameter two steel shafts, firmly attached to the cell and extending out some distance beyond the bearings to carry the driving sector at the north end, and with room at both north and south ends for a 10-inch or 12-inch mirror. A cell to carry an 8½-inch concave mirror, which we already possessed, was provided and furnished with clamps and slow motions in right ascension and declination: this cell being shown on the south end of the polar axis.

The bronze bushings, in which the axis and cell turn, are set in receptacles with screw caps at each end of a heavy cast semi-circular sector provided with a graduated arc, and a worm screw gearing into a circular rack fastened to the sector. By turning the worm, the sector rotates in its bearing on the upper part of the column, and the axis can be set at any altitude from 0° to 60°. Thus the instrument can be used at any place between the equator and 60° north or south latitude. Set screws are provided to rigidly clamp it in position when once set.

Below this polar head is the middle section of the column which also acts as clock case and is provided with a glass door at each side for convenience of access to the clock mechanism. The clock is of the ordinary type of conical pendulum, the rate being varied by lengthening or shortening the pendulum arms, this being effected by screwing the balls up or down, a lock nut serving to firmly fix them in the desired position. The braking is done by a knife edge on the pendulum arms engaging, when the balls rise, with arms attached to a friction disc rotating concentrically with the spindle. The motion is communicated through the clock train by bevel gears to a short shaft which again gears into a shaft containing a differential gear mechanism which serves to give a slow motion to the mirror. It is actuated by a cord passing around a grooved wheel, which can be led, through holes in the end of the column, in any desired direction, and to any required distance. From this shaft bevel gears transmit the motion to a connecting rod passing up through the column to the driving worm and sector. Two sets of gears on the end of the connecting rod and worm, either of which can be engaged as desired, give the mirror a motion of rotation of once in either 48 or 24 hours. With the former the instrument acts as a coelostat, and with the latter rate, and a plane mirror on either end of the polar axis, it could be used as a polar heliostat. The driving sector has an arc of 45°, and is hence long enough with the coelostat motion to drive for six hours without turning back.

The lower or base section of the column tapers by graceful curves from 34 inches by 36 inches at the bottom to 20 inches square at the top. It is provided with screws for adjustment in azimuth, and with removable doors at each side to give access to the clock weights. The height of the instrument to the centre of the mirror is 58 inches, and it is thus fairly compact.

The arrangement of the details is very convenient and serviceable, while the workmanship and finish are excellent. Of the mirror, Dr. Brashear says it is probably the best they have made, the radius of curvature being not less than 500 miles. We may rest assured that it cannot be excelled anywhere, and that the instrument should give excellent results in solar work.

THE CAMERAS (GENERAL).

The camera boxes, whose general construction may be readily obtained from the illustrations (figs. 5, 8, 10), were designed to be as compact as possible, practically the same external dimensions as the plate holders, in order to economize mirror surface and were made with parallel sides without projections for the same purpose and for convenience in mounting. The bodies were made of whitewood, panelled in the larger sizes to prevent warping, with backs of birch or cherry, while the objectives were mounted in short boxes made to telescope into the cameras for adjustment to focus. Each of the boxes was lined throughout the interior with black velvet to prevent reflections, as, owing to the small size of box and large size of objectives, it was impracticable to place diaphragms in them.

Instead of arranging the plate holders to slide in and out of grooves in the camera backs, which occupies too much time in the changing or reversing of holders, particularly with the large sizes, the backs were made with a groove at the bottom as wide as the holder was thick and a spring catch at the top, so that, to insert a plate holder, it could be simply dropped into the groove and then shoved forward, forcing up the catch at the top until it came to its seat, when the catch would drop, holding it in place; while to remove the holder all that was necessary was to pull it back with one hand while the catch was lifted with the other. Care was taken to have a thorough light-break all around the holder, so that there would be no danger of fog. It was found that this arrangement worked admirably, saving considerable time in changing holders.

The exposing devices were simple flap shutters of aluminum, blackened all over, and working on a simple hinge. A cord attached to a lever fastened to the shutter was led back through screw eyes to the operator, who thus exposed with one hand the instant he had drawn the slide with the other. This scheme insured saving of time, prevented crowding and confusion, lessened chances of spoiled plates, and besides only required half the assistance necessary for exposures made by a second person. In the long focus and Cooke cameras, in which the shutter was light, a small rubber band attached to the shutter and stretched over a screw at the side of the camera box insured the quick closing of the shutter besides forcing the metal shutter to strike against the cell of the objective, making an audible click which served to tell the operator without looking that the shutter was working properly. This was especially necessary in the case of the 45 foot camera, as the operator could not see the shutter.

The 45-foot Camera.

The objective as before stated was of 5 inches aperture and nearly, as appeared later, 45 feet 4 inches focus. It was made by Grubb, of Dublin, and was corrected for the blue and violet light, to which the ordinary photographic plate is most sensitive. A lens of this focal length will give an image very closely 5 inches in diameter, and since it was intended primarily for the inner corona it was considered that plates 14 inches by 17 inches would be of ample size to receive anything that could be obtained with a lens of the aperture ratio f 108 in the exposure time allowable. Owing to the length of focus it was impracticable to make the camera in one piece, and in consequence the two ends were made of wood, and the centre section of black cloth stretched over a light wooden frame work. The objective end was made 9 feet long so as to project far enough over the back of the 10-foot cameras for the cloth section to be out of the way of the operator. It was made about 8 inches square outside and 7 inches inside. This was the smallest dimension allowable to permit the full pencil of light from the objective to reach the edges of the plate without obstruction. The plate end was made 16½ by 19½ inches and 30 inches long, and was attached rigidly to the framework of the centre section ; its sides were panelled to prevent warping and shrinking of the wood. The construction of the centre section will be described more particularly when I come to speak of the erection of the installation.

The 10-foot Focus Twin Camera.

Two objectives each of 4 inches aperture and 10 feet focus were obtained from Grubb. One of these was corrected for the blue and violet light to be used with ordinary plates and the other corrected for wave length $\lambda 5500$, in the yellow green. to be used in conjunction with a yellow screen on yellow sensitive orthochromatic plates.

The equal focal length and aperture of these objectives readily permitted them to be mounted side by side, using two plates in the one holder forming a twin camera. This requires less mirror surface since the objectives can be placed nearly two inches closer together than if the cameras were separate, and also the services of one operator may be dispensed with. As it should be possible to obtain the outer corona with objectives of their aperture ratio $f30$, and an exposure of 30 or 40 seconds, 6½ by 8½ plates were considered the most suitable size, making the plate holder 8½ by 13 inches inside measurement. The camera box was made 10 inches by 15½ inches, with a thin partition down the centre, and each half at the objective end was provided with a telescoping tube for adjustment to focus; all four sides of the box were panelled to prevent warping and twisting and it was lined all over inside with black velvet like the others. A recess was made in the back of the camera, containing the lens corrected for the yellow rays, to hold the screen which thus worked quite close to the plate.

The Cooke Camera.

The objective which, as before stated, was of 4½-inch aperture and 81·8-inch focus was to be used for obtaining tri-colour red and green and monochromatic green photographs of the corona, and since, owing to the absorption of the screens, the exposures for the same actinic effect would be much increased, a plate 4¾ inches by 6½ inches would be of ample size to accommodate all possible extensions around a ⅞-inch image. The camera box was made similarly to the others, of whitewood, with a telescoping objective box for focussing at one end and a spring catch plate holder attachment at the other. A recess at the back was arranged to hold the screens, and provision also made for readily changing them.

THE SPECTROSCOPES.

The spectrum of the reversing layer was to be photographed by a concave grating and a prismatic camera. In these instruments no collimator is used, the thin shell or crescent of the gases surrounding the photosphere acting as a curved slit sending parallel light, in the one case, to the concave grating which diffracts the light and focusses it at the same time, forming the spectrum, and, in the other case, to the prisms which disperse the light, images of the crescent being formed in the focus of an objective placed just behind the prisms.

The Concave Grating Spectroscope.

The grating to be used is the dispersing part of a concave grating spectroscope of Rowland form and is of 4 inches aperture and 10 feet radius of curvature having a ruling about 3½ inches long and 1½ inches wide of 15000 lines to the inch. The manner in which this grating was to be used, *i.e.*, with parallel incident light, is quite different from the usual or Rowland way with slit, grating and camera on the circumference of a circle, and has been very strongly advised against by Wadsworth, Ap. J. XVIII., p. 77, who says the unsymmetrical aberrations are so great, except near the axis, that measurements made with it are untrustworthy. He supports this statement by mathematical calculations and by tables showing the amount of error introduced by gratings of different angular apertures at different distances from the axis. Even granting this to be so, although experiments here do not give so large an aberration, the error in the greater part of the length of spectrum used would be exceedingly small, and in the central three or four inches from $\lambda 4000 - \lambda 5000$ practically zero. Gratings used by Wadsworth, and by Frost, and by Mohler and Daniel, at the total eclipse of May 28, 1900, gave poor results, but Wadsworth's failure was due to the excessive angular aperture of his grating, and the others were due to defective focussing, and to their use of a flat plate, which could only be in sharp focus over a small portion of the curved focal field. In the case of the grating under consideration, however, the angular aperture is only ·43 of that of Wadsworth's and the aberrations would only be $(\cdot 43)^3$ or $\frac{1}{12}$ while it was determined to use a plate or film curved to correspond to the form of the field, and hence to overcome the difficulties by the observers just mentioned.

According to the theory of the concave grating the focal curve, when used with parallel incident light, is represented by the equation $r = \frac{\rho}{1 + \cos i}$ which for small distances from the axis is approximately an arc of a circle with a radius ½ that of the grating. However, it was determined to try the grating experimentally, not only to examine the aberration away from the axis, but also to test the focal curve. Since it was impossible to use the grating in the same way as at an eclipse, with a thin crescent in the heavens, it was necessary to use a slit and collimating lens. The Cooke photo-visual objective, owing to its property of bringing all the coloured rays to the same focus, was very suitable for this purpose, and its tube was fitted with a slit in place of the eyepiece, which was brought into the focal plane of the objective by examining the image of a star or very distant terrestrial object between the slit jaws with a high power eyepiece, and adjusting the focus until both slit and jaws were equally sharp. The grating was mounted on a large table in its adjustable holder, and the camera box of the spectroscope was also mounted about 5 feet distant on the same table. The grating was turned in azimuth until its axis or the normal to its surface passed through the centre of the camera box. The telescope tube or collimator, using the carbon arc as the source of light, was then shifted to the proper angle, about 17°, to get the correct range of spectrum in the field. The first order spectrum on one side was especially bright, and the grating was turned so as to use this spectrum. The camera box, placed at right angles to the axis, was moved until the spectrum at the centre, examined through a high power positive eyepiece, was perfectly sharp. The position marked, the eyepiece was moved a short distance to one side, focussed and then again marked. This was continued until the positions of sharp focus for various points in the spectrum up to 4 or 5 inches on each side of the axis had been determined.

When these positions were plotted on paper, and a curve drawn through them (fig. 1), it was seen that the difference between the experimental positions and the arc of a circle of 30 inches radius was well within the limit of accidental error, and it was decided to make the plate or film conform to an arc of this radius, especially as this agreed with the focal curve given by the mathematical theory. In focussing the grating, the definition was carefully observed, and it was considered, in the writer's estimation, to be decidedly better than that which would be allowed by aberrations of the magnitude mentioned by Wadsworth. A photograph of the spectrum of the carbon arc reproduced in fig. 1 which was taken after the camera was completed, and was one of a series used to test the focus, confirms this opinion, and the chances of obtaining useful and accurate results with the grating used in this way, when properly adjusted and focussed, are extremely good. If, however, the spectrum was examined more than 4½ inches or 5 inches from the axis the definition rapidly deteriorated, and as the range of spectrum given in a length of 9 inches was from $\lambda 3800$ to $\lambda 6000$, considerably longer than could be obtained on any commercial orthochromatic plate with a reasonable exposure, it was decided to limit the length to this value, and to design the camera accordingly.

The flash or reversing layer, whose spectrum was desired, is of such a transitory character on or near the centre line of totality, that some means of making exposures in rapid succession is absolutely necessary in order to give a reasonable chance of obtaining it. The image of the sun given by the grating is ⅝ inches in diameter, and, as the distance between the horns of the crescent will probably be less than the solar diameter, the width of the spectrum will probably not exceed ½-inch. In such a case the method of making a number of spectra side by side, by simply sliding the plate holder the necessary distance between exposures, was chosen as offering the simplest and most direct solution of the problem. The focal curve, a circular arc of 30 inches radius, was too steep to use plates, so films were chosen and the plate holder and sliding mechanism were designed accordingly. The number of exposures required was nine, one each on the solar cusp before and after totality, one long exposure on the corona during totality, and three each on the 'flash' immediately after second and before third contacts. This fixes the size of the film at 9 inches by 9 inches, while the focal length 5 feet fixes the length, and the angle 17° to include the required range of spectrum the centre lines of the camera box. The photograph of the rehearsal gives a fairly good idea of the design of the camera complete. It consists of two intersecting tubes, the one 4 inches square inside, admitting light to the grating placed at the end of the two tubes. At this end of the box is a removable cap on the side to insert the grating, which is pressed lightly yet firmly by springs against three adjusting screws passing through the end of the box. The light, after diffraction, passes along the second tube to the sliding plate holder at the other end (shown in fig. 8), where it is brought to a focus on the film. The plate holder attachment telescopes into this tube, and slides in and out for adjustment to focus. The plate holder itself moves back and forward across a slit 1 inch wide and 9 inches long, in the centre of the end of the back, which is opened and closed on the inside of the camera by a velvet covered flap shutter, actuated by a knurled wheel at each side of the attachment. The movement of the plate holder is given by two pinions gearing into rack on each side of the holder. These pinions, connected by a rod, and having knurled wheels at each side for turning, are of such a size that one-third of a revolution moves the plate holder exactly 1 inch. A spring catch, entering three equidistant notches in the circumference of a small wheel on the pinion shaft, fixes the necessary angular movement of the pinions and the corresponding linear movement of the plate holder. In making exposures the right hand at one side of the box may turn the wheel moving the plate holder while the left hand at the other side exposes by turning the shutter wheel, or vice versa, enabling exposures to be made in quick succession.

The plate holder is curved on the inside to an arc of 30 inches radius, and the film is held in contact with it by three or more narrow steel strips which spring into grooves on each side of the holder close to the film, and are so spaced as to come in the unoccupied intervals between the spectra. The whole arrangement worked admirably at the rehearsals, and there is no doubt that it would have behaved well during the eclipse.

The Prismatic Camera.

As the two single flint prisms of the universal spectroscope of the observatory were not required in that instrument, which used as dispersing medium the train of three prisms, it was decided to employ them in front of an objective for the same purposes as the grating spectroscope, to photograph the spectra of reversing layer and corona. The prismatic camera, owing to the loss of light in the various spectra given by a grating, can easily be made to give more intense spectra than a grating camera, and it was hoped with this instrument to get some details that the former could not secure. The prisms were two inches in height with a length of face sufficient to make a square field and in consequence an objective of 2½-inch aperture and 30 inches focus corrected for the photographic rays, was obtained. The minimum deviation for the central ray through the two prisms was 106°, and a simple box, shown in fig. 10, adapted to hold the prisms and objective and to send the dispersed light at this angle to a sliding plate holder, similar to that on the grating camera, was designed and constructed. The focal field of the lens was found experimentally to nearly coincide with an arc of 15-inch radius, and the back of the plate holder was curved accordingly, while the film 5 inches by 6 inches in size for 9 exposures on a spectrum ¼-inch wide was held to the curve in the same way as in the grating camera. The general design of this camera may be obtained from the photograph and drawing reproduced in figs. 10 and 5.

The Slit Spectroscope.

With this instrument, more particularly described under the observatory instruments, and used with the train of three prisms, adjusted to give a spectrum from D to beyond G, it was intended to photograph the coronal spectrum for the purpose of obtaining accurate measures of the wave length of its bright lines. A diaphragm was made to place in front of the slit, so that in one position the coronal spectrum could be photographed in the centre of the plate, and when moved to a stop a comparison spectrum of the sun would be photographed on each side of the coronal spectrum. The light for this spectroscope was to come from a concave mirror of 8½-inch aperture and 6 feet focus placed on the south end of the coelostat axis. This mirror formed an image of the sun on the slit of the spectroscope, which was attached to its adapter so as to be easily rotated in position angle without altering the position of the slit or the angle of inclination of the collimator axis.

THE PHOTOGRAPHIC PLATES.

In order to insure the best possible results from the instrumental equipment, a proper selection of the most suitable plates for their respective purposes is most essential, and especially is this the case for the monochromatic photographs of the corona.

The Ordinary Plates.

The ordinary photographic plate, that sensitive to what are ordinarily called the actinic rays, the blue, violet and ultra violet light, is the kind adapted for use with the 45-foot and one of the 10-foot focus objectives, which are corrected for this region of the spectrum. But of ordinary plates all are not equally suitable, and they must be chosen to give the best results in the particular service for which they are employed. The corona, photographically is rather a difficult object as the light intensity of the inner corona is many times greater than that of the outer corona, which is itself considerably brighter than the extensions. Hence in an exposure long enough to give detail in the outer corona, the inner corona will be much over-exposed, and in order to prevent halation troubles on the dark background of the moon, it will be desirable to use a non-halation plate. The best type for the purpose is undoubtedly the double-coated plate with a rapid emulsion over a slow, thus promising more successful renderings of the strong contrasts of the subject. The Seed Nonhalation plate was chosen for this purpose, as it not only has a very high sensitiveness, the outer emulsion being, by the kindness of the makers, '27 Gilt Edge,' but it also has a very fine grain, as the experiments of R. J. Wallace, Astrophysical Journal XX., p. 113, have shown. In addition it was proposed to use, for some of the shorter exposures on these two cameras, the Ilford Monarch, backed to prevent halation, a new plate of exceptional rapidity combined with very fine grain and freedom from fog. Thus the choice of plates for this portion of the work was a comparatively simple matter, but it was quite another question when it came to the plates required for the monochromatic photographs of the corona.

The Colour Sensitive Plates.

Plates were required sensitive to four particular regions of the spectrum; to the yellow green λ5500-λ5800, for photographs by the visually corrected 10-foot focus objective; to green λ5303 for photographs by the light of the principal coronium line; to red, λ5900-λ7000, for photographs of the corona by red light and for the red three-colour record negative; to green λ4900-λ5900, for the green three-colour record negative—the blue three-colour record to be obtained from one of the negatives on ordinary plates.

Since, as is well known, the ordinary plate is only sensitive to light of shorter wave length than λ5000,—it is only by very prolonged exposure that the range can be extended further into the green—such a plate will not answer for any one of these four purposes.

On the other hand the regular commercial orthochromatic plate, usually sensitized with erythrosine, has, generally speaking, two bands of sensitiveness, one due to the silver bromide from λ5000 down, and the other due to the special sensitiser employed from λ5500-λ5800. This type of plate will answer admirably for the first range specified, but will again be entirely useless for the other three. A reference to the literature on the subject of orthochromatics did not render much assistance as no precise agreement seemed to exist as to the range of sensitiveness given by different dyes;

further, I could find no published results in regard to the sensitiveness of commercial plates, which it was desired to use on account of convenience and reliability, if a suitable make could be found.

It seemed, therefore, not only desirable but necessary to experiment myself with all the available brands of commercial plates, and also with plates stained with those dyes for colour sensitising, which from the experience of others promised the most hopeful results. To this end, a box, cabinet size, of every commercial orthochromatic plate obtainable in England and the United States, with some of French and German manufacture, was obtained, and a small quantity of each of the probably useful dyes was likewise procured.

As the light to be photographed at the eclipse comes, primarily, from the sun the solar spectrum is certainly the most suitable to test the colour sensitiveness of the plates. The Brashear Universal Spectroscope of the observatory is admirably adapted for the purpose of photographing spectra, and was accordingly employed in the tests. Although the prismatic spectrum does not correctly represent the distribution of the colours, as the blue and violet are too extended and the red and orange too condensed, still the greater convenience, its freedom from overlapping spectra, and its more general use in this regard, led to its choice in preference to the spectrum from a grating. The train of three prisms gave too much dispersion to include sufficient range, and the single dense flint prism, moved sufficiently out of its position of minimum deviation to include just the desired range, from λ7000-λ3900, or from C to K, was employed. As the most convenient and suitable means of obtaining a uniform intensity of sunlight on the slit, the spectroscope was attached to the equatorial telescope, and to reduce the quantity of light and heat to a reasonable amount the objective was diaphragmed down to 3 inches aperture; the sun's image being focussed on a piece of ground glass close in front of the slit to insure the complete filling of the aperture of the collimator. Uniform exposures for all the plates tested were given by a Thornton-Pickard roller blind shutter attached in front of the ground glass. Thus a comparative estimate of the absolute as well as the relative colour sensitiveness of the plate tested can be readily obtained. To save time and plates, a diaphragm with four openings was made to slide in front of the slit so that four exposures could be given, and four spectra could be made side by side on the same plate. With exposures of $\frac{1}{25}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{3}{4}$, 2, 4, 8, 20 seconds, negatives were obtained serving admirably for comparison purposes. The great range of exposure given in each kind of plate showed much more readily and clearly than a single exposure could the relative colour sensitiveness of the various plates. Fig. 3 gives a reproduction of a few of the typical spectra and from these a general idea of the relative usefulness of the different plates may be obtained.

Plates Sensitive to Yellow Green λ5500-λ5800.

For the first range of sensitiveness specified, from λ5500-λ5800 a number of plates were found to satisfy the required conditions and of these the most sensitive to the yellow green were, the Ilford Rapid Isochrom, the Edwards Snapshot Isochromatic, the Cramer Instantaneous Isochromatic and the Seed Orthochromatic. A further comparative test of these plates, with and without a yellow green showed that, although all four gave high sensitiveness to the yellow green, the Cramer Instantaneous Isochromatic was probably the best and it was accordingly chosen for the purpose. Fig. 3 shows exposures of $\frac{1}{4}$ second on the Cramer and Ilford plates without and with screens.

Plates Sensitive to Coronium Light λ5303.

As regards this region in the spectrum no commercial plates tested were found to be sufficiently sensitive to give any hope of useful results, if employed to obtain photographs of the corona by this light. The best were the Cadett Spectrum, the Hammer Orthochromatic and the Mawson Orthochromatic B. Spectra on those plates are reproduced in fig. 3, and it can readily be seen, if the region around λ5300 were solely employed, that very little impression would be made on these plates. I had hoped, before the tests were made, to find a plate having, besides the usual bands in the blue, and the yellow green regions, a strong band of sensitiveness with a maximum about λ5300. The Hammer Orthochromatic shows traces of such a band but it is by no means sufficiently pronounced. If such a plate had been found, the difficulty of making a suitable screen, of which more anon, would have been considerably lessened.

The original method of sensitising plates, by bathing ordinary plates in weak solutions of certain aniline dye stuffs, commercial plates being prepared by incorporating the proper quantity of the dye in the emulsion, still remained to be tried. Hundreds, I might also say thousands, of aniline dyes have been tested as colour sensitisers, and of these scores have been recommended as useful for the purpose; but the most contradictory results have been obtained by different experimenters with the same dye. As it was hopeless, in the time at disposal, to attempt to repeat all these experiments, it was determined to choose those dyes that were specifically claimed by reliable authorities to sensitise in the required region. By far the most systematic and thorough experimenters in this field are Eder and Valenta, who between 1884 and the present time, have tested and tabulated the effects of several hundred dyes used as sensitisers for dry plates. Of this number perhaps a dozen gave reasonable promise of fulfilling the required conditions, and samples of these were procured and tested.

These may be divided into three classes:—

1. Certain yellow dyes claimed to sensitise in the green.
2. Dyes rendering plates sensitive to red.
3. Dyes rendering plates sensitive to all the spectrum colours, or panchromatic.

The first class among which were Titan, Canary and Cotton Yellow from Holliday, Nitrophenine from Clayton, and Thiazol Yellow from Bayer proved very disappointing. Eder and Valenta have published spectrograms made on plates sensitised with these colours showing a closed band between D and G with a maximum about E. The results of the tests made here seemed to indicate either that the dyes used were not the same or that such spectrograms must have been the result of considerable over-exposure, as the only effect of the dye seemed to be to diminish the violet sensitiveness, and to displace the blue slightly towards the green, while in no case did it get beyond *b* except with very prolonged exposure. A spectrum showing the effect of one of these dyes as a sensitiser is reproduced in fig. 3. The second class although sensitising for red, gave no useful effects in the green where it was required, and they were accordingly dismissed in favour of the panchromatic sensitisers of the third class.

