

# PROVINCE OF MANITOBA

Province of Manitoba, Office of the Premier  
Winnipeg

April 29, 1952

Dr. T. H. Hogg, Chairman,  
Royal Commission on the South  
Saskatchewan River Development,  
406 Elgin Building,  
Ottawa, Canada.

Dear Dr. Hogg:

I was glad indeed to learn from Mr. Richardson's letter that you have fully recovered from your recent illness and that you propose being in Winnipeg on Friday, May 9th. Needless to say Mr. McDiarmid and I will be pleased to have a discussion with you.

I had not previously placed before you Manitoba views in connection with your Commission's inquiry because of your illness, but think I might do so briefly now so that you will have a general knowledge of them when we meet for discussion on May 9th.

Manitoba has welcomed the appointment of your Commission as a body which can deal thoroughly and impartially with the questions referred to it and make findings and recommendations which will be of great value to all interested governments and individuals.

I believe that there is already available to our Commission the result of extensive engineering studies and investigations relating to this project and I assume that in accordance with the terms of reference set out in P.C. 4435 your Commission will give immediate and serious study to these data, plus of course any further investigations you deem advisable, to ascertain whether the project is economically feasible. I feel also that your Commission should obtain the opinion of engineers and expert consultants as to what adverse effects this project might have upon Manitoba's resources. As you will appreciate, Manitoba's share of the Saskatchewan River is the residue remaining after approved appropriations are made effective in other provinces. It is quite possible that this project could cause a serious decline in the potential capacity of the power sites on the Dauphin and Nelson Rivers. These power projects are substantial undertakings which must have dependable flows of water assured if they are to be successful. It

would appear therefore that your Commission should give consideration at this time as to what responsibility the Government of Canada should accept for the integrated development of the entire watershed.

It is noted that according to P.C. 4435 your Commission is directed to consider not only the engineering and technical possibilities of the South Saskatchewan project but

"Whether the economic and social returns to the Canadian people on the investment in the proposed South Saskatchewan River Project (Central Saskatchewan Development) would be commensurate with the cost thereof;"

and

"Whether the said Project represents the most profitable and desirable use which can be made of the physical resources involved."

While it is not a usual function of the Manitoba Government to advise on financial policies of the Federal Government, we suggest that when you are assessing "Whether the economic . . . returns to the Canadian people on the investment in the proposed South Saskatchewan River Project . . . would be commensurate with the cost thereof" you give consideration to the fact that if Federal taxpayers' money is to be used to build or assist in building a hydro-electric power development in the Province of Saskatchewan, Manitoba people will be justified in asking that similar assistance be extended to us in developing the sites above mentioned to supply the electrical power that will soon be needed in this province.

I trust this brief introduction to Manitoba's views on this question will indicate to you the importance we attach to the work of your Commission and some of the problems which we feel should be considered at this stage of your investigations.

I shall be looking forward to meeting you on May 9th.

Yours very truly,

(Sgd.) DOUGLAS CAMPBELL.

### The Saskatchewan River and Manitoba's Problem

D. M. STEPHENS, M.E.I.C.

(Published in *Engineering Journal*—June 3, 1948)

The main elements of Manitoba's Water Problem can be briefly stated.

In the first place, Manitoba is a sub-humid region. The Province lies in a low rainfall area where the annual precipitation ranges from 14 to 22 inches. Except for the occasional spring freshet when local flooding might occur, we are likely to be chronically short of water. That is the first element of our problem.

The second element of Manitoba's water problem is to be found in the fact that we lie at the bottom of a whole series of drainage basins, the water courses of which rise in and flow through other jurisdictions. Many of these water courses flow through provinces or states which also suffer from chronic shortages of water; and in some of these the shortages might be more acute than those suffered by Manitoba.

These conditions which exist in jurisdictions outside of Manitoba have given rise in the past and will no doubt continue to give rise to watershed developments and water uses which have had and will have an adverse effect upon Manitoba's water supply position. It will be obvious, of course, that to whatever extent water is extracted from streams flowing into Manitoba and is dissipated for irrigation or other similar purposes, Manitoba's chronically mad water supply situation will be, to that extent, worsened.