Three of these, Ethyl Red, Orthochrom T, and Pinachrom, all of the same group of chinaldin-cyanin derivatives, the German name of Orthochrom T, being p-Toluchinaldin-p-Bromchinolincyaninaethyliodid gave very promising results. Plates, carefully sensitised and handled, were tested, all showing that the last-mentioned Pinachrom (from Meister, Lucius and Brüning, Höchst am Main) was on the whole the most satisfactory, giving considerably more sensitiveness and less liability to fog than the other two. As the reproduction fig. 3 shows, the band of sensitiveness is nearly uniform from C to H, with traces of three maxima, one at or above D, one at E, and the third in the silver bromide region between F and G. Three different makes of rapid ordinary plates were tested with Pinachrom, the Lumière Extra Rapid, the Seed 'R' and the Ilford 'Monarch.' Of these the Seed showed slightly more tendency to fog while the Lumière was decidedly less sensitive than the Monarch. The latter was also more rapid than the Seed.

An Ilford Monarch plate stained with Pinachrom is very well suited for photographing by light of wave length λ5300 being about ten times more sensitive in that region than the best of the commercial plates, Cadett Spectrum or Hammer Orthochromatic. When used with a suitable absorbing screen to prevent the other colours from acting on the plate, the chance of obtaining a record of the distribution of coronium is very good, as the probable increase of exposure required is only about 25 times that on ordinary plates and this is well within the allowable limit with a lens of fairly large aperture.

A Pinachrom sensitised plate gives also excellent panchromatic effects and is hence very suitable for photographing the spectrum or for three-colour photography. Outside of the application of the former in general spectroscopic work it has also a direct bearing on the work to be done at the eclipse for the photographs by the three spectroscopes were to include the range of spectrum for which Pinachrom sensitised. An Ilford Monarch celluloid film was sensitised and tested in the concave grating objective camera using the carbon arc as the source of light and a reproduction of the spectrum obtained is given in fig. 1. It will be seen that it is not only entirely free from fog but also gives, taking into account the greater intensity of the carbon light in the violet and ultra-violet, a spectrum remarkably uniform in intensity from $\lambda 6100$ to $\lambda 3800$. It was proposed, therefore, to use Monarch films sensitised with Pinachrom for the Prismatic and Grating cameras and Monarch plates similarly sensitised for the slit spectroscope.

For plates sensitive to the other two regions required, in the red and green for the three-colour record negatives no plates tested were one-tenth as sensitive as those stained with Pinachrom and there was hence thought to be a very good chance of obtaining successful negatives. Indeed there had been no intention of trying to obtain such records, as it would be practically hopeless on the commonly used plates, until the tests of Pinachrom showed its special suitability for the purpose.

THE FILTERS OR COLOUR SCREENS.

As it is impossible to obtain photographic plates sensitive only to the required region of the spectrum, some sort of absorbing medium is necessary for each of the four ranges specified above to prevent light other than the desired colour from reaching and acting on the plate. Such an absorbing layer usually a transparent coloured substance, generally called a colour screen or filter may be made in various ways. It may be of coloured or stained glass; it may be a coloured liquid in a glass cell; or it may be stained collodion of gelatine films. Whatever form it may take the tint must be uniform throughout, and, to prevent distortion, it must be contained within plane and parallel glass walls. If coloured glass could be procured of the desired absorption it would be preferable to any of the other forms as it could be thinner and would not fade as some stained films are liable to do. Unfortunately, however, the range of absorptions obtainable in coloured glass is very limited and in several of these the colour is not pure but so mixed with black as to exercise a general absorption as well as in the special region for which it is adapted. This, of course, diminishes the intensity of the light and unnecessarily increases the exposure. Coloured liquids contained in glass cells can easily be made of any required absorption, but they are so troublesome and dirty owing to evaporation and to spilling of the liquid as to be quite unsuited for work in the field. Moreover they are thicker than dry filters and considerably less permanent and have to be retested for absorption every time the solution is replenished. Of the two other forms of filter, stained collodion and gelatine films, the latter was chosen as being more reliable and permanent and the colouring matter was applied by bathing a gelatine coated plate in a solution of the required dye. The G. Cramer Dry Plate Co. coated a number of pieces of thin plate glass 8 inches by 10 inches in size with an even and uniform layer of pure gelatine, which answered the purpose admirably.

In order to have some idea of the most suitable dyes for making the four filters required a number of test plates of the different colours available were made. Ordinary unexposed gelatine dry plates were fixed out, washed and dried and then cut into pieces about 2 inches square. Three or more of these test plates were stained of different intensities, weak, medium and strong in solutions of each of the dyes and these could then be readily examined spectroscopically to determine the absorptions of the colours. The preliminary examinations were visual with a small direct vision spectroscope, while the final test was invariably photographic with the same arrangement as that used in testing the photographic plates, the dyed strip being placed in the course of the light near the slit.

The Yellow Screen.

In making the yellow screen a number of yellow and orange dyes were examined for their transparency to light of long, and opacity to, light of short wave length. Tartazine made by Bayer of Elberfeld was decidedly the best of all tested, and is, in weak concentrations, of a beautiful yellow colour becoming more orange-yellow when used in strong solutions. It transmits red, yellow and yellow-green light almost undiminished in intensity, and absorbs violet light completely and blue in proportion to the strength of the solution or depth of stain. A single layer of gelatine stained with a saturated solution of tartazine absorbs up to wave length λ5200; if it is desired to carry the absorption further into the green more than one layer of the gelatine is required. However, for the yellow filter for the Cramer Instantaneous Isochromatic, it was not necessary to absorb even so far as this, since this region comes in the band of insensitiveness of the plate. A screen absorbing light below λ4900, or at the most λ5000, is as deep in colour as is necessary to prevent the blue rays from acting on the plates. This limit was finally tested by photographing the spectrum of sunlight on these plates through screens of different intensities, and the filter was made to correspond to the lowest intensity which showed no silver deposit in the blue part of the plate. The purpose of the filter being only to prevent the blue and violet light from acting on the plate, the weaker it can be made, provided this end is fulfilled, the better, for it will then transmit a greater proportion of the yellow green light: a moderately strong solution of tartazine was made and filtered and one of the 8 x 10 coated plates bathed in it until, as nearly as could be judged of the same intensity as the chosen test plate. When dry it was tested photographically, one test each on a Cramer and an Ilford plate being reproduced in fig. 3, and changed by dyeing more deeply or soaking out some of the dye in clear water, until it was exactly the right intensity. It was then carefully put away until the other filters were ready.

The Monochromatic Green Screen.

This was by far the most difficult screen to make, for, not only had the absorption on each side to approach as close as possible to λ 5303, but also the finished screen must be as transparent as possible to light of this wave length or else the exposure required to get the necessary details would be too long. If a plate could have been obtained with a narrow band of sensitiveness having its maximum at this point, the problem would have been much simplified, but, as already seen, no such plate could be found, and by far the most sensitive in that region was a plate stained with Pinachrom. Its range of sensitiveness, however, is quite uniform all along the spectrum from λ6000 to about λ4000, and hence the screen must be such as to absorb everything practically but λ5303. No one dye, especially in the green, would give the desired effect, and two dyes must be used, one absorbing the blue and the green as far as λ5250, and the other absorbing the red, yellow and the green as far as λ5350. The former would be a yellow and the latter a green dye. For the yellow no dye was found to answer so well as tartazine, and a very densely stained plate was found to absorb fairly sharply to about λ5250, and to transmit the balance of the spectrum without too much diminution of intensity. For the green, however, the problem was more difficult. Of the twenty green dyes in my list and of which I had specimens, only three or four gave any promise of answering the purpose, and none of these absorbed as sharply as I would have liked, so that to get the complete absorption to the required limit entailed a partial absorption of λ5303. Photographic tests finally reduced the suitable dyes to two, Brilliant Acid

Green 6B and Alkali Fast Green G, both by Bayer, of Elberfeld; and the final choice of these was not made until they were combined with the tartazine stained screens. In fact two filters were completely finished and then finally tested. The one made with one film of Brilliant Acid 6B and two films of dense tartazine, gave a purer monochromatic screen than the one made from one film of Alkali Fast G and one film of dense tartazine, but the general absorption was so much greater and the exposure required so much longer that the latter was finally chosen for the work. Fig. 3 shows reproductions of spectra taken on plates stained with Pinachrom without a screen, and with three monochromatic screens, although light of other wave lengths near λ5303 affects the plates, still it is of comparatively small intensity. Moreover, no other line in the emission spectrum of coronium but λ5303 can affect these plates, and the quantity of continuous coronal spectrum embraced in the region transmitted by these screens is so small in proportion to the quantity in this bright line as scarcely likely to affect the character of the photograph.

The Three-colour Red and Green Screens.

As before stated, the limit for the red screen transmission is between λ5900 and λ7000, and for the green between λ4900 and λ6000, with the absorptions ending somewhat gradually. No single colour could be found for either of these screens, and consequently like the monochromatic green, they were made of two plates. For the red screen erythrosine was found to be a very suitable colour although the absorption began rather abruptly at the yellow side. However, this was deemed an advantage in this case, as although not appreciably affecting the value of the negative as a three-colour record, it would render it more useful as a monochromatic red record of the corona. But erythrosine transmitted blue and violet as well as red, and this had to be absorbed by a second plate of tartazine. The screen as finally completed transmitted red and orange red as far as λ5900, while it entirely absorbed all the colours from orange down. The green screen also required two plates, one of a green dye and one of tartazine to absorb the blue transmitted by the green. The most suitable dye was found to be Acid Green 2G Extra, by Bayer, and of a comparatively weak concentration. It absorbed the red and violet and transmitted the rest, while the grading of the absorption in the orange and red was very suitable. When the screens were finally completed and cut to size they were sealed with Canada balsam. The yellow screen was cut 6½ by 8½ inches, and as only one film was needed a piece of thin plate glass was sealed to the film side of the screen. For the other three screens, size 5 by 6¾ inches, the components were sealed film to film. The balsam employed was a very white clear article used in three-colour work, and after the sealed filters had been allowed to set thoroughly they were bound up with lantern-slide binding strip. The finished screens were beautifully even and transparent, and I have no doubt would have performed admirably.

In order to be able to intelligently estimate the relative exposure required, when these screens were used, compared to that of unscreened plates, a series of tests were made on the plates with which they were to be employed. These tests consisted of exposures of suitable lengths with and without screens on a piece of crumpled white blotting paper pinned on a background of black velvet and so placed as to show both lights and shadows. A comparison of the density of the resulting negatives, which were all developed together, readily enabled one to estimate very closely the relative exposures required. It was found that for the yellow screen on Cramer Instantaneous Isochromatic plates from 3½ to 4 times the exposure without a screen was required. For plates stained with Pinachrom it was found that: The Monochromatic Green required 20 to 25 times normal exposure; the Three-colour Green required 10 times normal exposure; the Three-colour Red required 12 times normal exposure. So that 60 seconds with the monochromatic green on the Cooke lens f 18 which was one proposed exposure should give the same actinic effect as 108 seconds in 45-foot camera, and about 10 seconds in 10-foot camera, which is quite sufficient to get detail in the outer corona.

PRELIMINARY PREPARATIONS.

It is very necessary, before starting on an eclipse expedition to mount, adjust, and test the instruments under as nearly as possible the same conditions as will prevail in the field. Only by so doing can the most thorough preparations be made, and difficulties, which would not otherwise show themselves, be met and overcome. Evidently the first step before erecting the coelostat or cameras is to calculate the azimuth in which the latter are to be placed and the position of the sun at totality. Since the cameras are to be placed horizontally, at sunrise the coelostat mirror will be vertical and also since it is in the meridian the reflected beam will be as far south of east as the sun is north of east. The latitude of Northwest river is about 53° 31′ 30″ and the declination of the sun at totality 9° 9′ 20″. The azimuth of the sun at sunrise will be 15° 33′ north of east, and at totality, 7 hours 51 minutes, about 18° south of east. The altitude at totality will be about 24° and the azimuth of the reflected beam or of the cameras 15° 33′ south of east. The sun's light, proceeding to the mirror, will pass almost directly over the cameras which must hence be placed far enough back so as not to cast any shadows upon the mirror. Further, since they are all grouped together and as, owing to the changing declination of the sun, some movement in azimuth is desirable for the purposes of adjustment and focus, it was determined to mount them all on one base and a plank 10 feet 6 inches long, 24 inches wide and 3 inches thick, built up of 24 whitewood strips, 3 inches wide and 1 inch thick glued together, was obtained on which to mount the cameras and spectroscopes. It was proposed to place this baseboard at Northwest river on two cement piers about 8 feet apart, but for the preliminary tests at Ottawa it was placed on temporary wooden stands.

FOCUSSING THE INSTRUMENTS.

Before mounting the cameras, even temporarily, on the base each one was separately focussed. The objectives were mounted in their telescoping boxes, and an approximate focus was obtained by pointing them at a distant terrestrial object and viewing the image on the ground glass provided for each. They were then strapped to the tube of the equatorial telescope, and the final focus determined from a series of exposures, at different distances of the objectives, on stars trailing across the field. This method gave the focal point very exactly, a movement of $\frac{1}{16}$-inch in the 10-foot focus lenses or one part in 2000, made a recognizable difference in the sharpness of the trails. The focus of the objectives, which were to be used with screens, was determined through their respective screens, and the positions of sharp definition in all were carefully marked and noted. Owing to the grain of the wood running lengthwise in the cameras it is unlikely that any change in the position would occur. It was not, of course, possible, nor would it be worth while to focus the 45-foot camera in this way, as it had no fixed length and it was not focussed until finally installed at Northwest river.

The concave grating and prismatic cameras were focussed, primarily, by the collimator and slit previously used in determining their focal curves, and this position was further tested by photographing star spectra. These cameras were also rigidly attached to the tube of the equatorial and a series of exposures, varying the focal distance, were made on the spectra of Vega, Arcturus, Jupiter and Venus, guiding being accomplished by the micrometer wires in the telescope. The positions of sharp focus found by the two methods agreed very well though the latter was preferably followed, as more nearly approaching the conditions obtaining during totality.

CAMERA HUT AND DARK ROOM.

Some kind of portable and removable covering for protection against the weather was necessary for the coelostat and cameras, also a dark room where the plates could be safely stored and handled. The conditions to be fulfilled in the case of the camera hut were portability and ease of removal of roof and sides to admit the sun. After considerable thought it was decided to use a canvas fly for a roof, stretched over a wooden framework and walls. It was made 20 feet long and 9 feet wide with walls 5 feet high. The posts were made of 4-inch x 4-inch and the sills and plates of 2-inch x 4-inch stuff, all framed carefully together and fastened with screws. The side walls were made in sections, 6 to each side, each about 3 feet 4 inches wide and 5 feet high, of ⅞-inch matched siding nailed to battens at top and bottom, which were in turn fastened to the sills and plates by a couple of screws. The west gable end was nailed up solid, while at the east end the gable part was hinged to the end wall, and easily let down to a horizontal position when required to admit the sun. Beside the end rafters were two others each hence 6 feet 8 inches apart. The ridgepole was in two pieces, and the easterly half with the east rafters could easily be unhooked and taken away, while the westerly part attached to the west gable, served to stiffen the whole roof. The fly, which was readily pulled over the roof by long guy ropes, was re-inforced wherever it rested on the frame work to prevent leakage, and was made about 3 feet longer each way to allow plenty of overlap for the same purpose. When required to admit the sun, it was either pulled off altogether, or simply rolled back to the west end out of the way of the sun, the gable end was let down and the ridge and rafter removed, the whole process only taking about two minutes. The arrangement worked admirably and was very convenient and satisfactory. The side walls could also be readily removed by taking out the screws through the battens and taking away as many sections as desired. An idea of the design may easily be gathered from the illustrations (figs. 7, 8, 9 and 10). The dark room was a simple frame structure 8 feet square with a sloping roof, made of matched stuff and covered with tar paper. It had a small window opening in which was fastened a safe ruby light, and had a developing bench and shelves, while it was floored so as to be thoroughly dry for the safe storage of the plates.

The camera hut was built on a level spot north of the observatory, and, as soon as it was finished, the coelostat was erected on a cement base inside. It was carefully adjusted and the clock rated both by timing and by observing the steadiness of the images in the cameras. The baseboard for the cameras was placed on temporary wooden stands at the right height and the cameras placed in position and temporarily fastened. The installation was then carefully tested in every possible way with the sun, under as nearly as possible eclipse conditions, to allow any defects in design or construction to manifest themselves at a time when they could be easily remedied. When everything was satisfactory the instruments were taken down and carefully packed for shipment. The camera hut and dark room were all marked to facilitate re-erection and were then taken apart and crated in bundles of convenient size. All the materials and supplies which there was any possibility of requiring were gathered together and carefully packed. Altogether for the instrumental work there were 88 boxes, bundles and crates weighing in the neighbourhood of five tons. I wish to acknowledge here the very able and skilful assistance of Mr. W. P. Near who not only helped very materially in the preliminary preparations at home, but who brought a great deal of ability and energy to play in the erection and adjustment of the installation at Northwest river. Without his able help the work must have proceeded much more slowly and the preparation could not have been so thorough and complete.

FINAL ERECTION.

The ss. *King Edward* reached Northwest river on Friday morning, August 11, and after we had landed and looked over the ground there was no difficulty in choosing a suitable site for the camp as the level plot of ground close to the beach, east of the Hudson's Bay Company's post, was an ideal spot both for a camping ground and for an observing station. The instrument and camp supplies had all been landed by Saturday morning early, and the installation of the camp proceeded apace. It was nearly half a mile from the wharf to the observing station, and all the instruments and supplies had to be wheeled or carried this distance. The usefulness of the two-wheeled hand cart, which I had taken care to provide, showed itself, for without it there would have been the greatest difficulty in moving the heavier boxes. I cannot forbear here from speaking of the splendid way in which Mr. Macara not only looked after the moving of the stuff, but actually took the lion's share himself. If it had not been for his energy and zeal not only would our own preparations have been much delayed, but the camp arrangements and the preparations of other members of the party have been hindered. But his efforts did not end with the transport of instruments and supplies, for, as soon as that was finished, he showed his ability and energy in a marked way in the construction work.

For convenience in installing our equipment, a piece of fairly level ground, preferably rising slightly to the east, was necessary, and a suitable site was easily chosen on Saturday morning, a photograph of the completed camp being reproduced in fig. 6. The direction of the central line of hut and cameras, which was 15° 33′ south of east, was kindly given me by Prof. Stewart, and from this line the positions of the coelostat, camera and spectroscope piers, which are shown in the accompanying plan, fig. 4, were laid out. The construction of the piers was the first thing undertaken, and casings were soon knocked together and the filling in started. The foundations of the coelostat and rear camera pier were filled in on Saturday while on Monday these were finished and the other two well under way. When not engaged in cement work, the frame of the camera hut was put together away from the piers, to be carried into position later when they were finished. On Tuesday the dark room was erected, Dr. Chant in this and other work giving able assistance, and on Wednesday the piers were finished, the hut placed over them and the coelostat unpacked and erected.

The central section of the long focus camera was next undertaken. The tube was composed of nine frames of 1½ inches square stuff, 24 inches by 24 inches outside measurement, which were held together about 4 feet apart and the section made rigid and continuous by nailing strips 4 inches by ⅞-inch lengthwise along the corners of these frames, thus forming a tubular framework about 33 feet long. This tube is seen in the cut of the construction work, fig. 7, installed in place on supports about 4 feet from the ground. These supports were made sufficiently wide to allow the plate-holder end, which was of box form and rigidly screwed to the centre section, to slide about three feet north and south. The purpose of this range of movement was to permit the use of celestial objects for testing of focus whose declination differs slightly from 9° 10′, the declination of the sun at the time of eclipse. The frames of the supports were continued up and over the tube, and were then covered on top and sides with tar paper to keep out the rain, and as a further security against the entrance of light. The tube itself was entirely covered with black cloth so closely woven as to be practically light tight, while the frames and connecting strips were painted dead black. The tube was carried through the east end of the camera hut projecting about a foot, and was then connected with the objective end of the camera, which itself projected back over the twin camera about a foot, by more black cloth stretched between, a space of about 18 inches. The cord from the shutter was led back along the roof of the supports through screw eyes to the plate holder end, where it terminated in a convenient position for the operator. It was not thought necessary to build a pier for the plate holder end, as it was amply steady on its braced supports, and as there was no possible chance of vibration being transmitted between the sections by the flexible cloth connection.

The two cement piers, on which the camera base board was to be placed, were each about 33 inches long, 15 inches wide and about 3 feet high. Their centres were 8 feet apart, and each pier had a scantling built into the top, planed off so that the baseboard rested perfectly level. When the final position was obtained the base was to be firmly bolted to these scantlings so that everything would be perfectly rigid and stable. The extra length of the piers over the width of the base, and the extra length of the base over the distance between the piers allowed considerable range of adjustment end-ways and sideways, the former to allow the cameras to be placed as near to the mirror as possible without interference from shadows, and the latter allowing shifting in azimuth to get objects of different declinations for focussing purposes.

This base board was in position ready for service on the 16th and the cameras and spectroscopes were firmly attached to it and to each other by small angle irons and screws, and in the case of the prismatic and grating cameras by wooden braces. The position and method of attachment of the cameras is readily gathered from the illustrations, figs. 8 and 10, and plans, figs. 4 and 5. The twin camera is at the bottom, above this to the south the objective end of the 45-foot focus, then the Cooke, and to the north the grating and prismatic cameras. These were inclined at an angle of 40° with the vertical, so that the refracting edge of the prisms, and the lines of the grating were nearly parallel to the tangents at the second and third points of contact.

The slit spectroscope was attached to its adapter, to allow it to be readily rotated in position angle without disturbing the inclination, in order to get the brightest part of the corona tangent to the slit. The adapter was screwed into a cast iron flange which was attached by clamp and abutting screws, to allow adjustment, to a strong oak frame built to the correct angle, and bolted to the spectroscope pier, the position and arrangement being shown in fig. 8. The spectroscope itself was by this means placed at such a height, and adjusted to such an angle, that the light from the sun, after grazing the top of the frame, would be reflected back from the concave mirror forming an image of the sun on the slit of the spectroscope. The angles of incidence and reflection became by this means a minimum, and the deviation from normal incidence small enough so as not to appreciably affect the definition in the solar image. This image was brought to any desired position on the slit by two slow motion rods, connected to the screws by universal joints, and led to a convenient position for the observer, myself, near the spectroscope.

ADJUSTMENTS.

The top of the coelostat pier was very carefully levelled, and after the lower section of the column had been put in place, its planed upper surface was again carefully tested by a five-second level, and brought as nearly horizontal as possible by wedging up slightly where required. The axis was brought to the correct altitude by the graduated arc, on the sector, and then the only thing remaining was to get it into the meridian. An east and west line was run through the centre of the mirror, and a theodolite, placed about a hundred yards east and on the same level, was used for observing the reflection of its own telescope in the vertically placed coelostat mirror. The adjusting screws, provided in the column, were then used to shift the instrument in azimuth until the reflection was in the centre of the field. Evidently the mirror and consequently the axis can not then be very far from the meridian. This adjustment and that of the altitude can be readily tested, and were so tested by focussing an image of the reflected sunlight in the long focus camera, and observing any change in its position during a run of the clock of an hour or more. There was no appreciable shift in the position of the 5-inch image during that time, showing conclusively that, not only was the instrument well adjusted, but the clock closely rated.

The shorter focus cameras with the prismatic and grating cameras had already been focussed, but it was desirable to again test this adjustment and it was necessary to accurately focus the 45-foot camera which had not as yet been determined in any way. As its movement in azimuth was only about $3\frac{1}{2}°$, celestial objects whose declinations were between 8° 30′ and 10° 30′ could only be used, the declination of the sun at the time of eclipse being 9° 9′ 20″. The only bright star between those limits is α Aquilae, Altair, whose declination is 8° 37′ and which was in a suitable position for observation in the early evening. The declination of the sun only reached 11° on Friday the 25th, hardly leaving sufficient time after allowing for bad weather, and besides the sun is not very suitable for determining the focus. The declination of the moon was only within the required range on one evening, Sunday, the 20th, and, as it was a suitable object, it was decided to use it if possible on this evening. A preliminary test with Altair on Saturday evening showed the limits within which the true focus lay, but the star was too bright, gave too broad a trail, to accurately determine the correct position. The moon rose about ten o'clock on the 20th, and was in a suitable position to use between 11.30 p.m. and 3.00 a.m. But unfortunately the sky was too cloudy to make any successful exposures. Although on the Monday night the declination had risen to nearly 12°, it was determined to get the image on the plate by shifting the coelostat in azimuth, and, as the night was fine, two plates with four pictures on each, were successfully exposed, giving the position of best focus quite accurately.

In addition the moon was photographed in the other cameras, using colour screens where proposed, and the agreement with the previous focal position, obtained by star trails at the observatory, was excellent. Later on in the week, the cameras were all again tested by allowing Altair to trail suitably diaphragming the apertures to get the faint trails necessary for accurate estimation. Since no change in focal position in the cameras had been noticed, it was not thought necessary to redetermine the focal positions of the prismatic and grating cameras, especially as the spectrum of Altair, the only star bright enough, was of the first type with broad diffuse lines not at all suitable for accurate determinations.

After the focus had been thus carefully determined, each of the objective boxes of the cameras, and the sliding backs of the spectroscopes were firmly screwed into position, and I felt satisfied of the correctness of the focal distance to within $\frac{1}{20}$-inch in the case of the shorter focus cameras, and $\frac{1}{4}$-inch in the case of the 45-foot.

MISCELLANEOUS DETAILS.

The focussing was finally completed about the 25th, and the remainder of the time was spent in perfecting the numerous details in the working of the apparatus, and in arranging devices for facilitating speed in manipulation, and for avoiding accidents. It was found, in practising with the changing of plate holders, drawing of slides, &c., that considerable time, especially in the larger sizes, was lost in inserting the slides in the holders, that they were liable to enter crooked and stick, thus losing precious seconds, and entailing danger of fog. A very ingenious device of Mr. Macara, who was entrusted with the working of the 45-foot camera, entirely overcame this difficulty. A piece of wood with a groove in it was nailed on the same level as the bottom of the slide, which pulled out in this groove to a stop at the end preventing its complete withdrawal. The slide was simply pulled out to the stop with one hand, the exposing cord pulled with the other, and the slide immediately shoved back home as soon as the shutter was closed, saving three or four seconds each exposure, and enabling two more exposures to be made in the given time. This device was also applied to the twin camera operated by Mr. Near, and here also its use allowed two additional exposures.

The specially sensitised plates for the Cooke camera and films for the prismatic and grating cameras, which were preferably prepared shortly before using, were carefully sensitised on Monday evening, the 28th, and dried in a specially prepared calcium drying box. On Tuesday one of each was carefully tested for colour sensitiveness and freedom from fog, by photographing blotting paper on black velvet through the different filters, and was found practically perfect. I felt quite satisfied, therefore, that, so far as instrumental equipment and the photographic materials were concerned, everything was in the best of shape.

REHEARSALS.

The only other factors requisite for success were good weather conditions and practice of the various operations of totality. Although we had no control over the former, the latter was very important. Besides Mr. Macara, Mr. Near and myself three more operators were needed. Of these two, Mr. Howell and Mr. Maybee, came with the second party which arrived on the 28th, and Prof. Stewart kindly consented to take the Prismatic Camera. The names of the operators, with their instruments and proposed exposures are as follows:—

J. Macara—45-foot Camera—

Six exposures on Seed Non-Halation and Ilford Monarch plates of 3, 5, 10, 40, 20 and 15 seconds, respectively.

W. P. Near—10-foot Twin Camera—

Nine exposures on two plates each, one Seed Non-Halation by photographic objective, the other Cramer Instantaneous Isochromatic by visual objective through Yellow Screen exposures of 1, 2, 4, 7, 10, 40, 20, 15, 3 seconds, respectively.

D. J. Howell—81·8-inch Cooke Camera—

Four exposures on Ilford Monarch plates sensitised with Pinachrom.
One exposure 10 seconds through three-colour green screen.
One exposure 12 seconds through three-colour red screen.
One exposure 60 seconds through Monochromatic green screen.
One exposure 20 seconds through Monochromatic green screen.

J. E. Maybee—Concave Grating Objective Camera—

Nine exposures on Ilford Monarch film sensitised with Pinachrom.
One exposure, instantaneous, on Solar cusp shortly before totality.
Three exposures, ¼-½ second each, on Flash Spectrum immediately after totality.
One exposure, about 2 minutes on Coronal Spectrum during totality.
Three exposures, ¼-½ second each, on Flash Spectrum just before third contact.
One exposure, instantaneous, on Solar Cusp immediately after totality.

Prof. L. B. Stewart—Prismatic Camera—

Same programme as Mr. Maybee.

J. S. Plaskett—Slit Spectroscope—

One exposure on Ilford Monarch plate sensitised with Pinachrom on spectrum of corona throughout the total phase. The slit to be set tangent to the brightest point of the corona image produced by the concave mirror. A comparison solar spectrum to be formed on each side of coronal spectrum immediately after totality.

The two illustrations of the rehearsals (figs. 9 and 10) show each operator in position at his instrument. Each one practised with his own programme until he could perform it satisfactorily. On the morning of the 29th a complete rehearsal was held under as nearly as possible the same conditions as would prevail at the eclipse. The signal was given for totality, after a warning 30 seconds previous, and then the time was called every ten seconds until the 150 seconds had elapsed, the intermediate intervals being given by the beats of a metronome. So well had every one practised that the first rehearsal went through without a hitch. The following rehearsals served to perfect the movements, until, after fifteen or twenty, the whole programme went with machine-like regularity. Another set of rehearsals was held in the evening by lantern light to accustom the operators to working by artificial light which might be required during totality. These went even better than the morning ones, and I felt satisfied that every thing would go smoothly. After rehearsal the plate holders were carefully loaded and numbered by Mr. Near and myself and every thing was ready for the eventful morning.

Although the prospects for fine weather on the previous day had been very poor, rain with a continually falling barometer, we still hoped, even against our better judgment, that it might clear up for the time, but at daylight on the 30th, although the clouds were more broken than on the previous day, there did not seem much chance of observing the eclipse. However, all preparations were made, the plate holders placed in order in their positions on the stands provided for them, the canvas roof rolled back, the gable end dropped, and the ridge and rafter removed. The computed time of second contact was about 7.51, and at 7.30 although there was no perceptible difference in the density of the clouds, one could notice a diminution in the brightness which became more and more marked as time went on. About twenty minutes before totality, when it was seen there was no possible chance of the clouds breaking, I set up my camera and made a number of exposures of graded length to get some idea of the relative intensity of the light during the eclipse. As a result of carefully comparing the exposures given and intensities produced on these negatives, it may be said that—

Intensity	20	minutes before	totality was	1000	times	that during	totality.
"	10	"	"	650	"	"	
"	6	"	"	200	"	"	
"	4	"	"	120	"	"	
"	2	"	"	45	"	"	
"	20	seconds after	"	15	"	"	

The exposure required during totality to get the same density of negatives was about 10,000 times that required on a bright day at the same hour.

Visually, however, the darkness during the total phase was not so great as I had expected, it being very considerably lighter than a night with full moon. The darkness at first seemed very gradual in its approach until about five minutes before totality, when the obscurity increased more rapidly. The time of totality could not be mistaken as there was a rapid onrush of darkness which was very perceptible and awe-inspiring. The return of light seemed much more rapid than the diminution, but that may probably have been an illusion. Of that I have no means of judging.

Naturally it was a bitter disappointment at having practically no result for six months' work, except the experience in preparation and the useful knowledge gained of colour sensitive plates and absorbing screens. If everything had not been in such first-class shape for the observations, if the perfection of adjustment to focus and working of the camera shutters and plate holders, if the running of the coelostat, or the quality of the specially sensitised plates had not come up to my required standard, probably I would not have felt the disappointment so keenly; but, when the prospects of obtaining some original and useful results were so good, it seemed too bad there was no chance to try.

However, nothing remained to be done but dismantle and pack up all the instruments and appliances. This was entered into with such vigour that little remained to be packed after the evening of the 30th. The rest of the packing was done on the morning of the 31st, and by evening everything was loaded on a schooner in readiness to be transferred to the steamer.

I cannot close this report without expressing, in some slight degree, my appreciation of the confidence you showed in entrusting me with the work, of the readiness with which you endorsed my plans, and of the kindly help and encouragement you were always so ready to give me in the preparations for the observations.

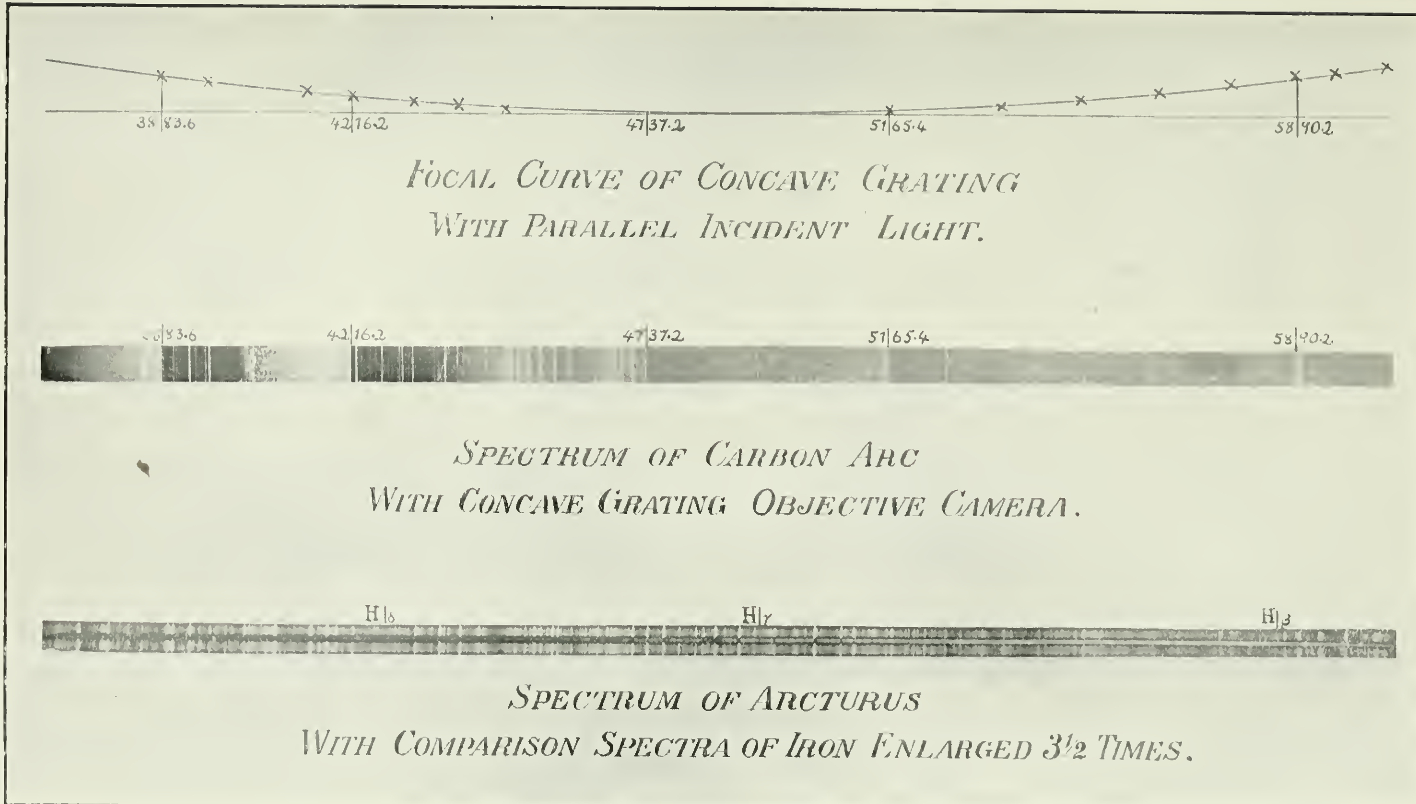

38|83.6
42|16.2
47|37.2
51|65.4
58|90.2
FOCAL CURVE OF CONCAVE GRATING
WITH PARALLEL INCIDENT LIGHT.
42|16.2
47|37.2
51|65.4
58|90.2
SPECTRUM OF CARBON ARC
WITH CONCAVE GRATING OBJECTIVE CAMERA.
H|δ
H|γ
H|β
SPECTRUM OF ARCTURUS
WITH COMPARISON SPECTRA OF IRON ENLARGED 3½ TIMES.

Fig. 1.

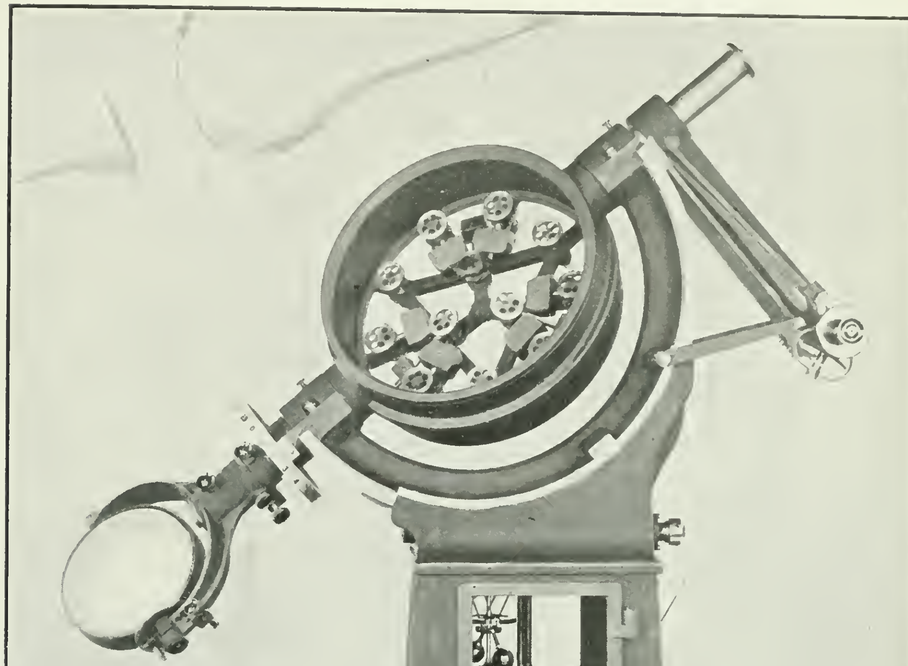
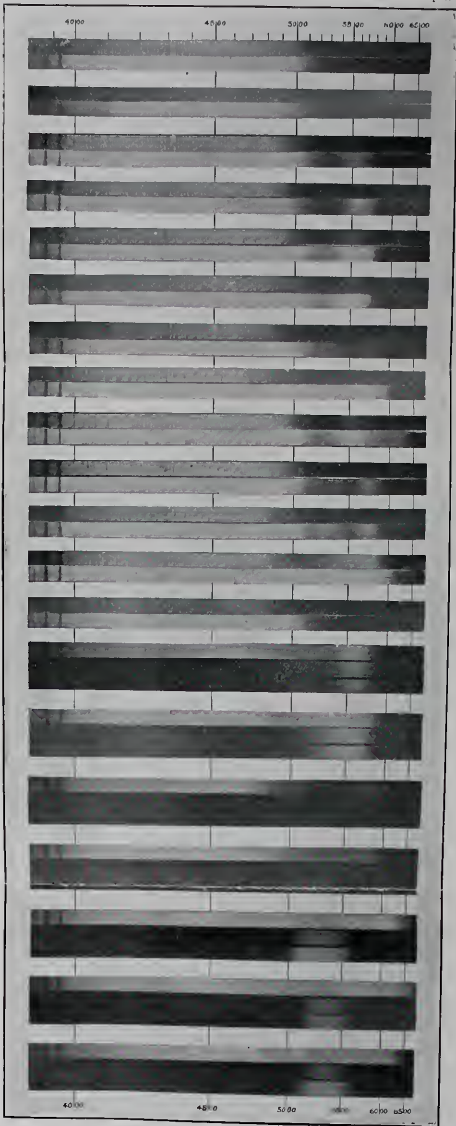


Fig. 2.—20-Inch Coelostat.



Ilford Monarch.

Seed R.

A. G. F. A. Isolar Ortho.

Mawson Ortho A.

Barnet Orthochromatic.

Seed Ortho.

Hammer Orthochromatic.

Cadett Spectrum.

Lumière Panchromatic.

Wratten & Wainwright's Allochrome.

Wratten & Wainwright's Verichrome.

Mawson Ortho B.

Plate stained with Canary Yellow

Ilford Rapid Isochrom through Yellow Screens.

Cramer Instantaneous Isochromatic through Yellow Screens.

Hammer Orthochromatic through Monochromatic Green Screen.

Cadett Spectrum through Monochromatic Green Screen.

Plate stained with Pinachrom through Monochromatic Green Screen.

Plate stained with Pinachrom through denser Monochromatic Green Screen.

Plate stained with Pinachrom through lighter Monochromatic Green Screen.

Fig. 3.—Photographs of the Solar Spectrum on various Plates.

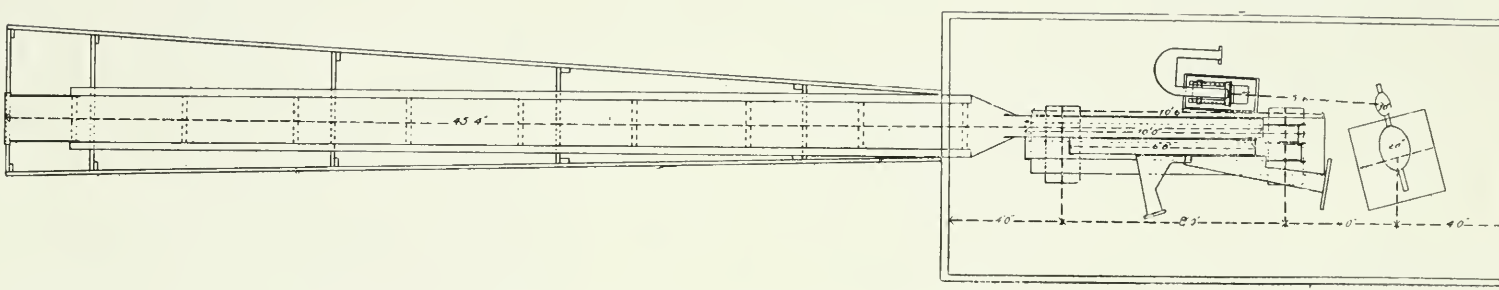


Fig. 4.—Plan of Camera Installation.

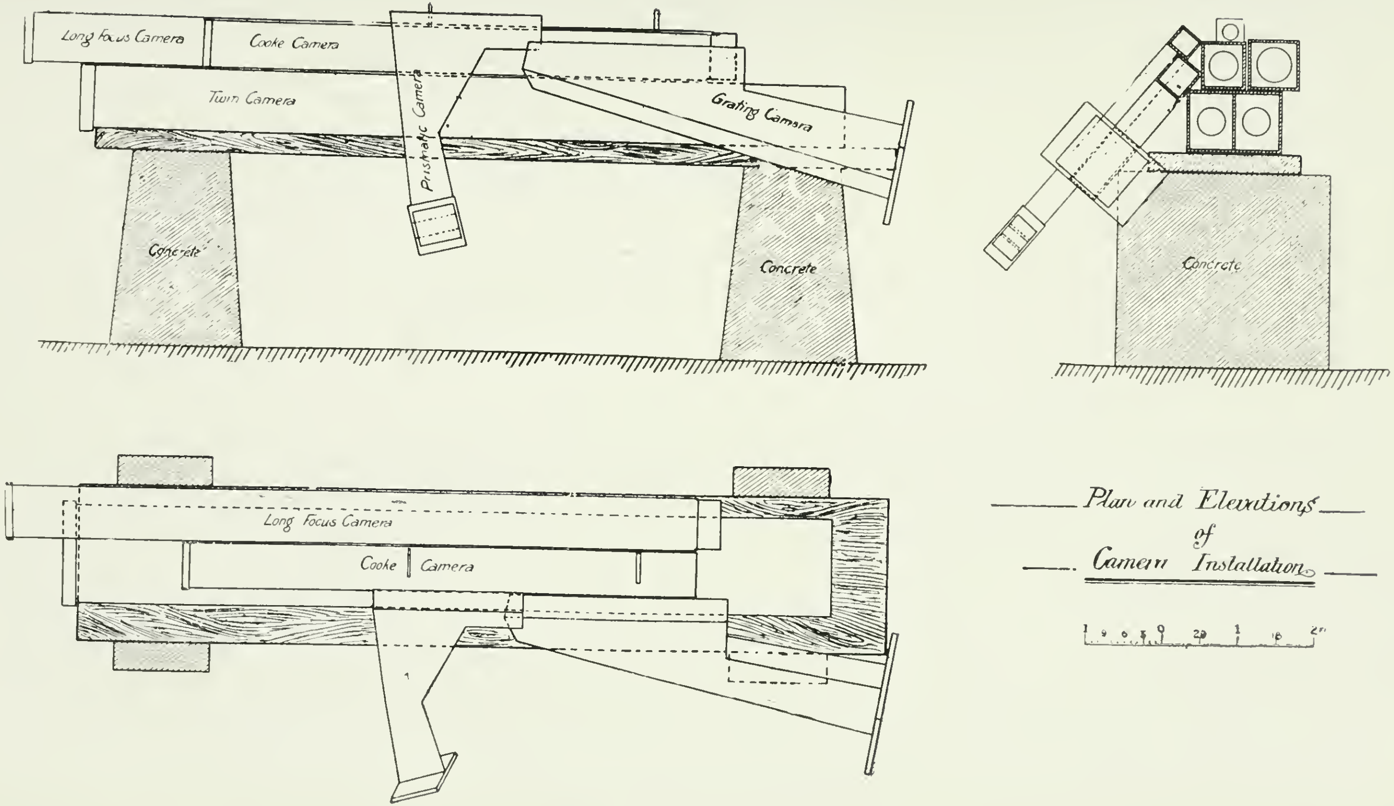


Fig. 5.—Camera Installation

Fig. 6.—Eclipse Camp at Northwest River.

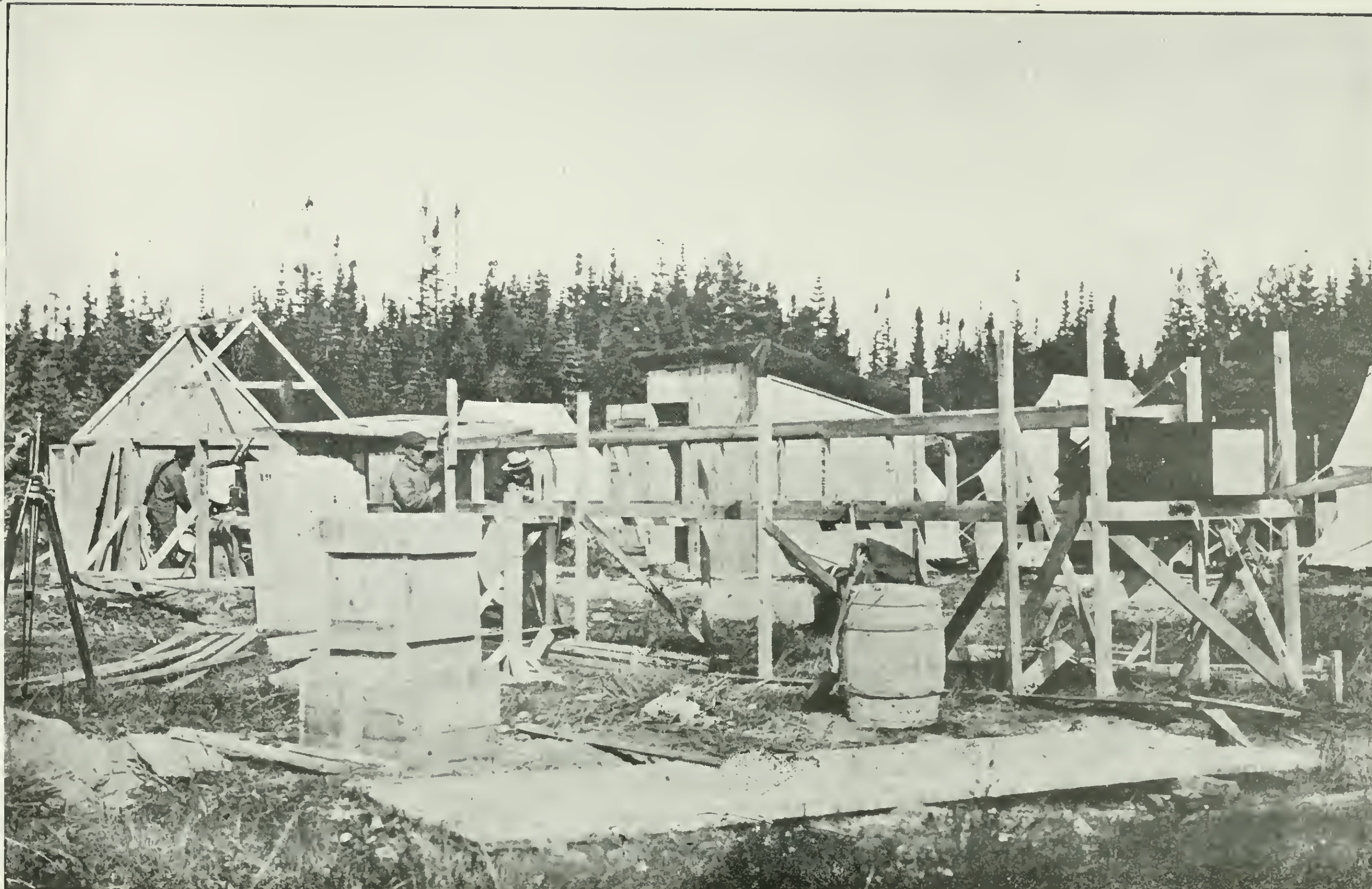


Fig. 7.—Construction of Long Focus Camera.

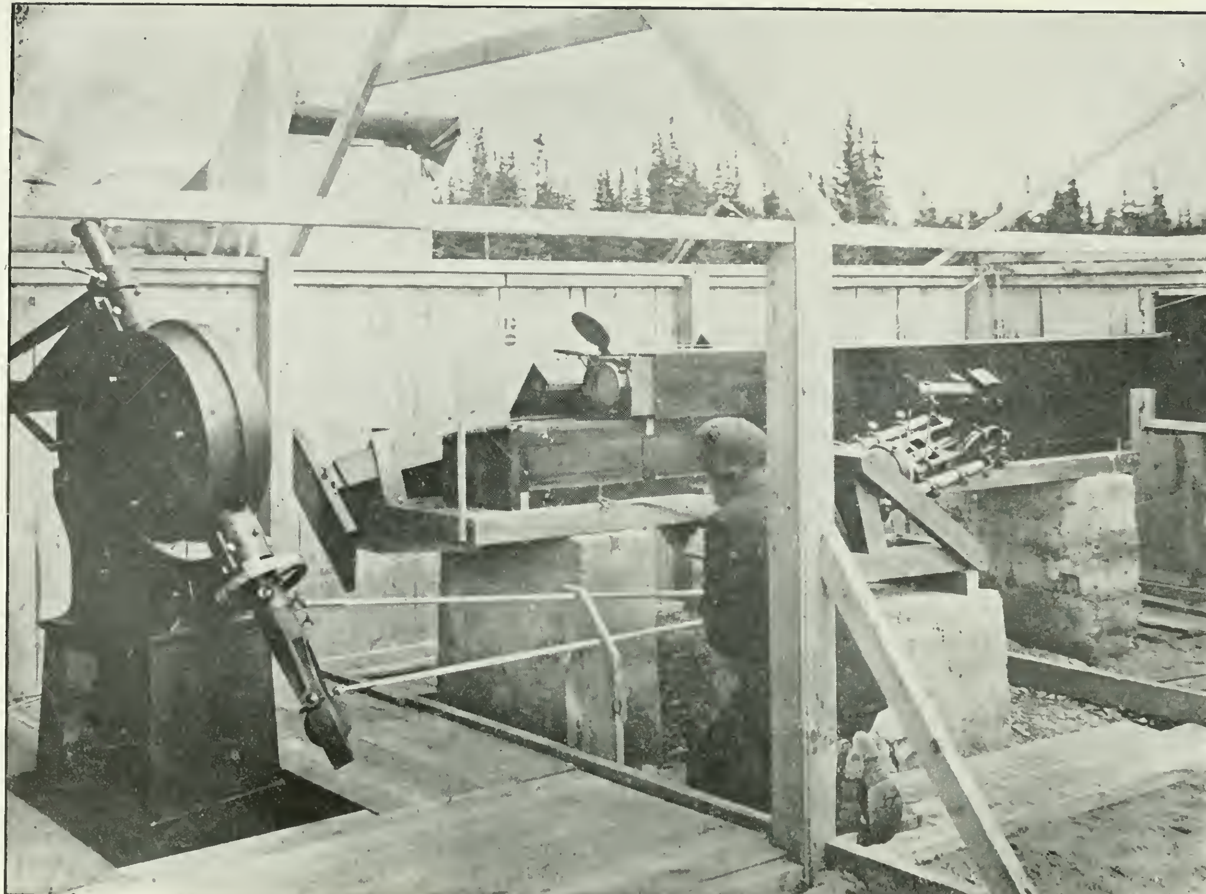


Fig 8.—View of Installation from South.

Fig. 9.—Rehearsal.

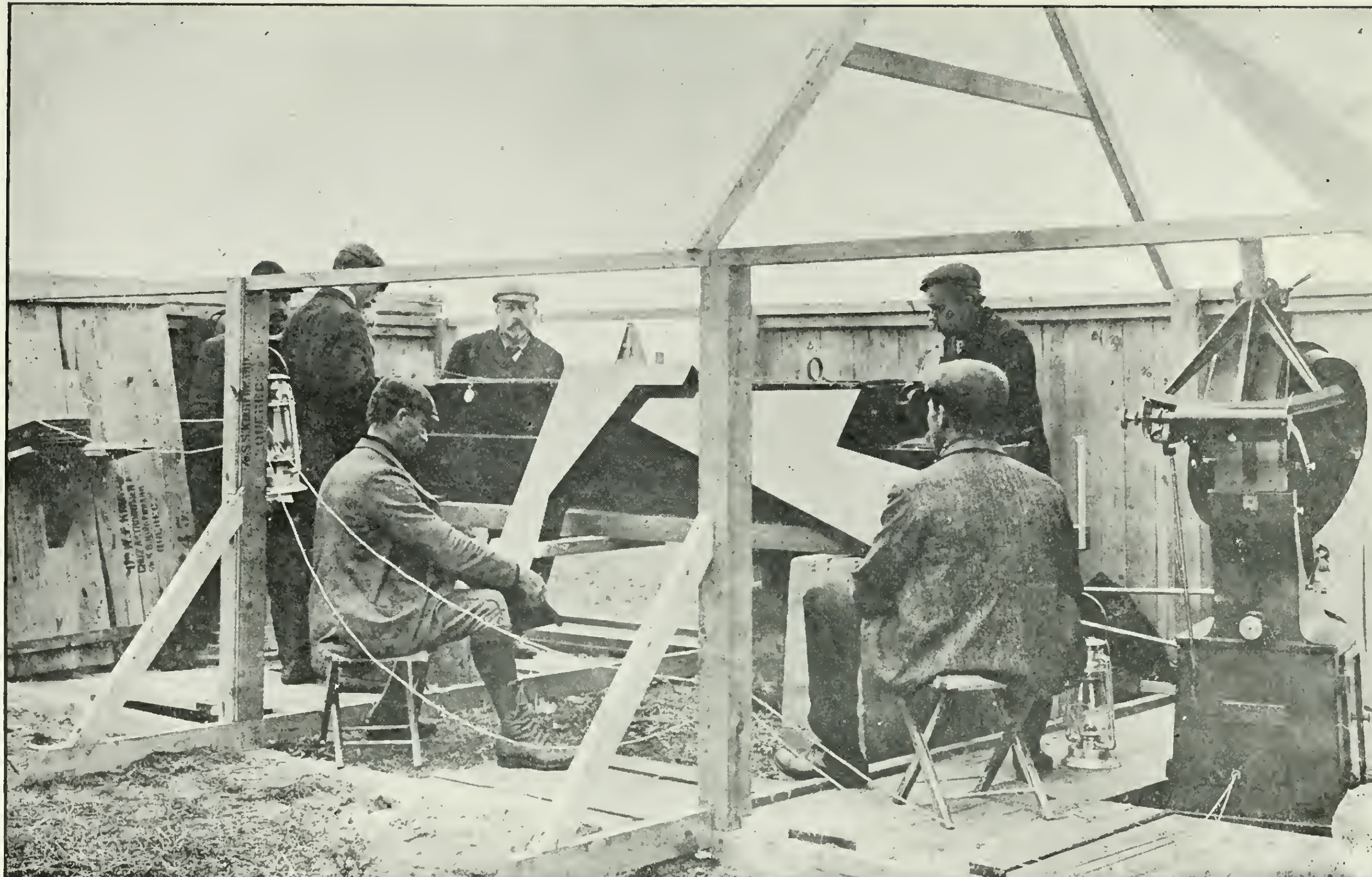


Fig. 10.—Rehearsal.

APPENDIX 6

REPORT OF THE CHIEF ASTRONOMER, 1905.

TIME SERVICE SYSTEM

BY

R. M. STEWART, M.A.

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ILLUSTRATIONS.

APPENDIX 6.

DESCRIPTION OF THE APPARATUS USED IN THE TIME SERVICE, BY R. M. STEWART, M.A.

W. F. King, Esq., B.A., LL.D., D.T.S., &c.,
Chief Astronomer,
Department of the Interior,
Ottawa.

Ottawa, Ont., October 21st, 1905.

Sir,—I have the honour to make the following report on the Time Service System connected with the observatory. Practically the whole equipment has been installed since the occupation of the new observatory building last May; consequently it is in several respects not yet perfected, as much of the apparatus requires experiment and considerable adjustment to get it into proper working condition.

The apparatus used in connection with the time service system may be divided into three main classes—a transit instrument, with its accessory apparatus, for obtaining the time by observation; a system of sidereal clocks for use in the observatory itself for the purposes of the time service and for observation; and a system of mean time clocks for use in the observatory and the government buildings. Each of these systems consists of two primary clocks mounted in the clock room, and any required number of secondary master-clocks and dials electrically controlled by one or other of these primaries. There are at present in use five secondary mean time master-clocks, synchronized by the mean time primary, one in the time room at the observatory, one in the parliament building, and one in each of the three departmental buildings. Each of these operates a number of electrically driven dials in the building where it is situated. One secondary sidereal master-clock is mounted in the time room, and is designed to operate dials wherever required in the building.

Clock Room.—The clock room is situated nearly in the centre of the basement of the observatory building, so that fluctuations in the outside temperature may be as little felt as possible; and, with the same end in view, it is separated from the rest of the basement by double doors which are kept always closed. A fairly constant temperature is maintained in the interior of the room by an electric heater connected with a thermostat set at the required degree of temperature. To equalize the temperature in all parts of the room an electric fan continually plays directly over the surface of the heater, keeping the air in constant circulation. A continuous record of the temperature is kept by a thermograph as a check on the temperature control, and so that if for any reason it should temporarily fail, allowance can be made for the circumstance in computing the clock errors.

The four primary clocks are mounted on cement piers. These piers are built entirely independent of one another, and of the floor and walls of the building; embedded in each one is a vertical marble slab, upon which the clock is securely bolted. They are disposed in pairs, one pair, consisting of a sidereal and a mean time clock, being placed at each end of the room. The clocks of each pair are so situated that the planes of oscillation of their pendulums are at right angles; in this way any mutual effect on their rates is obviated.

Howard Clock.—The Howard sidereal clock, made by the Howard Clock Company of Boston, which has been in use for some years, is shown in fig. 1. It has a mercurial pendulum and Denison's four-legged gravity escapement, and is equipped with an electric contact for chronograph work. The contact wheel is mounted on the same axis as the escapement wheel, and has 29 teeth corresponding to the even seconds, omitting the 58th. The contact itself consists of a platinum spring which bears against a point of the same metal; at every even beat (omitting the 58th) the spring is momentarily thrust aside by a tooth of the contact wheel, and the circuit broken. There is also a wheel with a single slot, turning once in five minutes, which operates a short-circuit at the 54th second, so that every fifth minute the breaks corresponding to both the 54th and 58th seconds are omitted. This circuit operates three relays in the time room, from which other circuits can be obtained as required. Previous to the completion of the observatory this clock was hung on a wall in the basement of the Supreme Court building, where, though its performance was very satisfactory, the stability of suspension and constant temperature requisite for extreme accuracy were not attainable. Even for some months after its removal to the observatory, the clock room, owing to pressure of other work, was not properly equipped; consequently the results of a thorough test of its performance under fair conditions are not yet available; the same applies also to the other clocks.

Riefler Sidereal Standard.—The Riefler sidereal standard (fig. 2), made by Clemens Riefler, Munich, has a compensated nickel-steel pendulum, free escapement, and electrical self-winding arrangement, and is inclosed in an air-tight glass cylinder. The pendulum rod is of nickel-steel, of composition 35·7 per cent nickel and 64·3 per cent steel, which has a coefficient of thermal expansion only about $\frac{1}{12}$ that of steel. Thus the compensation becomes a comparatively simple matter; the method is shown in fig. 3. The pendulum rod runs completely through the bob and has a regulating nut on the lower end. On this nut and surrounding the pendulum rod, rests a hollow cylinder of brass, surmounted again by one of steel; on the upper surface of this the pendulum bob is supported exactly at its centre. The relative lengths of brass and steel are adjusted so as to give the required amount of compensation.

On the pendulum-rod, toward its upper extremity, is a small shelf upon which small auxiliary weights may be placed for the final regulation of its rate before sealing up the cylinder; on the edge of this shelf is a scale to be viewed through a microscope, so that the amplitude of swing of the pendulum may be read from time to time. The glass cylinder is closed by an air-tight joint and partially exhausted, so that, provided the temperature is kept constant, the air pressure within the cylinder also remains constant. This obviates the change in clock rate due to change in barometric pressure, which affects a pendulum swinging in the open air sometimes as much as $\frac{1}{4}$ to $\frac{1}{2}$ second per day. The pressure inside the clock is kept at about 725^{mm} of mercury, so that it may be always lower than the outside barometric pressure. A thermometer and barometer are hung within the cylinder, to check the temperature and pressure from time to time.

The clock-weight consists merely of a lever attached by a ratchet to a wheel which engages the pinion of the escape-wheel; when the lever has dropped to a certain point it closes an electric circuit which raises it again to its highest position; this action recurs every 20 or 30 seconds. There is also on this clock an 'intermittent' seconds-contact through which runs a circuit operating two relays in the time room. From them may be obtained circuits for recording on the chronograph or for synchronizing secondary clocks. This contact, of which a diagram is shown in fig. 4, closes the electric circuit every alternate second; the even minute is recorded on the chronograph by the omission of one tooth on the contact wheel, so that the circuit remains closed from the 59th second to the 2nd second of the following minute. (Fig. 4 and fig. 7.)

Time Observations.—The Riefler sidereal is the clock which is used as the primary standard, the Howard and the Mean Time Primary being compared with it daily.

Its error, as also that of the Howard, is allowed to accumulate, and allowance made for it in computing the time. Observations for time are made as often as practicable—in summer practically every clear night, in winter at less frequent intervals, unless required for some particular purpose. On account of the type of electrical contact on the Riefler clock, which requires a double-record chronograph, it is more convenient to make the observations with the Howard. The error of the Riefler is obtained by comparing the two clocks on the chronograph both before and after the observations.

Time observations are made with a Cooke transit instrument mounted in the meridian. At present, pending the completion of the transit room, it is mounted in a small temporary shed east of the observatory. The object glass is of 3-inch clear aperture, with a focus of 35½ inches. In the focal plane is mounted a glass reticule upon which are ruled two horizontal lines and thirteen vertical lines. The vertical lines, or 'threads,' are separated into groups—a centre tally of five, a tally of three on each side of this, and two single threads one at each side; ordinarily only the middle eleven threads are used in observations. The equatorial interval between the threads of a tally is about 2·4 seconds of time, and that between the tallies about double this. The field of the instrument is illuminated by small electric lamps placed at the extremities of the axis, which is hollow; the light is reflected down along the tube by a diagonally placed mirror at the point of intersection of the axis and the line of sight; the intensity of the light is governed by a rheostat mounted conveniently on the side of the pier. A handle is mounted on the base by which the instrument can be lifted from the Y's and the axis reversed.

The chronograph used in the observations was made by Warner & Swasey. The cylinder is driven by clock-work so as to turn approximately once every minute. A small carriage carrying an electro-magnet with a pen attached to the armature is mounted alongside, and is moved longitudinally by an endless screw which turns at the same speed as the cylinder. The clock circuit goes through the coils of the electro-magnet, so that the pen traces a spiral line on the chronograph paper and records the beats of the clock. The circuit controlling the pen also passes through a key in the hand of the observer, who taps the key as the star passes over each successive thread in the field of the instrument, thus registering the transit on the chronograph. In addition, for convenience in picking out the transits on the sheet, he gives a continuous rattle on the key at the beginning and end of each observation. A chronograph sheet with a number of transits recorded is shown in fig. 6. During the time of observation, readings are also taken to determine the level error of the axis of the instrument.

A complete time determination for accurate purposes consists usually of observations of the transits of twelve stars, six in each position of the axis. The clock time of transits over the separate threads are scaled off the chronograph sheet, and the mean taken as the time of transit of that particular star over the meridian of the instrument. After the proper correction for level has been applied to each star, and the right ascensions of the stars found for that particular day, the results are computed by least squares for three unknowns, giving a determination of azimuth, collimation, and clock error for the mean time of the observations. The probable error of such a time determination is usually from one-hundredth to one-fiftieth of a second.

Comparison of the clocks is made on a chronograph which carries two magnets and two pens, one for each circuit. The record of a comparison is shown in fig. 7. The same clock is thrown on both sides of the chronograph for a portion of the time, so as to show the amount of the parallax of the pens, if any exists.

The apparatus so far described comprises the equipment for obtaining the time, and for preserving it as nearly as may be without error between successive observational determinations. The remainder of the equipment is applied to the purpose of furnishing exact time throughout the observatory itself, and to the public.

Of the two mean time clocks mounted in the clock room, one, also made by Riefler, is the main Mean Time Primary (fig. 8); the other, made by G. Borrel, of Paris, is intended to be used as an auxiliary primary and master-clock for the building (fig. 9).

Riefler Mean Time Primary.—The Riefler Mean Time Primary has a dead escapement, and a nickel-steel pendulum similar to that of the Sidereal Standard, but lighter and with a lens-shaped bob, to obviate air-resistance. The seconds-contact is an intermittent one, identical with that shown in fig. 4. It operates four relays in the time room, one for synchronizing the mean time master-clock, one to control the synchronization line running to the city, and two for recording on chronographs.

A mean time clock is of course required always to show the true time; hence an arrangement becomes necessary for correcting small outstanding errors from day to day. It consists of the two small auxiliary pendulums visible in fig. 8, mounted one on each side of the main pendulum. The one on the left has its centre of gravity slightly below its point of suspension, the one on the right slightly above. It follows that if the first of these is connected to the main pendulum, it will accelerate the clock, while the second will retard it. The method of controlling these auxiliary pendulums is shown in fig. 5. The electro-magnet *e*, is traversed by a circuit which runs to the switch-board in the time room; when the circuit is open, as is normally the case, the arm, *a*, is held clear of the shelf on the main pendulum rod, *p*, by the arm, *b*, connected to the armature, *c*; when the circuit is closed the armature is attracted, the arm, *a*, is released, and drops into the slot, *s*, thus throwing the auxiliary pendulum into connection with the main one; when the clock has been corrected to the required extent the circuit is opened and the arm, *a*, again lifted. The arrangement for the other auxiliary pendulum is similar. The rate of correction can be adjusted by moving the bobs of the auxiliary pendulums on their rods. That used is about six seconds per hour, so that a correction of a tenth of a second either way can be made by simply throwing the switch in the time room in the required direction for the space of a minute. The clock is compared with the sidereal standard every morning, and the proper correction made, if any is necessary.

Borrel Primary.—The Borrel clock is the one which was formerly used as the primary for the small experimental system installed in the Langevin block and the old offices of the Astronomical Branch on Wellington street. It has a pin wheel escapement and a wooden pendulum rod with a lead bob supported at the bottom, which gives a fair compensation for temperature. Its rate is considerably affected, however, by variations in the moisture of the atmosphere. The correction arrangement on it consists of a permanent magnet mounted longitudinally on the pendulum rod, immediately beneath which, and fixed to the clock case, is a solenoid entirely destitute of iron. If a current is passed in one direction through the solenoid the magnet is attracted and the clock accelerated, while a current in the opposite direction repels the magnet and retards the clock. The electrical contact operated by this clock consists of a spring attached to the pendulum rod close to its upper extremity, which makes contact with an adjustable screw every time the pendulum swings to the right.

This clock will be used as a reserve primary, to run the circuits ordinarily worked by the Riefler in case of stoppage of the latter through accident or for repairs, &c. It is also intended to fit it with two other contacts so that it may be used in addition as a reserve for the master-clock in the time room.

Time Room.—Fig. 10 shows a photograph of the switch-board and the two master-clocks in the time room. The clock on the right is the mean time master-clock, that on the left the sidereal. The mean time master-clock was made by Borrel, and is the one which was installed in 1902 in the offices of the Astronomical Branch on Wellington street as a part of the experimental system before referred to. It has a pin-wheel escapement and a pendulum with wooden rod and lead bob.

At the bottom of the clock-case and at one side there is a fixed vertical electro-magnet through which the intermittent current controlled by the primary clock flows; on the lower end of the pendulum rod, below the bob, there is a horizontal brass arm with an iron armature attached, which is attracted by the electro-magnet while the current flows; by means of the impulse thus administered every alternate second the pendulum is kept swinging in synchronism with that of the primary clock. It may be remarked that the controlled pendulum lags in every case about half a second behind the controlling one; any error in indicated time is, of course, obviated by keeping the controlling clock that amount fast on true time. In the experimental system first installed the synchronization was effected in a different way; in place of the vertical electromagnet a horizontal solenoid was used, through which passed one end of a permanent bar magnet attached horizontally to the lower end of the pendulum rod; the other end of the magnet passed through a copper cylinder which served to damp the oscillations of the pendulum. This system, however, was found to be open to several objections, the most serious of which was that if from any cause (as was sometimes liable to happen when wires from one building to another were used) the synchronization current failed to flow, the synchronized clock must necessarily stop. Hence the present system, due to Riefler, was adopted, and has given complete satisfaction.

The electric contacts operated by the mean time master-clock are three in number; a diagram of the first is shown in fig. 12; the wheel, *w*, is mounted on the same axis as the escapement wheel; the arm, *a*, pivoted at *p*, rests ordinarily against the contact screw, *b*; at the 58th second it is lifted off *b* by the projecting jewel *j* on the contact wheel, and at the 59th pressed against the contact screw *c*, remaining there till the 60th second, when it drops back against *b*. Thus two circuits can be operated from this contact, one being closed from the 59th to the 60th second of every minute, the other continuously closed except from the 58th to the 60th second.

The first of these circuits operates a mercury contact relay in the relay cupboard at the base of the switchboard. This consists of a pair of vertical coils and an armature with a horizontal arm attached; at the end of the arm is an adjustable vertical screw, which dips into a mercury cup and completes the circuit when the relay is actuated. A relay of this type was found necessary where a fairly heavy current flows through the points, on account of the unavoidable sparking, which would oxidize the points of an ordinary relay and spoil the contact. Through this mercury connection flows the current which actuates the electric minute dials distributed throughout the building. These dials contain no clock movement of their own, but simply an electro-magnet with the necessary mechanism for transforming the electro-magnetic impulses into the movement of the hands; as the impulse occurs only once a minute, the hands do not move gradually, but jump the space of one minute at a time, advancing always at the 60th second as indicated by the regulator. There are in the observatory twenty-six of these dials, which are divided into six circuits, all passing through the mercury contact referred to. In addition, the tower clock of the observatory is operated by the same circuit, but in a different way; on account of its size, the same method would be impracticable in its case. The hands are operated by a small motor which is cut in every minute by the electro-magnet connected with the minute-dial circuit; as soon as it has advanced the hands the space of one minute, it automatically cuts itself out, the time required for the movement of the hands being somewhat less than a second. The motor and auxiliary mechanism is situated just back of the dial, in an alcove off the equatorial room, and is shown in fig. 11. The dial is of sectional ground glass, of five feet diameter, and is equipped with lights for illumination. This is effected by a white back-board illuminated by eight 16 c.p. lamps arranged with reflectors in a circle around its edge between it and the dial.

The second contact on the mean time master-clock consists of two springs fixed one on each side of the pendulum rod close to its upper extremity, which make contact with adjustable screws fixed to the case as the pendulum swings to either side; this contact is intended for driving seconds-dials wherever required throughout the building, but is at present not in operation.

The remaining contact is operated by a wheel with a single tooth, which revolves once every hour; at about 30 seconds before the even hour it presses a spring against an adjustable screw, closing a circuit; at about thirty seconds after the hour the spring is released and the circuit opened. This circuit operates a relay which will be used in connection with dropping the time-ball on Parliament Hill; the arrangements for this have been completed and the wires installed, awaiting only the final connections.

The method of operating this circuit is shown diagrammatically in fig. 13. The relay A is the one operated by the hourly contact in the master-clock; the relay B, which when actuated closes two circuits and opens a third, is operated by the same circuit as the relay which controls the minute-dials, from the 59th to the 60th second of every minute; C is a neutrally adjusted polar relay. The time-ball circuit passes through the central points of B and the points of C. As will readily be seen from the diagram, when the relay A is not energized, the battery D will send a current through the coils of C for one second every minute, and the time-ball circuit will remain open through the points of C. When A is energized at 30 seconds before the even hour, the battery E is thrown on the coils of C, the circuit being completed at the 59th second through the left-hand points of B in the reverse direction to the former one, thus closing the time-ball circuit through the points of C. Finally when at the 60th second the circuit is completed through the central points of B, the current flows and releases the ball at the other end of the line. The right-hand pair of points of the relay B is to be used for sending preliminary signals, the arrangements for which have not yet been completed. In connection with this it is the intention to install a return signal to announce at the observatory the descent of the time-ball.

The sidereal master-clock in the time room is a Riefler clock, with the same pendulum and escapement as the mean time primary. It is equipped with a synchronization magnet similar to that in the mean time master-clock, and is synchronized by the Riefler sidereal standard. The electric contact operated by it is a reversing one, similar to that shown in fig. 4, with the addition of another contact screw below the lever, and the difference that there is no tooth omitted on the contact wheel. The circuit controlled by it will be reversed every second, and can be used for driving seconds-dials wherever required.

The time room switch-board controls all the circuits connected with the time service. On the lower part of it is fixed a relay cupboard containing two shelves, with sliding glass doors; these relays are the ones which operate all the different circuits. Just above the relay cupboard is a row of eighteen jacks through which the different circuits pass; on pushing a plug connected with the ammeter into any one of these, the ammeter is cut in without breaking the circuit. The switches are so arranged that any combination of the primary clocks can be thrown on either one of the two chronographs mentioned above, for purposes of comparison. Provision is also made for a circuit for another chronograph when required, and for the circuits required for longitude work. When the new transit building has been completed, the chronographs will be set up in a small room adjoining the time room, and opening directly into the transit room; in the meantime the double chronograph is set up temporarily in the time room, and the other in the temporary transit shed.

Battery.—The battery power used for the time system is obtained from twenty-six storage cells situated in the battery room in the basement. The battery room switch-board is shown in fig. 16. Down the right hand side of the board are two rows of jacks; to one of these rows come wires from the storage cells, giving a potential of four volts between adjacent jacks; to the other row come the different circuits. The connections are made by plugs connected by insulated wires, as shown in the figure. In this way any required voltage can readily be applied to any given circuit. The cells are charged weekly by the motor-generator in the workshop.

Outside Service.—Running from the observatory to the city there are four insulated wires used by the time service, in addition to two bare telegraph wires. Of these one pair runs to the time-ball on Parliament Hill; the other pair divides into four branches carrying the synchronization current for the master-clocks in the four government buildings. In each building there is a switch room containing the master-clock, a switch-board and relay cupboard, a battery cupboard containing storage cells, and a small motor-generator set for charging the battery. As the equipments in the different buildings are nearly identical, it will be sufficient to describe one. The apparatus in the switch room in the Langevin block is shown in fig. 17. The master-clock is a Borrel clock identical with the one in the time room at the observatory; the master-clocks in the other buildings, however, were made by Riefler. The local synchronization current is worked from a relay driven by one branch of the main synchronization line from the observatory. The battery consists of nine storage cells, giving a potential of about eighteen volts; these are charged weekly. The motor-generator set is a Holzer & Cabot machine of 85 watts capacity. The motor is of the induction type with a self starting device, and runs on the ordinary electric light circuit; it is coupled directly to a compound wound generator giving 2·8 amperes at 30 volts. The charging circuit, which runs through a regulating rheostat on the switch-board, is usually turned on in the evening and off the next morning. In place of the ordinary automatic cut-out in the charging circuit, which, in case of stoppage of the motor for even a few seconds due to failure of current would cause the generator to run idle till morning, a special automatic low resistance relay is used. This consists, as shown in fig. 14, of a pair of vertical coils and an armature with a horizontal arm attached. In the unexcited state of the relay this arm makes contact with the spring *s*, completing the generator circuit through the coils of the relay and the resistance T. When the generator starts, as soon as the voltage becomes high enough to attract the armature, the arm *a*, is drawn down into the mercury cup *m*, making the lower contact just as it breaks the upper one, and throwing the battery into circuit through the rheostat R.

The minute dials are in this case divided into circuits of ten, which branch off wherever convenient from a pair of mains running to the switch-board; one of the dials is located in the switch-room to check the coincidence of the system with the master-clock. The dial circuit passes through the points of a mercury contact relay similar to the one in the time room at the observatory, and also through another relay which serves to open the corresponding branch of the main synchronization line, so as to furnish a signal at the observatory. The ammeter is a double-scale Weston, the upper scale reading to 2½ amperes, the lower to 250 milliamperes; the shunts required are operated by the switch directly underneath it. The current strengths are read in the same way as at the observatory, by several jacks and a plug attached to the ammeter.

Provision is made, in case of necessity, for working the minute-dial relays in as many of the other blocks as may be required, either from the Langevin block or from the parliament building, using the synchronization wires for the purpose. Thus in case of accident or repairs to any one of the master-clocks the dials dependent on it could still provisionally be kept going.

There are in operation at present 42 dials in the parliament building, 60 in the west block, 36 in the east block, and 48 in the Langevin block; in addition there are operated from the Langevin block two dials in the old offices of the Astronomical Branch on Wellington street, now occupied by the Schools Lands Branch of the department. These, with those at the observatory, make a total of 214 secondary dials now working, besides the tower clock at the observatory.

Check-dial.—As stated above, each of the four dial circuits is made to report itself to the observatory every minute by opening the synchronization line; a circuit has been so arranged at the observatory that these signals may operate a check-dial, shown in fig. 10, above the sidereal master-clock. A diagram of the connections employed for this purpose is shown in fig. 15. The relay A is traversed by the main synchronization current; when the synchronization line is closed the circuit through its points is open, and *vice versa.* B is a differentially wound, neutrally adjusted polar relay; through one pair of coils the main synchronization line passes in such a direction as to close the circuit through the points; through the other pair of coils, however, there flows in the opposite direction a stronger current, except from the 58th to the 60th second of every minute; this circuit is operated by one of the contacts described in the mean time master-clock. The circuit operating the check-dial passes in series through the points of these two relays. Evidently it will be held open at B up till the 58th second, and after this, since the relay is neutrally adjusted, it will remain open till closed by the flowing of the synchronization current; this will next occur at the 59th second by the synchronizing clock, which, it will be remembered, corresponds to 58½ seconds by the master-clock, due to the lag of the latter. The circuit through B, then, is closed for the last 1½ seconds of every minute, provided a current flows through the synchronization line just previous to the 59th second by the master-clock. At the 59th second by the master-clock, each of the branches of the synchronization line is opened by the corresponding minute dial circuit, and, provided there is no short circuit on the main synchronization line, the circuit through the points of A is thereby closed, and the check dial is advanced one minute. In this way the check dial will keep true time only so long as there is no short circuit or break in the synchronization line, and so long as each of the minute dial circuits operates properly. A failure of any one of these conditions makes it lose time, and give warning to the official in charge.

In such a system of secondary electric clocks, on account of the multiplicity of delicate adjustments required for perfectly satisfactory working, it takes some time subsequent to installation before everything is in proper working condition; consequently a certain amount of trouble is to be expected for a time in any newly-equipped building. At the date of writing, however, most of these difficulties have been remedied, and the whole system is working fairly satisfactorily; as time progresses, it is hoped that the service will be still further perfected.

I have the honour to be, sir,

Your obedient servant,

R. M. STEWART.

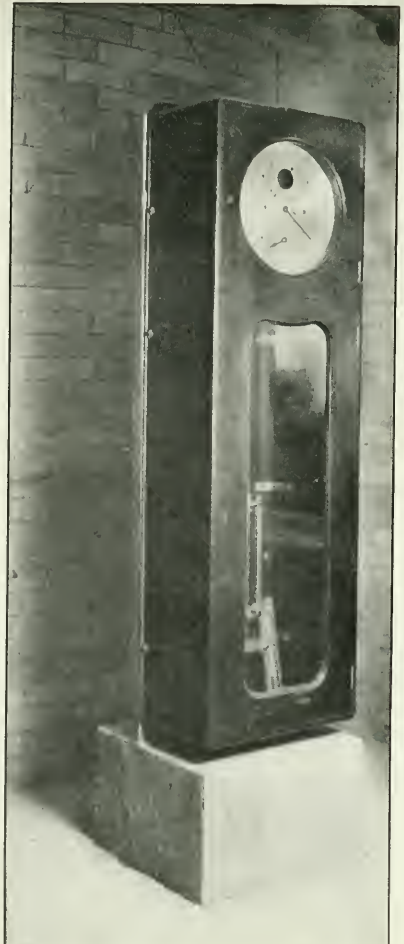

Fig. 1.—Howard Sidereal Clock.

Fig. 2.—Riefler Sidereal Standard.

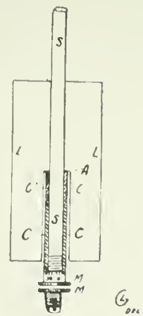

Fig. 3. Compensation of Riefler's Pendulum

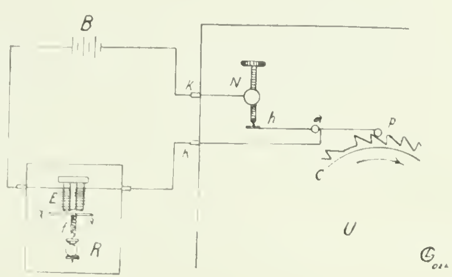

Fig. 4. Seconds-contact on Riefler Sidereal Standard.

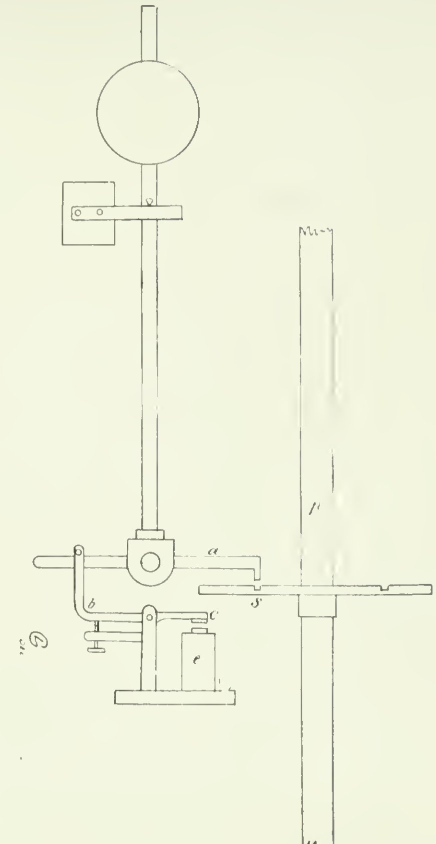

Fig. 5.—Method of Correcting Mean Time Primary.

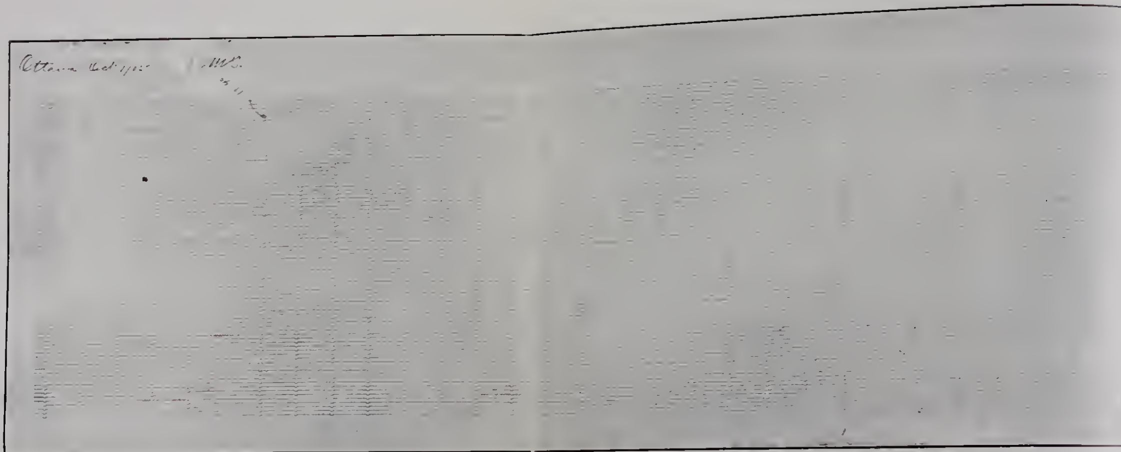

Fig. 6.—Chronograph Record of Time Observations.

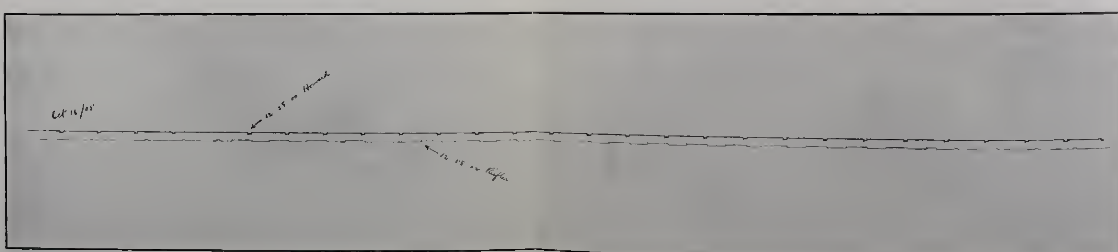

Fig. 7.—Chronograph Record of Clock Comparison.

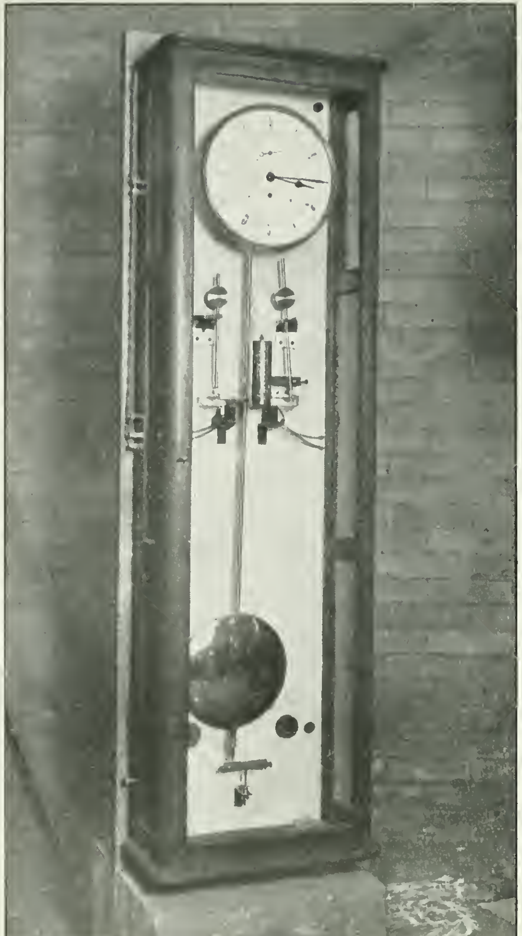

Fig. 8.—Rietler Mean Time Primary.

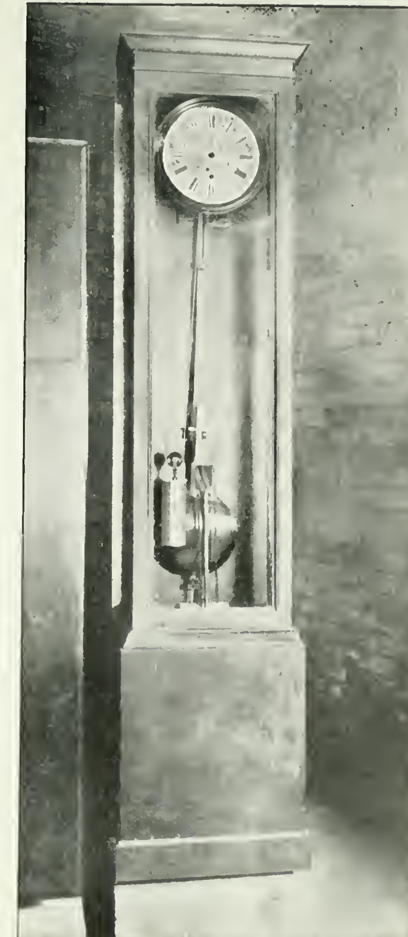

Fig. 9.—Borrel Mean Time Clock,

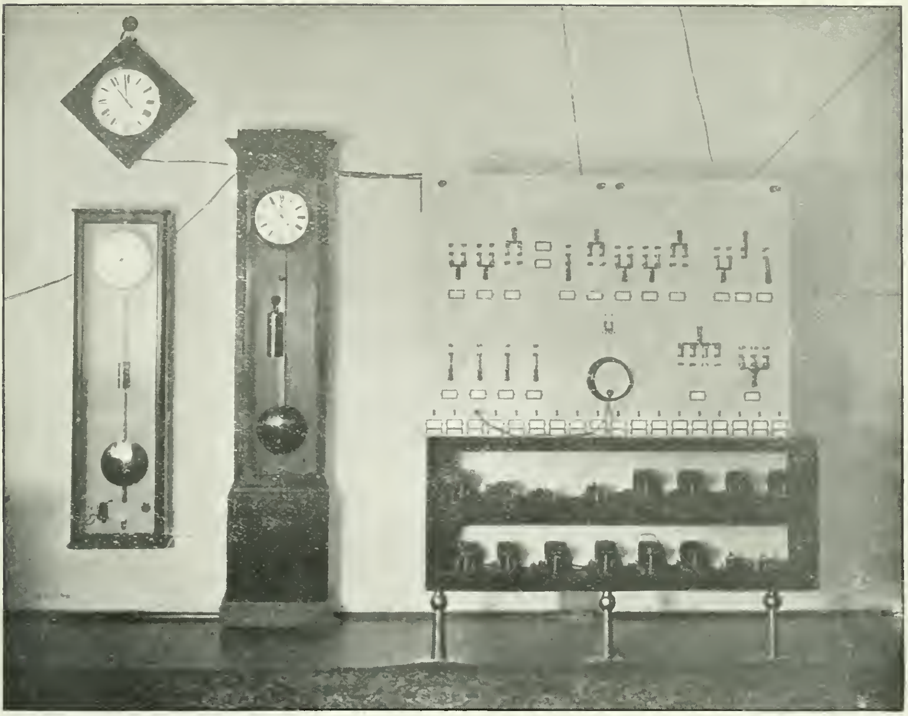

Fig. 10.—Time Room Installation.

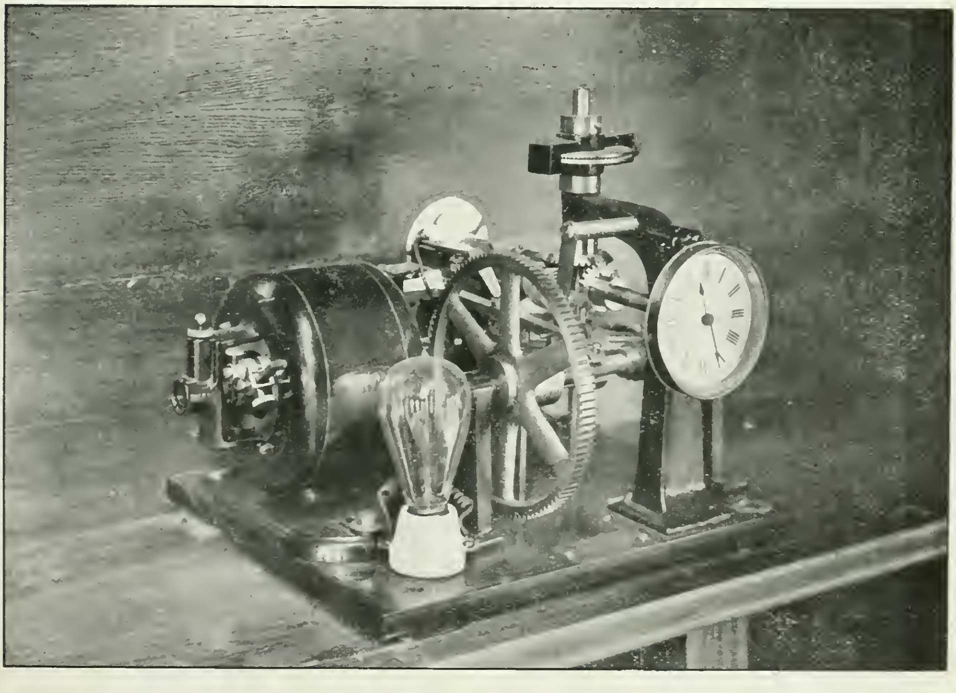

Fig. 11.—Movement of Tower Clock.

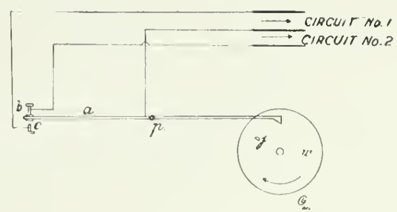

Fig. 12.—Minute-contact on Master-Clock.

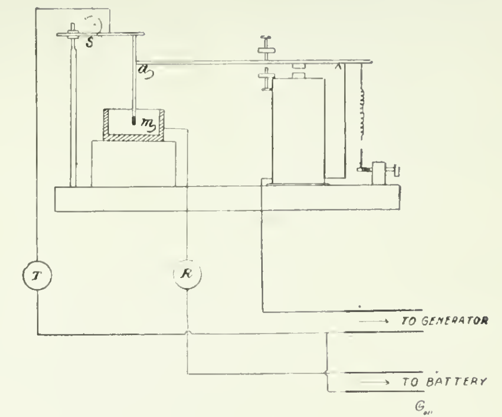

Fig. 14.—Cut-out Relay for Charging Circuit.

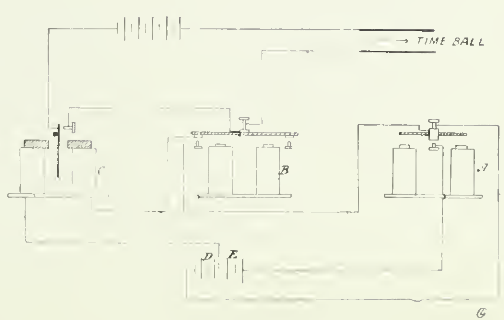

Fig. 13.—Time-ball Circuit.

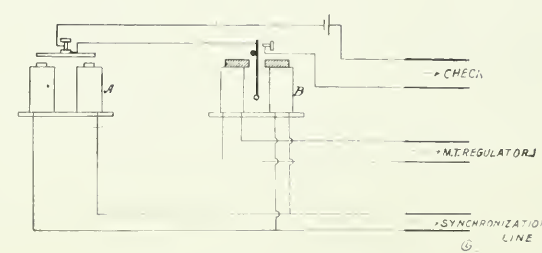

Fig. 15.—Check-dial Circuit.

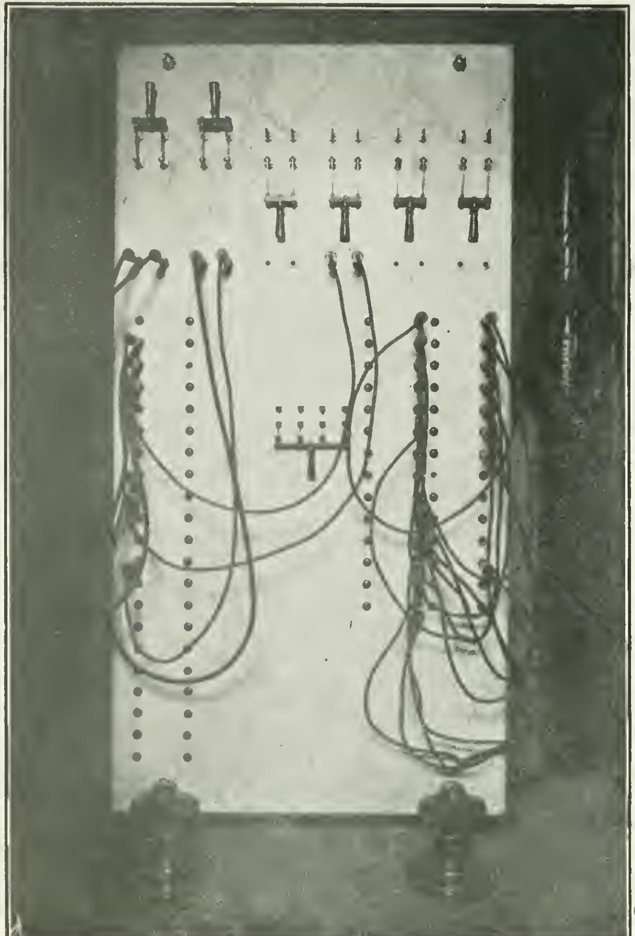

Fig.16.—Battery Room Switch Board.

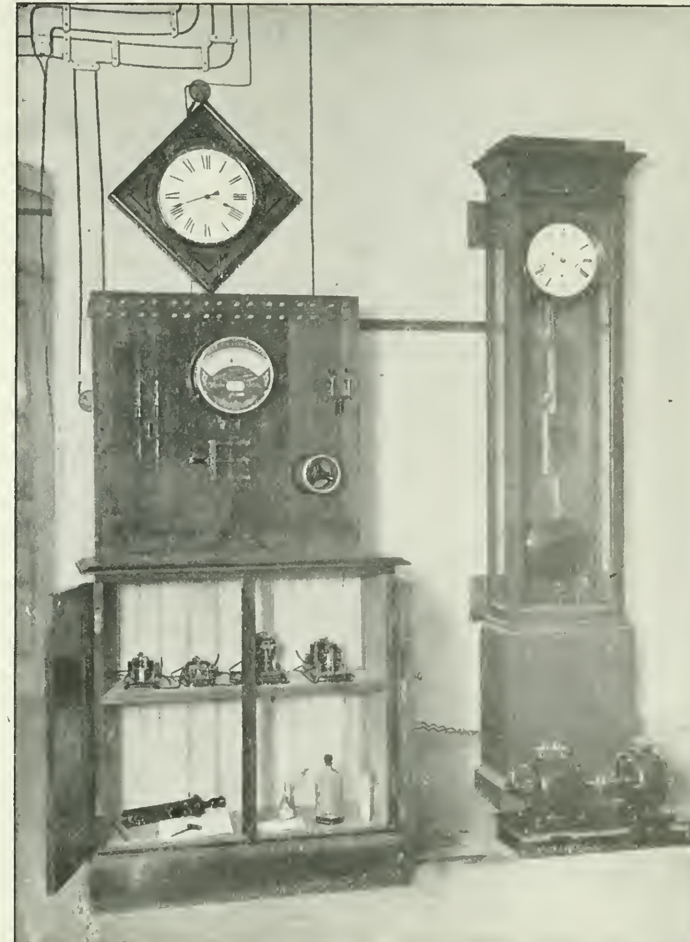

Fig. 17.—Langevin Block Installation.

APPENDIX 7

REPORT OF THE CHIEF ASTRONOMER, 1905.

TABULAR STATEMENT OF LONGITUDE OBSERVATIONS, 1885 TO 1904

BY

J. MACARA.

CONTENTS

APPENDIX 7.

TABULAR STATEMENT OF LONGITUDE OBSERVATIONS, 1885 to 1904.

OTTAWA, ONT., October 31, 1905.

W. F. KING, Esq., B.A., LL.D., D.T.S., &c.,
Chief Astronomer,
Department of the Interior,
Ottawa.

SIR,—I have the honour to submit herewith a summary of results, arranged in chronological order, for differences of telegraphic longitude between stations observed from 1885 to 1904.

In comparing the summary with the table of astronomical positions published in appendix I, part IX, of the annual report of 1904, a few slight discrepancies will be observed. It may be explained that this arises from the fact that the results for difference of longitude have been recomputed within the past year.

As a description of the stations was given in the above mentioned report of 1904, it has been considered unnecessary to repeat the information here.

A synopsis of the summary with the longitude of stations will be found on page 277.

I have the honour to be, sir,
Your obedient servant,

J. MACARA.

TABULAR STATEMENT OF LONGITUDE OBSERVATIONS, 1885 TO 1904.

DIFFERENCE OF LONGITUDE BETWEEN SEATTLE AND VICTORIA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1885.	h. m. s.	h. m. s.	h. m. s.		h. m. s.		m. s.	m. s.	m. s.			s.
June 14....	1 23 17·24	1 23 17·06	8 25 42·47	....	7 06 32·03	....	4 06·80	4 06·62	4 06·71	....	....	·090
" 15....	1 23 19·14	1 23 19·03	8 25 46·65	....	7 06 34·36	....	4 06·85	4 06·74	4 06·795	....	....	·055

	m. s.
Mean	4 06·752
Personal equation.	·242
$\triangle\lambda$	4 06·994

Observers, West, T. Drummond.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN KAMLOOPS AND PORT MOODY.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1885.	h. m. s.	h. m. s.	h. m. s.		h. m. s.		m. s.	m. s.	m. s.			
Aug. 11....	—1 21 44·58	—1 21 44·65	+7 07 02·37	....	+8 38 52·23	....	10 05·28	10 05·21	10 05·245	.. ....	....	....
" 12....	—1 21 47·33	—1 21 47·40	+7 07 05·23	....	+8 38 58·05	....	10 05·49	10 05·42	10 05·455	....	....	....

	m. s.
Mean....	10 05·350
Personal equation.	—·242
$\triangle\lambda$	10 05·108

Observers, West, O. J. Klotz.
East, T. Drummond.

DIFFERENCE OF LONGITUDE BETWEEN KAMLOOPS AND REVELSTOKE.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1886.	h. m. s.	h. m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Aug. 15....	7 48 15·673	7 48 15·653	9 41 41·582	± ·024	2 01 55·457	± ·022	8 29·548	8 29·528	8 29·538	± ·033	·069	·010
" 15....	48 16·123	48 16·084	41 42·285	± ·023	01 55·463	± ·022	·301	·262	·281	± ·032	·188	·019
" 16 ..	52 10·689	52 10·658	45 39·554	± ·023	01 58·084	± ·017	·219	·188	·203	± ·029	·266	·015
" 17....	56 04·453	56 04·434	49 36·177	± ·017	02 01·388	± ·023	·664	·645	654	± ·029	·185	·009
" 17....	56 05·070	56 05·051	49 36·804	± ·017	02 01·396	± ·023	·662	·643	·652	± ·029	·183	·009

	m. s.	s.
Weighted mean................	8 29·469	± ·014
Personal equation..............	—·499	± ·017
$\Delta\lambda$..........	8 28·970	± ·022

Observers, West, W. Ogilvie.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN KAMLOOPS AND FIELD.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1886.	h. m. s.	h. m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 7...	9 17 34·666	9 17 34·619	11 12 12·630	± ·032	2 09 57·495	± ·066	15 19·530	15 19·483	15 19·507	± ·073	·055	·023
" 10...	29 10·556	29 10·494	23 53·954	± ·017	10 03·035	± ·019	·637	·575	·606	± ·025	·154	·031
" 10....	29 11·044	29 10·993	23 54·732	± ·017	03 040	± ·019	·352	·301	·327	± ·025	·125	·025
" 11....	33 03·758	33 03·708	27 50 417	± ·015	06·072	± ·020	·413	·363	·388	± ·025	·064	·025
" 11...	33 04·416	33 04·402	27 51·064	± 015	06 079	± ·020	·431	·417	·424	± ·025	·028	·007
" 12....	36 55·596	36 55·583	31 44·154	± ·019	08·023	± ·024	·465	·452	·459	± ·031	·007	·007
" 12....	36 56·040	36 56·004	31 44·634	± ·018	08·029	± ·024	·435	·399	·417	± ·030	·035	·018
" 12....	36 56·606	36 56·574	31 45·065	± ·018	08·034	± ·024	·575	·543	·559	± ·030	·107	·016

	m.	s.	s.
Weighted mean..	15	19·452 ±	·010
Personal equation..............		—·499 ±	·017
$\Delta\lambda$.........................	15	18·953 ±	·020

Observers, West, W. Ogilvie,
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN CALGARY AND KAMLOOPS.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1886.	h. m. s.	h. m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Oct. 2....	10 54 53·520	10 54 53·460	12 50 36·538	± ·029	2 20 47·288	± ·017	25 04·270	25 04·210	25 04·240	± ·034	......	0·30
" 2...	54·340	54·274	37·650	± ·029	47·313	± ·017	04·003	03·937	03·970	± ·034	......	0·33
" 2....	54·872	54·819	38·273	± ·029	47·324	± ·017	03·923	03·870	03·897	± ·034	....	0.27
								Weig't'd mean	25 04·036	± ·019	·122	
" 3...	10 58 48·144	10 58 48·095	12 54 34·526	± ·021	2 20 50·787	± ·020	25 04·405	25 04·356	25 04·380	± ·029	....	·025
" 3...	·546	·503	35·030	± ·021	·794	± ·020	·310	·267	·289	± ·029	....	·022
								Weig't'd mean	25 04·334	± ·020	·176	
" 10...	11 25 48·106	11 25 48·030	13 21 59·215	± ·026	2 21 15·241	± ·013	25 04·132	25 04·056	25 04·094	± ·029	....	·038
" 10....	48·616	48·539	·705	± ·026	·248	± ·013	·159	·082	·120	± ·029	....	·038
" 10....	49·086	49·008	22 00·195	± ·026	·256	± ·013	·147	·069	·108	± ·029	....	·039
" 10....	49·988	49·922	01·005	± ·026	·267	± ·013	·250	·184	·217	± ·029	....	·033
								Weig't'd mean	25 04·135	± ·015	·023	

	m. s.	s.
Final weighted mean.......	25 04·158	± ·010
Personal equation.....	—·499	± ·017
$\Delta\lambda$............... ...	25 03·659	± ·020

Observers, West, W. Ogilvie,
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN WINNIPEG AND KAMLOOPS.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1886.	h. m. s.	h. m. s.	h. m. s.	s.	h. m. s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
Nov. 9....	13 22 05·146	13 22 04·922	15 20 02·291	± ·014	3 30 44·888	± ·023	1 32 47·743	1 32 47·519	1 32 47·631	± ·027	....	·112
" 9....	05·592	05·363	02·782	± ·014	·904	± ·023	·714	·485	·599	± ·027	....	·115
" 9....	06·476	06·235	03·600	± ·014	931	± ·023	·807	·566	·686	± ·027	....	·120
								Weig't'd mean	1 32 47·639	± ·016	·017	
" 10....	13 25 55·156	13 25 54·890	15 23 59·940	± 020	3 30 52·561	± ·024	1 32 47·777	1 32 47·511	1 32 47·644	± ·031	....	·133
" 10....	56·124	55·873	24 00·934	± ·020	·578	± ·024	·768	·517	·642	± ·031	....	·126
" 10....	56·650	56·393	01·429	± ·020	·587	± ·024	·808	·551	·679	± ·031	....	·128
" 10....	57·114	56·864	01·924	± ·020	·595	± ·024	·785	·535	·660	± ·031	....	·125
								Weig't'd mean	1 32 47·656	± ·016	·000	
" 12....	13 33 37·492	13 33 37·240	15 31 50·592	± ·020	3 31 00·880	± ·028	1 32 47·788	1 32 47·536	1 32 47·662	± ·034	....	·126
" 12....	38·002	37·743	51·081	± ·020	·900	± ·028	·821	·562	·692	± ·034	....	·130
								Weig't'd mean	1 32 47·677	± ·024	·021	
" 14....	13 41 18·350	13 41 18·064	15 39 43·600	± ·020	3 31 12·987	± ·015	1 32 47·737	1 32 47·451	1 32 47·594	± ·025	....	·143
" 14....	18·868	18·592	44·094	± ·020	13·000	± ·015	·774	·498	·636	± ·025	....	·138
" 14....	19·396	19·113	44·588	± ·020	13·013	± ·015	·821	·537	·679	± ·025	....	·142
" 14....	19·936	19·654	45·083	± ·020	13·025	± ·015	·878	·596	·737	± ·025	....	·141
								Weig't'd mean	1 32 47·662	± ·014	·006	

	h. m. s.	s.
Final weighted mean..................	1 32 47·656	± ·008
Personal equation..................	— ·499	± ·017
$\triangle\lambda$ to old observatory, Winnipeg.....	1 32 47·157	± ·019
$\triangle\lambda$ survey connection	—2·242	
$\triangle\lambda$ to new observatory, Winnipeg....	1 32 44·915	± ·019

Observers, West, W. Ogilvie,
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN WAPELLA AND WINNIPEG.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1887.	h. m. s.	h. m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 30....	51·221	51·133	— 4 25 02·613	± ·023	— 4 06 32·444	± ·017	19 21·390	19 21·302	19 21·346	± ·028	·187	·044
July 1....	48·923	48·856	— 03·791	± ·025	— 31·010	± ·022	21·704	21·637	·671	± ·033	·138	·034
" 2...	45·416	45·336	— 05·621	± ·009	— 29·687	± ·027	21·350	21·270	·310	± ·028	·223	·040
" 3...	41·665	41·614	— 05·347	± ·009	— 28·391	± ·032	21·621	21·570	·595	± ·033	·062	·026
" 5...	33·593	33·540	— 14·328	± ·016	— 26·198	± ·019	21·723	21·670	·696	± ·024	·163	·027

	m. s.	s.
Weighted mean....	19 21·533	± ·012
Personal equation...	— ·028	± ·018
$\triangle\lambda$ to old observatory, Winnipeg.......	19 21·505	± ·021
$\triangle\lambda$ survey connection....	—2·242	
∴ $\triangle\lambda$ to new observatory, Winnipeg.....	19 19·263	± ·021

Observers, West, O. J. Klotz,
East, W. F. King.

DIFFERENCE OF LONGITUDE BETWEEN PORT ARTHUR AND WINNIPEG.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1887.	m. s.	m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
July 22....	13·391	13·307	− 4 06 01·887	± ·029	− 3 34 35·275	± ·012	31 40·003	31 39·919	31 39·960	± ·031	·131	·042
" 26...	28·392	28·310	− 05 54·583	± ·033	− 34 42 681	± ·020	40·294	40·212	40·253	± ·038	·162	·041
" 27 ..	31·494	31·428	− 05 52·479	± ·033	− 34 43·793	± ·019	40·180	40·114	40 147	± ·038	·056	·033
" 30 ..	44·886	44·816	− 05 45·904	± ·033	− 34 50·602	± ·012	40·188	40·118	40·153	± ·035	·062	·035
Aug. 29 ...	23·499	23·432	− 04 49·932	± ·030	− 36 33·388	± ·022	40·043	39·976	40·009	± ·035	·082	·034

Observers—West, W. F. King.
East, O. J. Klotz.

	m.	s.		s.
Weighted mean	31	40·091	±	·025
Personal equation		·101	±	·017
$\triangle\lambda$ to old observatory, Winnipeg	31	40·192	±	·031
$\triangle\lambda$ survey connection..................		+ 2·242		
∴ $\triangle\lambda$ to new observatory, Winnipeg......	31	42·434	±	·031

DIFFERENCE OF LONGITUDE BETWEEN WINNIPEG AND KALMAR.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1887.	m. s.	m. s.	h. m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 30. ..	− 5 49·325	− 5 49·301	− 4 03 22·686	± ·025	− 4 00 31·507	± ·019	8 40·504	8 40·480	8 40·492	± ·031	·040	·012
Oct. 3....	− 6 07·038	− 6 07·012	− 03 08·932	± ·019	− 35·469	± ·015	40·501	40·475	·488	± ·024	·044	·013
" 4. .	− 6 16·950	− 6 16·926	− 02 59·230	± ·007	− 35·414	± ·023	40·766	40·742	·754	± ·024	·222	·012
" 5....	− 6 22·118	− 6 22·096	− 02 52·816	± ·021	− 34·429	± ·010	40·505	40·483	·494	± ·023	·038	·011

Observers—West, W. F. King.
East, O. J. Klotz.

	m. s.	s.
Weighted mean	8 40·532	± ·013
Personal equation	−·056	± ·017
$\triangle\lambda$ to old observatory, Winnipeg..........	8 40·476	± ·021
$\triangle\lambda$ survey connection.	+ 2·242	
$\therefore\triangle\lambda$ to new observatory, Winnipeg......	8 42·718	± ·021

DIFFERENCE OF LONGITUDE BETWEEN EDMONTON AND WINNIPEG.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals	Mean.	Probable Error.	r.	
1888.	m. s.	m. s.	h. m. s.	s.	s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
July 8....	0 59·690	0 59·603	— 1 04 08·795	± ·014	19·868	± ·007	1 05 28·353	1 05 28·266	1 05 28·310	± ·016	·009	·043
" 9...	1 01·025	1 00·902	— 1 04 07.182	± ·018	20·231	± ·024	28·437	28·315	28·376	± ·030	·057	·061
" 10....	1 01·004	1 00·916	— 1 04 06·736	± ·033	20·565	± ·015	28·305	28·219	28·262	± ·036	·057	·044
" 11....	1 02·222	1 02·106	— 1 04 05.124	± ·013	21·079	± ·015	28·425	28·309	28·367	± ·020	·048	·057
" 16 ...	1 13·873	1 13·783	— 1 03 53·337	± ·013	21·225	± ·009	28·435	28·345	28·390	± ·016	·071	·045
" 18 ...	1 17·873	1 17·787	— 1 03 50·447	± ·012	19·976	± ·011	28·296	28·210	28 253	± ·016	·066	·043
" 19....	1 17·889	1 19·797	— 1 03 48·983	± ·036	19·543	± ·009	28·415	28·323	28 369	± ·037	·050	·046
" 20 ...	1 22·136	1 22·000	— 1 03 48·684	± ·012	19·493	± ·017	28·313	28·177	28·245	± 021	·074	·063

Observers—West, O. J. Klotz.
East, W. F. King.

	h. m. s.	s.
Weighted mean..........	1 05 28·319	± ·007
Personal equation..........	— ·354	± ·013
$\Delta\lambda$..........	1 05 27·965	± ·015

DIFFERENCE OF LONGITUDE BETWEEN WINNIPEG AND ONION LAKE.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1888.	m. s.	m. s.	m. s.	s.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 1 ..	4 25·628	4 25·563	— 47 13·193	± ·014	—11·393	± ·015	51 27·428	51 27·365	51 27·396	± ·020	·099	·032
" 3 ...	....	3 52·774	— 47 06·134	± ·013	+28·273	± ·012	....	....	27·181	± ·017	·106	
" 4....	3 57·181	3 57·076	— 47 02·780	± ·018	+27·327	± ·013	27·288	27·183	27·235	± ·022	·052	·053
" 6 ...	4 04·201	4 04·103	— 46 57·529	± ·011	+25·626	± ·009	27·356	27·258	27·307	± ·014	·020	·049
" 7....	4 07·071	4 06·965	— 46 54·521	± ·023	+25·792	± ·017	27·384	27·278	27·331	± ·028	·044	·053
" 8 ...	4 13·612	4 13·550	— 46 50·587	± ·020	+23·162	± ·013	27·361	27·301	27·330	± ·024	·043	·031

Observers—West, O. J. KLOTZ.
East, W. F. KING.

	m. s.	s.
Weighted mean	51 27·287	± ·008
Personal equation	— ·454	± ·010
$\triangle\lambda$....	51 26·833	± ·013

DIFFERENCE OF LONGITUDE BETWEEN MATTAWA AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1890.	m. s.	m. s.	s.	s.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 14 ...	12 17·173	12 17·121	20·967	± ·009	3·042	± ·014	11 59·248	11 59·196	11 59·222	± ·016	....	·026
" 16....	22·109	22·074	26·247	± ·011	3·278	± ·006	59·140	59·105	59·122	± ·013	....	·018

	m. s.		s.
Weighted mean	11 59·172	±	·010
Personal equation	-- ·152	±	·019
$\triangle\lambda$	11 59·020	±	·022

Observers—West, E. Deville.
East, W. F. King.

DIFFERENCE OF LONGITUDE BETWEEN MONTREAL AND OTTAWA.

Date.	Difference of Chronograph.		Station	Clock Correction.							Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.		Before Signals.		After Signals.		At Signals.			Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
				At T_1	$\triangle T$	At T_2	$\triangle T$	At T	$\triangle T$	ϵ						
1896.	m. s.	m. s.		h. m.	s.	h. m.	s.	h. m.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 3.	9 03·480	9 03·457	W.	17 13	— 3·206	16 00	— 3·201	15 13	— 3·207	± ·018						
			E...	13 30	— 35·165	17 45	— 35·609	15 22	— 35·360	± ·010	8 31·327	8 31·304	8 31·315	± ·021	·100	·011
" 4.	06·489	06·464	W.	17 13	— 3·206	16 00	— 3·201	15 13	— 3·201	± ·024						
			E...	13 30	— 37·955	16 50	— 38·391	15 22	— 38·199	± ·010	·501	·476	·488	± ·026	·027	·012
" 5.	04·431	09·417	W.	16 00	— 3·201	16 00	— 3·082	15 28	— 3·085	± ·017						
			E...	13 30	— 40·816	. . . .	. . . .	15 37	— 41·064	± ·011	·452	·438	·445	± ·020	·070	·007
" 10.	19·149	19·128	W.	. . . . . .	. . . .	16 00	— 4·367	15 34	— 4·361	± ·014						
			E...	. . . . .	. . . .	16 10	— 52·152	15 43	— 52·089	± ·021	·421	·400	·411	± ·025	·004	·010
" 12.	22·192	22·153	W.	14 00	— 4·219	16 00	4·207	15 39	4·209	± ·018						
			E...	13 30	— 54·808	17 20	— 55·043	15 49	— 54·941	± ·014	·460	·421	·441	± ·023	·026	·019

Observers, West, C. H. McLeod.
East, W. F. King.

Weighted mean . . . . 8 m. 31·415 s. ± ·011 s.

Date.	Western Signals.	Eastern Signals.	Station	At T_1	$\triangle T$	At T_2	$\triangle T$	At T	$\triangle T$	ϵ	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	Time of Transmission.
	m. s.	m. s.		h. m.	m. s.	h. m.	m. s.	h. m.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 26.	9 50·501	9 50·463	W.	16 00	— 7·390	18 00	— 7·452	16 47	— 7·414	± ·010						
			E...	15 15	—1 26·338	17 52	—1 26·662	16 57	—1 26·549	± ·017	8 31·366	8 31·328	8 31·347	± ·019	. . . . . .	·019
" 27.	9 52·537	9 52·493	W.	16 20	— 7·738	15 45	— 8·285	17 04	— 7·755	± ·011						
			E...	15 10	—1 28·676	18 02	1 28·960	17 14	—1 28·881	± ·017	·411	·367	·389	± ·020	. .	·022
" 28.	9 54·361	9 54·339	W.	15 45	— 8·285	19 00	— 8·281	16 58	— 8·283	± ·002						
			E...	18 02	—1 28·960	18 04	—1 31·335	17 08	—1 31·243	± ·018	·401	·379	·390	± ·018	. . . .	·011
July 1.	10 01·926	10 01·904	W.	15 15	— 7·958	19 10	— 7·917	17 09	— 7·938	± ·010						
			E...	16 33	—1 38·387	19 13	—1 38·643	17 19	1 38·461	± ·015	·403	·381	·392	± ·018	. . . . . .	·011
" 2.	10 04·385	10 04·362	W.	16 20	— 7·857	19 00	— 7·964	17 17	— 7·895	± ·012						
			E...	16 19	—1 40·827	18 21	—1 41·040	17 27	—1 40·946	± ·014	·334	·311	·323	± ·018	. . .	·012
" 15.	10 32·109	10 32·067	W.	16 00	— 13·567	19 20	13·660	18 03	— 13·624	± ·013						
			E...	16 30	2 14·147	19 21	—2 14·551	18 13	—2 14·390	± ·015	·343	·301	·322	± ·020	. . . . . .	·021

Weighted mean . . . . 8 m. 31·361 s. ± ·007 s.

Observers, West, W. F. King.
East, C. H. McLeod.

$\Delta\lambda$ . . . . 8 31·388 ± ·007

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND WINNIPEG.

Date.	Difference of Chronograph. Western Signals.	Difference of Chronograph. Eastern Signals.	Station	Clock Correction. Before Signals. At T_1	Before Signals. $\triangle T$	After Signals. At T_2	After Signals. $\triangle T$	At Signals. At T	At Signals. $\triangle T$	At Signals. ϵ	Difference of Longitude. Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	Time of Transmission.
1896.	h. m. s.	h. m. s.		h. m.	s.	h. m.	s.	h. m.	s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
July 26.	1 25 36·919	1 25 36·541	W.	16 24	— 24·107	19 25	— 24·322	18 10	— 24·233	±·016						
			E...	18 00	— 17·100	16 40	— 18·126	19 35	— 17·135	±·017	1 25 44·017	1 25 43·639	1 25 43·828	±·023	·028	·189
" 30.	35·252	34·885	W.	17 52	— 28·407	19 42	— 28·549	18 25	— 28·449	±·012						
			E...	18 15	— 19·714	16 35	— 19·887	19 51	— 19·726	±·012	43·975	·608	·792	±·017	·008	·184
" 31.	34·360	33·994	W.	16 37	— 29·486	19 17	— 29·543	18 12	— 29·520	±·010						
			E...	18 20	— 19·937	16 45	— 19·814	19 37	— 19·934	±·012	43·946	·580	·763	±·016	·037	·183
Aug. 2.	35·077	34·710	W.	17 02	— 28·859	20 00	— 27·221	18 26	— 28·774	±·013						
			E...	18 25	— 19·840	18 30	— 20·127	19 51	— 19·857	±·013	43·994	·627	·810	±·018	·010	·184
" 3.	36·888	36·522	W.	17 02	— 28·859	20 00	— 27·221	18 30	— 27·312	±·022						
			E...	18 30	— 20·127	21 10	— 20·120	19 56	— 20·123	±·009	44·077	·711	·894	±·024	·094	·183

Observers, West, W. F. King.
East, O. J. Klotz.

Weighted mean.. .... h. 1 m. 25 s. 43·800 s. ±·009

Date.	Western Signals.	Eastern Signals.	Station	At T_1	$\triangle T$	At T_2	$\triangle T$	At T	$\triangle T$	ϵ	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	Time of Transmission.
	h. m. s.	h. m. s.		h. m.	m. s.	h. m.	m. s.	h. m.	m. s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
June 28.	1 21 35·497	1 21 35·130	W.	16 00	—4 16·791	15 30	—4 18·037	16 27	—4 16·815	±·016						
			E...	15 45	— 8·285	19 00	— 8·281	17 49	— 8·282	±·008	1 25 44·030	1 25 43·664	1 25 43·847	±·018	......	·183
" 29.	34·424	34·076	W.	15 30	—4 18·037	18 40	—4 18·177	17 00	—4 18·103	±·007						
			E...	19 00	— 8·281	19 40	— 8·326	18 20	— 8·333	±·028	44·204	43·856	44·030	±·029	.....	·174
" 30.	33·096	32·746	W.	15 30	—4 19·124	18 00	—4 19·080	16 38	—4 19·104	±·015						
			E...	15 50	— 8·037	19 00	— 8·087	18 00	— 8·071	±·012	44·129	43·779	43·954	±·019	...	·175
July 1.	32·908	32·622	W.	15 30	—4 19·231	18 00	—4 18·960	16 55	—4 19·077	±·013						
			E...	15 15	— 7·958	19 10	— 7·917	18 17	— 7·926	±·010	44·059	43·773	43·916	±·016	......	·143
" 6.	26·224	25·908	W.	15 30	—4 26·928	18 10	—4 26·968	17 03	—4 26·951	±·015						
			E...	17 30	— 9·100	18 40	10·125	18 24	— 9·136	±·010	44·039	43·723	43·881	±·018	.....	·158

Weighted mean............. ... h. 1 m. 25 s. 43·910 s. ±·009

Observers, West, O. J. Klotz.
East, W. F. King.

$\triangle\lambda$....... .... 1 25 43·855 ±·006

DIFFERENCE OF LONGITUDE BETWEEN PORT STANLEY AND OTTAWA.

Date.	Difference of Chronograph. Western Signals.	Difference of Chronograph. Eastern Signals.	Clock Correction. Western Station.	Clock Correction. Probable Error.	Clock Correction. Eastern Station.	Clock Correction. Probable Error.	Difference of Longitude. Western Signals.	Difference of Longitude. Eastern Signals.	Difference of Longitude. Mean.	Difference of Longitude. Probable Error.	Difference of Longitude. v.	Time of Transmission.
1896.	m. s.	m. s.	m. s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Oct. 11...	1 46·275	1 46·128	−21 23·902	±·010	−1 8·885	±·013	22 01·292	22 01 145	22 01·219	±·016	·128	·073
" 13 ..	34·388	34·245	− 34·457	±·012	− 7·715	±·010	01·130	00·987	01·058	±·016	·033	·072
" 14....	27·948	27·820	− 40·159	±·009	− 6·923	±·011	01 184	01·056	01·120	±·014	·029	·064
" 15...	21·032	20·904	− 46·201	±·011	− 6·211	±·012	01·022	00·894	00·958	±·016	·133	·064

Weighted mean .... m. s. 22 01·091 s. ±·008

Observers, West, O. J. Klotz.
East, W. F. King.

Date.	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	Time of Transmission.
	h. m. s.	h. m. s.	m. s.	s.	h. m. s.	s.	m. s.	m. s.	m. s.	s.		s.
Nov. 3 ...	2 56 59·876	2 56 59·736	+00 06·618	±·015	−2 34 52·656	±·008	22 00·602	22 00·462	22 00·532	±·017	......	·070
" 13....	55 44·905	55 44·792	−00 04·364	±·016	− 52·584	±·008	·685	·572	·629	±·018	....	·056
" 16 ..	55 17·484	55 17·369	−01 29·501	±·009	− 46·205	±·010	·780	·665	·722	±·014	......	·057
" 22 ..	54 24·778	54 24·651	−02 15·589	±·010	− 39·649	±·007	·718	·591	·654	±·012	....	·064
" 24....	54 07·070	54 06·946	−02 30·518	±·009	− 36·789	±·008	·859	·735	·797	±·012	....	·062

Weighted mean ..... m. s. 22 00·638 s. ±·007

$\Delta\lambda$ .... 22 00·865 ±·006

Observers, West, W. F. King.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN ROSE POINT AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1909.	m. s.	m. s.	s.	s.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
May 19...	17 23·264	17 23·228	43·882	±·018	40·410	±·013	17 19·792	17 19·756	17 19·774	±·020	·004	·018
" 21....	28·297	28·276	46·621	±·013	38·032	±·012	·708	·687	·697	±·018	·081	·011
" 23....	36·498	36·465	49·296	±·017	32·714	±·019	·916	·883	·899	±·025	·121	·016
" 25....	44·49[illegible]	44·476	51·933	±·010	27·408	±·012	·965	·951	·958	±·016	·180	·007
" 28 ..	57·611	57·554	56·351	±·011	18·333	±·013	·593	·536	·564	±·017	·214	·029

Weighted mean........ 17 m. 19·778 s. ±·008 s.

Observers, West, O. J. Klotz.
East, F. W. O. Werry.

Date.	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	Time of Transmission.
	m. s.	m. s.	m. s.	s.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 4....	18 33·446	18 33·387	1 07·631	±·018	−5·786	±·012	17 20·029	17 19·970	17 19·999	±·023	·046	·029
" 5 ..	39·027	38·995	09·866	±·012	−9·025	±·009	20·136	20·104	20·120	±·015	·075	·016
" 8 ...	53·352	53·324	15·525	±·015	−17·867	±·009	19·960	19·932	19·946	±·018	·099	·014
" 9....	58·181	58·127	17·618	±·012	−20·477	±·011	20·086	20·032	20·059	±·016	·014	·027

Weighted mean........ 17 m. 20·045 s. ±·008 s.

Mean Δλ ... . 17 19·911 ±·006

Observers, West, F. W. O. Werry.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN OWEN SOUND AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1900.	m. s.	m. s.	m. s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 19....	19 39·941	19 39·865	−2 03·019	±·010	−46·097	±·011	20 56·863	20 56·787	20 56·825	±·015	·154	·038
" 20....	45·260	45·180	−2 00·014	±·019	−48·548	±·014	·726	·646	·686	±·023	·015	·040
" 22..	55·620	55·540	−1 54·512	±·011	−53·587	±·011	·545	·465	·505	±·015	·166	·040
" 23....	20 00·830	20 00·750	−1 51·858	±·013	−55·963	±·023	·725	·645	·685	±·026	·014	·040

Weighted mean .. ... m. s. 20 56·671 s. ±·009

Observers, West, L. B. Stewart.
East, F. W. O. Werry.

Date.	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	Time of Transmission.
	m. s.	m. s.	m. s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
July 4...	20 47·940	20 47·848	−1 28·484	±·017	−1 19·518	±·014	20 56·906	20 56·814	20 56·860	±·022	·082	·046
" 6....	56·04	56·000	−1 25·073	±·021	−1 24·343	±·014	·770	·730	·750	±·025	·028	·020
" 15	21 29·228	21 29·158	−1 12·176	±·011	−1 44·749	±·012	·664	·591	·629	±·016	·149	·035
" 18....	38·280	8·210	−1 07·380	±·010	−1 48·730	±·012	·930	·860	·895	±·016	·117	·035

Weighted mean......... m. s. 20 56·778 s. ±·010

λ .... 20 56·724 ±·007

Observers, West, F. W. O. Werry.
East, L. B. Stewart.

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND CHALK RIVER.

Date	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1900.	m. s.		m. s.	s.	s.	s.	m. s.			s.		
July 25	1 39·550	...	−6 14·240	±·039	−55·790	±·015	6 58·000	...	...	±·042	...	...
" 26	41·990	...	− 12·420	±·027	−56·520	±·014	57·890	...	...	±·031	...	...
" 27	44·975	...	− 10·140	±·026	−57·140	±·014	57·975	...	...	±·029	...	...
" 28	48·100	...	− 08·510	±·040	−58·370	±·013	58·240	...	...	±·042	...	...

	m. s.	s.
Weighted mean..........	6 57·998	±·017
Personal equation........	·508	±·051
$\Delta\lambda$	6 58·506	±·054

Observers, West, L. B. Stewart.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND VANCOUVER.

Date.	Difference of Chronograph. Western Signals.	Difference of Chronograph. Eastern Signals.	Station	Clock Correction. Before Signals. At T_1	Before Signals. ΔT	After Signals. At T_2	After Signals. ΔT	At Signals. At T	At Signals. T	At Signals. ϵ	Difference of Longitude. Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	Time of Transmission.
1900.	h. m. s.	h. m. s.		h. m.	m. s.	h. m.	m. s.	h. m.	m. s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
Aug. 18.	2 59 14·770	2 59 14·430	W.	18 30	-12 37·470	21 00	12 37·930	19 31	-12 37·657	+·014						
			E.	20 30	-2 13·900	18 50	2 13·860	22 30	-2 13·896	+·016	3 09 38·531	3 09 38·191	3 09 38·361	±·021	·124	·170
" 19.	11·330	10·950	W.	18 50	12 40·810	21 2[illegible]	-12 41·240	19 38	-12 10·918	+·013						
			E.	20 20	2 13·870	18 30	-2 14·210	22 37	2 13·905	+·016	·373	37·990	·182	±·020	·055	·190
" 20.	08·490	08·150	W.	18 20	-12 41·100	21 00	-12 44·350	19 44	-12 44·233	+·019						
			E.	20 20	2 14·230	18 30	-2 16·410	22 43	-2 14·343	+·009	·380	38·040	·210	±·021	·027	·170
" 25.	03·430	03·070	W.	19 10	-12 51·470	21 30	12 58·840	20 05	12 54·61	+·015						
			E.	20 20	-2 19·580	..	....	23 04	-2 19·655	+·009	·390	38·030	·210	±·018	·027	·180

	h. m.	s.	s.
Weighted mean.............. ...	3 09	38·237	±·010

Observers, West, W. F. King.
East, O. J. Klotz.

Date.	Western Signals.	Eastern Signals.	Station	At T_1	ΔT	At T_2	ΔT	At T	T	ϵ	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	Time of Transmission.
	h. m. s.	h. m. s.		h. m.	m. s.	h. m.	m. s.	h. m.	m. s.	s.	h. m. s.	h. m. s.	h. m. s.	s.	s.	s.
Sept. 9.	2 55 09·560	2 55 09·200	W.	......	....	22 10	-16 48·110	20 53	-16 47·968	+·017						
			E.	21 20	2 18·8[illegible]0	25 50	-2 19·010	23 48	-2 18·947	+·012	3 09 38·581	3 09 38·221	3 09 38·401	±·021	·660	·180
" 11.	2 55 01·600	2 55 01·220	W.	21 20	17 02·190	.....	... ...	21 23	17 02·190	+·021						
			E.	21 20	2 24·870	25 00	-2 25·120	24 18	-2 25·092	+·015	·698	·318	·508	±·026	·410	·190
" 17.	55 00·310	54 59·950	W.	20 10	17 09·310	22 40	17 09·800	21 30	17 09·571	+·013						
			E.	23 40	-2 31·200	25 00	-2 31·270	24 25	2 31·239	+·012	·642	·282	·462	±·018	·050	·180
" 18.	54 59·580	51 59·220	W.	20 20	17 11·810	23 00	17 12·270	21 56	17 12·086	+·022						
			E.	22 50	-2 32·960	25 40	-2 32·990	24 51	-2 32·981	+·009	·685	·325	·505	±·024	·380	·180

	h. m.	s.	s.
Weighted mean................	3 09	38·467	±·011
$\Delta\lambda$.....	3 09	38·352	±·007

Observers, West, O. J. Klotz.
East, W. F. King.

DIFFERENCE OF LONGITUDE BETWEEN RAYSIDE AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1900.	m. s.	m. s.	m. s.	s.	s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
July 25....	20 51·777	20 51·724	— 1 36·830	± ·016	— 55·772	± ·015	21 32·835	21 32·782	21 32·808	± ·021	·058	·027
" 26....	54·100	54·036	— 1 35·173	± ·012	— 56·510	± ·0 0	·763	·699	·731	± ·015	·019	·032
" 27....	58·190	58·110	— 1 31·731	± ·010	— 57·143	± ·010	·781	·701	·741	± ·014	·099	·040
" 28. ..	03·140	03·060	— 1 27·990	± ·008	— 58·339	± ·009	·791	·711	·751	± ·012	·001	·040

Observers, West, F. W. O. Werry,
East, O. J. Klotz.

Weighted mean.......... .... 21 m. 32 750 s. ± ·007

Date.	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	Time of Transmission.
	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Oct. 9....	22 37·330	22 37·290	— 43·240	± ·015	— 1 48·248	+ ·011	21 32·322	21 32·282	21 32·302	+ ·019	·029	·020
" 10....	36·892	36·852	— ·225	± ·020	— 1 47·920	+ ·010	·197	·157	·177	+ ·022	·096	·020
" 11....	36·436	36·390	— ·467	± ·020	— 1 47 538	± ·013	·365	·319	·342	+ ·024	·069	·023

Observers, West, O. J. Klotz,
East, F. W.O. Werry.

	m. s.	s.
Weighted mean..........	21 32·273	± ·012
Δλ........	21 32·512	+ ·007

DIFFERENCE OF LONGITUDE BETWEEN WILNO AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1900	m. s.	m. s.	m. s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Aug. 20....	− 1 22·70	− 1 22·74	−11 01·664	± ·036	− 2 14·246	± ·009	7 24·718	7 24·678	7 24·698	± ·037	·060	·020
" 24...	− 1 07·68	− 1 07·76	−10 51·605	± ·039	− 2 19·036	± ·011	·889	·809	·849	± ·040	·091	·040

	m. s.	s.
Weighted mean...	7 24·758	± ·026
Personal equation	− ·082	± ·005
$\Delta\lambda$...	7 24·676	± ·026

Observers, West, F. W. O. Werry,
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND CANOE LAKE.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1900	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 13...	13 47·920	13 47·910	— 40·492	± ·032	— 2 23·288	± ·008	12 05·124	12 05·114	12 05 119	± ·033	·135	·005
" 14....	13 52·786	....	— 37·616	± ·030	— 2 25·010	± ·012	·392	....	·392	± ·032	·138	.....
" 17 ...	14 12·280	14 12·250	— 24·176	± ·022	— 2 31·200	± ·017	·256	·226	·241	± ·028	·013	·015

	m. s.	s.
Weighted mean........................	12 05·254	± ·012
Personal equation..................	— ·340	
$\Delta\lambda$....	12 04·914	

Observers, West, F. W. O. Werry,
East, W. F. King.

DIFFERENCE OF LONGITUDE BETWEEN VANCOUVER AND MIDWAY.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1901.	m. s.	m. s.	s.	s.	s.	s.	m. s.	m. s.	m. s.	s.		s.
Aug. 14....	17 51·233	17 51·057	23·477	± ·013	— 08·311	± ·014	17 19·445	17 19 269	17 19·357	± ·019	....	·088
" 15....	49·485	49·241	19·660	± ·015	— 10 199	± ·013	·626	·382	·504	± ·020	....	·122
" 16 ...	47·982	47·813	16·428	± ·011	— 12·326	± ·021	·228	·059	·144	± ·024	....	·084
" 18....	48·270	48·102	12·290	± ·009	— 16·618	± ·014	·362	·194	·278	± ·017	....	·084
" 20....	50·302	50·136	8·543	± ·010	— 22·304	± ·015	·455	·289	·372	± ·018	....	·083
" 21....	50·901	50 714	5 860	± ·013	— 25·518	± ·014	·523	·336	·430	± ·019	....	·093

	m.	s.		s.
Weighted mean.............	17	19·355	±	·008
Personal equation		—·001	±	·013
$\triangle\lambda$	17	19·354	±	·015

Observers, West, O. J. Klotz.
East. F. W. O. Werry.

DIFFERENCE OF LONGITUDE BETWEEN THREE RIVERS AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1902.	m. s.	m. s.	m. s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
May 10....	10 26·697	10 26·661	— 2 28·789	± ·012	— 0 14·147	± ·015	12 41·339	12 41·303	12 41·321	± ·019	·104	·018
" 14....	10 41·879	10 41·801	— 2 34·773	± ·011	— 0 35·132	± ·026	·520	·442	·481	± ·028	·056	·039
" 16....	10 49·300	10 49·262	— 2 37·338	± ·011	— 0 45·130	± ·014	·508	·470	·489	± ·018	·064	·019
" 17....	10 53·098	10 53·034	— 2 38·707	± ·015	— 0 50·390	± ·013	·415	·351	·383	± ·020	·042	·032
" 20...	11 03·688	11 03·639	— 2 43·717	± ·008	— 1 05·930	± ·013	·475	·426	·451	± ·015	·026	·025

	m.	s.	s.
Weighted mean	12	41·425 ±	·008
Personal equation.		—·018 ±	·013
$\Delta\lambda$....	12	41·407 ±	·015

Observers, West, W. F, King.
East, C. A. Bigger.

DIFFERENCE OF LONGITUDE BETWEEN WHITE RIVER AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1902.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
June 10....	41 44·842	41 44·732	− 00·505	± ·018	− 3 27·597	± ·017	38 17·750	38 17·640	38 17·695	± ·025	·017	·055
" 15 ...	34·958	34·848	− 21·370	± ·014	− 3 38·802	± ·019	·526	·416	·471	± ·024	·207	·055
" 16 ...	33·323	33·227	− 26·301	± ·017	− 3 40·916	± ·019	·708	·612	·660	± ·026	·018	·048
" 17 ..	30·313	30·200	− 30·650	± ·028	− 3 43·103	± ·013	·860	·747	·803	± ·031	·125	·057
" 19....	25·278	25·143	− 40·028	± ·016	− 3 47·459	± ·010	·847	·712	·780	± ·019	·102	·067
" 27....	11·201	11·095	− 72·087	± ·019	− 4 05·587	± ·015	·701	·595	·648	± ·025	·030	·053

	m.	s.		s.
Weighted mean	38	17·678	±	·010
Personal equation		− ·051	±	·012
$\Delta\lambda$	38	17·627	±	·016

Observers, West, F. W. O. Werry.
East, O. J. Klotz.

DIFFERENCE OF LONGITUDE BETWEEN PORTNEUF AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1903.	m. s.	m. s.	m. s.	s.	s.	s.	m. s.	m. s.	m. s.	s.		s.
Sept. 2....	11 09·583	11 09·525	— 4 40·394	± ·010	— 34·151	± ·007	15 15·806	15 15·748	15 15·777	± ·012	....	·029
" 5....	05·294	05·209	— 49·673	± ·011	— 39·153	± ·011	·814	·729	·772	± ·015	....	·042
" 7....	10 59·164	10 59·109	— 55·829	± ·012	— 39·126	± ·011	·867	·812	·839	± ·016	....	·027
" 8....	57·054	56·992	— 58·897	± ·007	— 40·117	± ·009	·834	·772	·803	± ·011	....	·031
" 11....	46·900	46·801	— 5 08·385	± ·010	— 39·416	± ·010	·869	·770	·819	± ·017	....	·049

	m.	s.	s.
Weighted mean..................	15	15·799	± ·006
Personal equation..............		— ·146	± ·007
$\Delta\lambda$..........................	15	15·653	± ·009

Observers, West, F. A. McDiarmid.
East, C. A. Bigger.

DIFFERENCE OF LONGITUDE BETWEEN WOODSTOCK AND OTTAWA.

DATE.	DIFFERENCE OF CHRONOGRAPH.		CLOCK CORRECTION.				DIFFERENCE OF LONGITUDE.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	r.	
1903.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
October 12..	22 02·278	22 02·228	3·799	± ·012	− 1 43·759	± ·009	20 14·720	20 14·670	20 14·695	± ·015	·000	·025
" 13..	04·607	04·571	3·118	± ·009	− 1 46·762	± ·009	·727	·691	·709	± ·013	·014	·018
" 14..	07·704	07·635	3·188	± ·010	− 1 49·775	± ·008	·741	·672	·707	± ·013	·012	·034
" 20..	20·444	20·377	− 1·471	± ·011	− 2 07·221	± ·011	·694	·627	·661	± ·015	·034	·034

	m. s.	s.
Weighted mean...............	20 14·695	± ·007
Personal equation............	·146	± ·007
$\Delta\lambda$	20 14·841	± ·010

Observers, West, C. A. BIGGER.
East, F. A. McDIARMID.

DIFFERENCE OF LONGITUDE BETWEEN HARRISTON AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1904.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
August 17..	22 15·610	22 15·504	— 11·986	± ·014	— 1 48·319	± ·015	20 39·277	20 39·171	20 39·224	± ·020	·035	·053
" 18..	17·483	17·407	— 13 427	± ·014	— 1 51·669	± ·015	39 241	39·165	39·203	± ·020	·056	·038
" 22..	25·977	25·886	— 18·8[illegible]0	± ·015	— 2 05·474	± ·010	39·393	39·302	39·347	± ·01[illegible]	·088	·046

	m.	s.	s.
Weighted mean..............	20	39·259	± ·012
Personal equation......... ...		—·007	± ·013
λ..	20	39·252	± ·018

Observers, West, F. W. O. Werry.
East, R. M. Stewart.

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND BEETON.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Trans-mission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1904.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 5....	19 14·839	19 14·734	1·434	± ·018	− 2 55·821	± ·009	16 17·584	16 17·479	16 17·531	± ·020	·004	·053
" 6.. ..	18·483	18·375	1·326	± ·015	− 2 59.566	± ·010	·591	·483	17·537	± ·018	·002	·054

	m. s.	s.
Weighted mean...............	16 17·535	± ·001
Personal equation....	− ·007	± ·013
$\triangle\lambda$..........................	16 17·528	± ·013

Observers, West, F. W. O. Werry.
East, R. M. Stewart.

DIFFERENCE OF LONGITUDE BETWEEN GUELPH AND OTTAWA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	v.	
1904.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 12....	21 34·911	21 34·819	2·508	± ·011	— 3 21·800	± ·007	18 10·603	18 10·511	18 10·557	± ·013	·005	·046
" 13....	39·887	39·811	3·760	± ·014	— 25·503	± ·014	10·624	10·548	10·586	± ·019	·034	·038
" 17....	58·227	58·134	7·322	± ·017	— 40·330	± ·009	10·575	10·481	10·528	± ·019	·024	·046
" 19....	22 06·557	22 05·482	8·351	± ·017	— 47·639	± ·009	10·567	10·492	10·529	± ·019	·023	·038

	m. s.	s.
Weighted mean................	18 10·552	± ·009
Personal equation..........	—·007	± ·013
$\Delta\lambda$..........................	18 10·545	± ·016

Observers, West, F. W. O. Werry.
East, R. M. Stewart.

DIFFERENCE OF LONGITUDE BETWEEN OTTAWA AND ORILLIA.

Date.	Difference of Chronograph.		Clock Correction.				Difference of Longitude.					Time of Transmission.
	Western Signals.	Eastern Signals.	Western Station.	Probable Error.	Eastern Station.	Probable Error.	Western Signals.	Eastern Signals.	Mean.	Probable Error.	*v.*	
1904.	m. s.	m. s.	s.	s.	m. s.	s.	m. s.	m. s.	m. s.	s.	s.	s.
Sept. 26....	18 55·174	18 55·087	– 7·275	± ·015	– 4 12·185	± ·009	14 49·961	14 49·877	14 49·921	± ·018	·048	·044
" 29 ...	19 07·310	19 07·241	– 5·921	± ·016	– 23·179	± ·007	50·052	49·983	50·017	± ·018	·048	·035

	m. s.	s.
Weighted mean..	14 49·969	± ·013
Personal equation.....	— ·007	± ·013
△λ	14 49·962	± ·018

Observers, West, F. W. O. Werry.
East, R. M. Stewart.

SYNOPSIS OF OBSERVED DIFFERENCES OF LONGITUDE, AND THE LONGITUDE OF STATIONS, 1885-1904.

Place.	Year.	Difference of Longitude. h.	m.	s.	ε	To	Longitude. h.	m.	s.	ε	Longitude. °	′	″	″
Victoria	1885	+	4	06·994		Seattle (1885)	8	13	26·444		123	21	36·66	
Port Moody	1885	+	10	05·108		Kamloops (1885)	8	11	26·685		122	51	40·27	
Revelstoke	1886	—	8	28·970	± ·022	" (1886)	7	52	49·847		118	12	27·70	
Field	1886	—	15	18·953	± ·020	"	7	45	59·864		116	29	57·96	
Calgary	1886	—	25	03·659	± .020	"	7	36	15 158		114	03	47·37	
Kamloops	1886	+ 1	32	47·157	± ·019	Winnipeg (Old Observatory)	8	01	18·817		120	19	42·25	
Wapella	1887	+	19	21·505	± ·021	" "	6	47	53·165		101	58	17·47	
Port Arthur	1887	—	31	40 192	± ·031	" "	5	56	51·468		89	12	52 02	
Kalmar	1887	—	8	40·476	± ·021	" "	6	19	51·184		94	57	47·76	
Edmonton	1888	+ 1	05	27·965	± ·015	" (New Observatory)	7	34	01·867		113	30	28·00	
Onion Lake	1888	+	51	26·833	± ·013	" "	7	20	00·735		110	00	11·02	
Mattawa	1890	+	11	59·020	± ·022	Ottawa	5	14	49·042	± ·059	78	42	15·63	± ·88
Ottawa	1896	+	8	31·388	± ·007	Montreal	5	02	50.022	± ·053	75	42	30·33	± ·81
Winnipeg	1896	+ 1	25	43·855	± ·006	Ottawa	6	28	33·877	± ·053	97	08	28·15	± ·82
Port Stanley	1896	+	22	00·865	± ·006	"	5	24	50·887	± ·054	81	12	43·30	± ·81
Rose Point	1900	+	17	19·911	± ·006	"	5	20	09·933	± ·054	80	02	28·99	± ·81
Owen Sound	1900	+	20	56·724	± ·007	"	5	23	46·746	± ·055	80	56	41·19	± ·82
Chalk River	1900	+	6	58·506	± ·054	"	5	09	48·528	± ·076	77	27	07·92	±1·14
Vancouver	1900	+ 3	09	38·352	± ·007	"	8	12	28·374	± ·055	123	07	05·61	± ·82
Rayside	1900	+	21	32·512	± ·007	"	5	24	22·534	± ·054	81	05	38·01	± ·81
Wilno	1900	+	7	24·676	± ·026	"	5	10	14·698	± ·060	77	33	40·47	± ·90
Canoe Lake	1900	+	12	04·914		"	5	14	54 936		78	43	44·64	
Midway	1901	—	17	19·354	± ·015	Vancouver	7	55	09·020		118	47	15·30	
Three Rivers	1902	—	12	41·407	± ·015	Ottawa	4	50	08·615	± ·056	72	32	09 22	± ·84
White River	1902	+	38	17·627	± ·016	"	5	41	07·649	± ·056	85	16	54·73	± ·84
Portneuf	1903	—	15	15·653	± .009	"	4	47	34·369	± ·055	71	53	35·53	± ·82
Woodstock	1903	+	20	14·841	± ·010	"	5	23	04·863	± ·055	80	46	12 94	± ·82
Harriston	1904	+	20	39·252	± ·018	"	5	23	29·274	± ·057	80	52	19·11	± ·85
Beeton	1904	+	16	17·528	± ·013	"	5	19	07·550	± ·055	79	46	53·25	± ·82
Guelph	1904	+	18	10·545	± ·016	"	5	21	00·567	± ·056	80	15	08 50	± ·84
Orillia	1904	+	14	49·962	± ·018	"	5	17	39·984	± ·057	79	24	59·76	± ·85

APPENDIX 8.

REPORT ON FIELD OPERATIONS IN THE GEOLOGY OF THE MOUNTAINS CROSSED BY THE INTERNATIONAL BOUNDARY (49TH PARALLEL), BY R. A. DALY, PH.D.

OTTAWA, Ont., December 30, 1905.

W. F. KING, Esq., B.A., LL.D., D.T.S., &c.,
International Boundary Commissioner,
Ottawa.

SIR,—I have the honour to submit herewith my report upon my field operations in the geology of the mountains crossed by the international boundary.

In August of this year I was officially notified of my transfer from the Department of the Geological Survey to your department. In accordance with instructions, therefore, I herewith present a brief account of the work done during the past year. My four previous annual statements are printed in the summary report of the Geological Survey department.

The winter of 1904-5 was occupied with the preparation of the final report on the geology of the boundary mountains. Within the year I have also written five papers founded on special studies of that geology. Those on 'The Accordance of Summit Levels among Alpine Mountains,' and on 'The Classification of Igneous Intrusive Bodies' have been published in the *Journal of Geology*; that on 'The Secondary Origin of Certain Granites,' in the *American Journal of Science*. A paper on 'Magmatic Differentiation through Gravitative Adjustment' and another on 'The Nomenclature of the Mountains crossed by the 49th Parallel Boundary between Canada and the United States,' have not yet been published. A sixth paper on 'Machine-made Line Drawings for the Illustration of Scientific Papers' was published in the *American Journal of Science*, and reprinted in the weekly *Science*.

On May 16 I left Ottawa for Gateway, Montana, the point on the boundary where I closed the field-work at the close of the season of 1904. My party, including an assistant, a packer and a cook, was immediately outfitted and went into camp. Mr. Fred. Nelmes of Chilliwack had done such excellent service as assistant in three out out of the four preceding seasons that I engaged him again this year in the same capacity. A little delay was occasioned by rains in June and, at the first, by deep winter snow still covering summits on the commission trails east of Gateway, but, in the main, it was found possible to pursue the work steadily throughout the season. The geological map of the boundary belt was completed to the summit of the Rocky Mountains, and a structure-section carried from there to the Great Plains at Waterton lake. Then a rapid journey via Chief mountain and the Swift Current pass brought the party, on June 26, to Belton, Montana and again to the railroad. There the party was disbanded, and, with my assistant, I went to Midway, B.C., and Loomis, Washington. At Midway I met Mr. McDiarmid of the boundary surveys staff. He was kind enough to let me have three horses from his pack-train. Two men and four additional horses were hired at Loomis for this second part of the season. Field work was resumed on August 3 at the Similkameen river, and the geology of the belt westward to the Skagit river was completed on September 9. Beyond the Skagit the boundary belt has not yet been mapped. It was, therefore, inexpedient to attempt any systematic work on that side of the river. Continued bad weather and the failure of supplies hastened us to Hope station where I disbanded the party and returned to Ottawa on September 16.

The total area geologically mapped in detail was about 625 square miles. Notwithstanding the exceeding ruggedness of both parts of the Cordillera crossed this season, it was possible to cover so great an area partly because of favourable weather for most of the season, and partly because of the many excellent trails already cut through the forests by the topographic and monument-setting parties. These trails rendered every part of the boundary belt accessible.

The third and most important reason for such rapid work is that, as in the previous season, I had the advantage of using admirable contour maps of the regions studied. These were photographic copies of the original manuscript plane-table sheets of the United States topographers attached to the commission. I have pleasure in recording the great accuracy and completeness of these maps as well as in acknowledging the kindness of the United States officials who so generously supplied them.

This opportunity of working out the structural geology with the aid of an accurate contour map already in the hands of the geologist as he goes into the field is all but unique in the history of geological investigation in Canada. That such a map is of incomparable aid to the geologist is recognized by every worker in the rough western mountains, as, indeed, it was recognized fifty years ago in the far easier country of Europe and eastern Canada by such masters as Sir Roderick Murchison and Sir William Logan. It is not too much to say that a thorough as well as accurate record of the constitution and anatomy of a western mountain range is quite impossible unless the geologist is supplied with the antecedent topographic data of a contour map. A fortiori, the economic geologist, necessarily covering his mining camp or mining district with still greater detail, needs his contour map ready to hand.

The total length of the boundary belt between the Great Plains and the Pacific is about 425 miles. The geology has now been worked out for parts of the belt aggregating 380 miles, of which 16 miles have been surveyed in detail by Professor Brock. A section 14 miles long has never been traversed; about 30 miles of the belt require some supplementary field work.

The main object of my field work this season, as in the other four seasons on the boundary, has been to develop a continuous structure section across the many mountain axes of the Cordillera. Though the width of the belt studied is small (from 5 to 10 miles) it has proved possible to construct such a section as shall fairly represent the staple, average formations and structures characteristic of this part of the Cordillera.

The first part of the season was concerned with the Rocky mountain range proper. At the 49th parallel this range is very clearly divided into two great sub-ranges separated by the broad and deep longitudinal valley of the Flathead river. The western sub-range, thus extending from the even greater valley of the Kootenay river at Gateway eastward to the Flathead, has been called the Galton range; it includes the subordinate McDonald range immediately overlooking the Flathead. The eastern sub-range is double. From the Flathead to the wide open valley occupied in part by Waterton lake, the mountains belong to the Livingstone range. From Waterton lake to the Great Plains, the 49th Parallel crosses the narrower Lewis or Wilson range.

The scenic quality of the Lewis and Livingstone ranges is quite similar to that along the main line of the Canadian Pacific Railway. In ruggedness and grandeur of form, as in the colouring of their countless cliffs and peaks, the mountains of these two ranges are the most impressive on the boundary line. Their only possible rivals for this pre-eminence are the high Cascades east and west of the Skagit river. The Galton range is, not only in geographical position but also in composition and scenery, intermediate between the superb Livingstone range and the tamer Purcell range west of Tobacco Plains.

As in the Purcells, the rocks of the Galton and more easterly ranges are chiefly sedimentary. A stratigraphic column was worked out for the Galton range and another for the Livingstone range. In each column there are represented twelve conformable, stratified members aggregating about 15,000 feet in thickness. The respective members were, in general, found to match well on the two sides of the Flathead valley. The lower part of this thick series carries fossils of pre-Cambrian age. On lithological grounds the upper 7,000 feet of each column is tentatively correlated with the fossiliferous Cambrian rocks of the Castle Mountain series, described by Mr. McConnell on the main line of the Canadian Pacific Railway. Three relatively small blocks of massive 'Devono-Carboniferous' limestone, showing a maximum thickness of more than 2,500 feet, are faulted down into the staple Cambrian-pre-Cambrian series. The only other bed-rock sedimentary formation in this part of the belt is a fresh-water, fossiliferous tertiary deposit occurring in the Flathead valley.

Near the top of the Cambrian stratified group is a contemporaneous volcanic formation varying in thickness from 250 to 400 feet or more. It shows a most remarkable persistence and extent and serves as a valuable horizon-marker among the old sediments of the Purcell range and the Rocky mountains proper. This lava was traced through seventy-five miles of the boundary belt and was seen in its usual relations at Altyn, Montana, 100 miles or more from its western outcrop, on the 49th parallel. An intrusive sheet of basic rock which apparently functioned as a feeder to the ancient volcanic vents, occurs a few hundred feet lower in the Cambrian. This sheet also shows great persistence in the adjacent parts of Montana, Alberta, and British Columbia.

The conformable Cambrian-pre-Cambrian sedimentaries thus studied in the Rocky mountains were found to be equivalent in age to the sedimentary formations of the Purcell range and to others in the southern Selkirk range west of the Kootenay at Port Hill. This discovery furnishes the key to the structural and stratigraphic geology of the continuous belt from the Columbia river at Boundary town eastward to the Great Plains, a distance of 175 miles. In this latitude the general geology of the Cordillera for about two-fifths of its entire width between the sea and the Great Plains is largely included in the history of a single, thick group of sea-bottom deposits. In the southern Selkirks this group is coarse-grained and heterogeneous, composed largely of grits, conglomerates and quartzites laid down near the old zone of shore-lines. In the Purcell range to the eastward and farther from that coast-line zone, the sediments are, in general, medium to fine-grained sandstones and notably homogeneous. In the Rockies proper the group is again heterogeneous but made up chiefly of argillites, limestones and dolomites, all rocks deposited relatively far from shore. The 49th parallel thus affords a line of cross-section with reference to the structural and orographic axes of the Cordillera and also an exceptionally continuous transverse section of the rock-formations that have filled a single submarine down-warp or 'geosynclinal.'

The time spent in the Rockies proper was mostly occupied in delimiting the various formations and in working out the faults and folds incident to the upbuilding of the mountains. It would be inappropriate to enter on details in a report like this. In general, the structures due to rock-dislocation show a steadily increasing complexity as one follows the belt from the Great Plains to the Columbia river. Throughout that distance the dislocation has developed much normal faulting and thrusting; folding is distinctly subordinate.

The petroleum problem of southern Alberta and of the Flathead valley is intimately related to the structural geology of the Livingstone range. Active prospecting for commercial deposits of oil has been carried on for some years and is now winning more attention than ever. The problem has special interest and special difficulty of analysis since the oil seepages of the region, as at Waterton lake, in Oil creek (Cameron Falls brook) valley, and in the Kintla lake canyon, are located at fissures in the pre-Cambrian stratified formations. Commercial petroleum has never been found in rocks so old as these and the great majority of the world's authorities in rock-oil consider that the reason is clear. They do not expect petroleum to occur in commercial quantities in pre-Cambrian formations, because those formations carry almost negligible amounts of organic debris, such as is regarded by these authorities as the original source of the petroleum substance. The hypothesis of an inorganic origin for petroleum has long been advocated by individual writers on the subject, but they have not proved their case, nor yet produced a body of arguments so compact and cogent as those advanced for the organic theory. Even in the peculiar case of the Alberta field the evidence bearing on the question seems to be adverse to the inorganic theory.

The thick 'Devono-Carboniferous' limestone of the region is bituminous through a large part of its exposed thickness. So far as known, no other formation in the Livingstone range carries bituminous matter indigenous to the formation. It is, however, possible, that certain zones of the Cretaceous rocks of the Great Plains carry indigenous oils.

To explain the Waterton lake and Oil creek seepages, I adopted in the field a tentative hypothesis involving the immense Front range thrust-fault called by Mr. Willis the 'Lewis Thrust.' At and near the 49th parallel the strong, rigid pre-Cambrian beds have been pushed bodily out over the weaker Cretaceous strata of the plains for a distance of several miles. Farther south in Montana, Mr. Willis has demonstrated that the whole Lewis range has similarly migrated as a single block thrust at least seven miles over the yielding floor of the plains. A hundred and fifty miles to the north-northwest, Mr. McConnell long ago proved the existence of a similar overthrust in the gaps of Bow river and Ghost river. It is owing to such an overthrust that the very eldest formation known in the vicinity of Waterton lake (the pre-Cambrian 'Altyn Limestone') overlies the very youngest bed-rock formation of the region (Cretaceous). Far below the thrust-surface and underlying the Cretaceous is the 'Devono-Carboniferous' limestone. By the tentative hypothesis mentioned, the oil seepages of this district are supposed to be due to the rising of oil from the limestone or from some petroliferous zone in the Cretaceous, upward through fissures in the overlying pre-Cambrian block. I have since learned that Mr. Willis had independently come to the same view of the various oil occurrences on the eastern slopes of the Lewis and Livingstone ranges.

This hypothesis, if correctly matching the real facts, has an important bearing on the location of oil prospects. If the pre-Cambrian rocks truly form a huge cover upon potentially oil-bearing Cretaceous or other strata, it is clear that boring should be directed with due regard to the position and shape of the thrust-surface underlying that cover. Preferably the drill should go down where the thrust-surface or at least the strata of the relatively impervious cover are bent into anticlinal warps or folds and as near the summits of the folds as possible. Further, since the great thrust-surface seems to dip westward, it is also manifest that the bore-hole should not be located so far within the range as to compel the penetration of an inordinate thickness of the hard cover. At the same time it cannot too often be repeated that seepages do not necessarily mean an oil-field. In fact, the more numerous the seepages, the greater is the danger that the underground reservoirs have, in the course of ages, become largely depleted of oil. Structural geology must recognize the possibility of large oil deposits along the eastern foot of the Rockies, but the anatomy of the range is so peculiar, and the significant underground structures, especially the relations and attitude of the thrust-surface so difficult of determination, that it is impossible to indicate the best locations for test borings in other than the most general terms. This much is certain that no one, by virtue of any amount of experience in other oil fields, can forecast either success or failure for prospecting companies in the Alberta field. The structure of the field is unique. All that the structural geologist can do in this instance is to declare the findings of a surface study of the country and to suggest for preliminary boring certain localities favoured as a result of such study. Common sense teaches that, if boring is to be undertaken at all, the drill should go down where the rock-structures deducible from surface rock-croppings seem most likely to have led to the accumulation of oil. Just as surely common sense teaches that, in this particular field of Alberta, the underground arrangement of the rocks cannot in its details, be deduced from surface croppings. For those details the structural geologist is as dependent upon trial borings as the prospector himself.

The future of the Flathead field is still more difficult of forecast. A thick mantle of glacial drift so completely covers the bed-rock of the Flathead valley that rock-outcrops are exceedingly rare. Prospecting in the valley has therefore been blind, and blind it must remain unless the treacherous seepages be considered as guides. It is not impossible that the great thrust-fault of the eastern slopes of the Rockies is really continuous beneath the whole of the Livingstone range, so that the pre-Cambrian beds of the Flathead slope have been thrust over the 'Devono-Carboniferous' limestone or other organic formation. Or, secondly, it is possible that this stratigraphic relation has been produced by a local thrust similar to, but not identical with, the proved thrust on the east. Yet neither of these suppositions is as yet capable of proof from the surface study of the rocks. Neither of them would probably ever have been suggested were it not for the existence of the Flathead oil seepages and for the fact that natural gas has, for more than two years, been steadily blowing from the hole bored in the pre-Cambrian argillites and quartzites at Lower Kintla lake. This particular occurrence of oil and gas is nothing more nor less than a complete puzzle which apparently will be cleared up only after slow and costly experiments with actual boring.

The work of the second part of the season fell into two parts, according to a natural division of the boundary belt covered. From the heights east of Osoyoos lake to the canyon of the Pasayten river, a distance of sixty miles, the geological section runs continuously through plutonic, intrusive rocks. In 1901 a reconnaissance study of these was made by Messrs. Smith and Calkins of the United States Geological Survey, who found that the same rocks extend far to the south of the boundary line. They together form an igneous complex which is yet a unit in the structure of the whole range. After the manner of many a large mass of homogeneous granite, this complex displaces, or more truly expressed, replaces the older, non-igneous formations that once composed these mountains. The whole complex mass may be called the Okanagan batholith. It was found to include nine different large bodies of granitic, syenitic or peridotitic rock. Four of the bodies are of batholithic dimensions themselves; the other five are of stock dimensions. At least seven different periods of intrusion, exclusive of those represented in the many injected dikes, are illustrated in the development of the whole composite batholith. Abundant rock-exposures and the specially favourable conditions of field-work, made it possible to delimit with considerable accuracy the various component members of the batholith.

West of the Pasayten is the other division of the belt covered this season in the Cascades. In largest part it is underlain by an extremely thick, apparently conformable series of arkose-sandstones, conglomerates and argillites bearing fossils of Cretaceous age at various horizons. The series totals nearly 30,000 feet in thickness. Its basal beds rest on a zone of pre-Cretaceous, secular weathering in granite, one of the oldest component members of the Okanagan batholith. The Cretaceous series is, however, cut by stocks of granite believed to be of the same age as the youngest members of the batholith.

One of these stocks has the most perfectly exposed contacts I have ever seen about a granite body. The stock occurs in a very rugged, deeply canyoned portion of the range forming the main Cascade water-divide. At many points about the entire periphery of the stock, the surface of contact between the granite and the invaded sediments can be followed with the eye or with the hammer through vertical descents of from 700 to 2,200 feet. It was invariably found that the plunging contact-surface sloped outward with reference to the centre of the granite as now exposed. I do not know of there being anywhere described such a telling illustration of the downward enlargement of igneous stocks. The evidence is equally well displayed that this granite, in assuming its present position, actually replaced the Cretaceous sandstones and argillites. The sedimentaries were already strongly tilted before the intrusion began. Their regional dip and strike were essentially unaffected by the advance of the granite magma. It seems quite without question that here, in some way or other, the magma ate its way up through the sedimentaries so as to form the subterranean chamber now filled with the crystallized granite. Similar evidences of downward enlargement and of magmatic incorporation are also illustrated on a large scale in the Okanagan batholith. The primary importance of these facts, as bearing on principles of general and economic geology, warrants their being noted even in a brief report of the season's operations.

The thicknesses, structures and lithological composition of the members of the Cretaceous series were determined. Fossils were collected at six horizons. The whole series is cut off on the west by a master fault running along the eastern base of the Hozomeen ridge. From that fault to the Skagit the rocks are chiefly serpentines, green-stones and cherty quartzites, enormously crushed and believed to be upper Palæozoic in age.

This season the extreme eastern and extreme western limits of the great Cordilleran ice-cap of the glacial period were located for the 49th parallel. It is now possible to construct a complete profile showing the width and varying depth of the ice-cap in this latitude.

I have the honour to be, sir,
Your obedient servant,

REGINALD A. DALY.