The third element of our water problem relates to the nature of our terrain. Manitoba is a region of relatively low relief. Surface elevations vary from a maximum of 2,724 feet above sea level *datum* in the Duck Mountains to sea level along the shores of Hudson Bay. Lake Winnipeg, an immense collecting basin for the very large watersheds draining into Manitoba lies at elevation 713 feet above sea level. The mean level of the Winnipeg River at the Manitoba-Ontario Boundary is approximately 982. The main level of the Red River at the International Boundary is 750. The Souris River enters Manitoba from North Dakota at elevation 1,402. The Assiniboine River enters from Saskatchewan at elevation 1,375, and the level of the Saskatchewan River at the Manitoba-Saskatchewan Boundary is approximately 855. With respect to water matters, Manitoba's relatively flat terrain imposes certain definite limitations upon us. Above Lake Winnipeg and with the exception of the Winnipeg and Churchill Rivers, there is very little natural storage on any of our streams. This means relatively poor natural regulation and a very uneven stream regimen with flows varying through wide extremes from season to season and from year to year. A second limitation which is imposed upon us by

the nature of our terrain is that there is exceedingly little scope within Manitoba for the creation of large storage reservoirs for the control of river flows. This applies particularly to the Red River, the Souris River, the lower reaches of the Assiniboine River as well as the Saskatchewan River above Cedar Lake.

The limitations which are imposed upon us in the matter of water storage are particularly serious when considered in relation to the uneven regimen of our prairie rivers, such as the Red and the Assiniboine. It is with respect to these streams that we are likely to suffer extreme water shortages during certain periods. It is in these same watersheds that we are faced with most acute flood hazards. It is also on these watersheds that the nature of our terrain imposes the most severe limitations in the matter of water storage.

With respect to the portion of the Red River which lies within Manitoba, for example, it would be physically impossible to create sufficient storage to provide what might be called adequate river regulation. On the Assiniboine River we would have some scope for the development of storage in the deeper portions of the valley in the extreme western portions of Manitoba.

Other and closely related limitations are imposed upon us by the nature of the Manitoba terrain. There are few places, for example, where large dams could be built for irrigation purposes and which would make it possible to command any substantial acreage by gravity. The relatively flat gradients which characterize our prairie streams when considered in relation to the uneven stream regimen and the relative lack of storage possibilities means, of course, that the prairie streams are not well adapted to water power purposes.

The fourth element of Manitoba's water problem becomes apparent when we examine water in relation to other resources. Here I would like to refer specifically to energy sources. There are at the present time no large known sources of coal, oil or natural gas in Manitoba. The water power resources, therefore, constitute our main known energy source and energy reserve. Any commodity which aspires toward an industrial future and which has, so to speak most, if not all of its energy eggs in one basket would be wise to watch that basket very carefully. It is for this reason that the people of Manitoba place a good deal of emphasis upon water power matters and that water power management takes a rather high place in our thinking and planning.

There is another point which I should mention and which relates to the very great interest which Manitoba takes and is likely to continue to take in water power matters. Of the 246,512 square miles contained within the Province of Manitoba, only 16 per

cent is agricultural land. In a very large proportion of the remainder we must look to forestry and mining to provide the main economic activities of the future. The forest are of such a type as to lend themselves more readily to pulp, paper and cellulose products than to lumber. There are very encouraging indications at the moment that in our northern areas and in the relatively near future we may see some very large mining developments, particularly with respect to base metals. The point that I wish to bring out now is that the pulp, paper, cellulose and base metal industries are almost as dependent upon cheap power as they are upon the wood and ores that make up the raw materials. Without Island Falls on the Churchill River or some other water power site which would be equivalent in terms of capacity and costs, the Flin Flon mine which now supports a city of 10,000 people would never have been developed. It takes almost 100,000 h.p. to keep Flin Flon going and there are other large known deposits of ore in the immediate vicinity of Flin Flon for the treatment of which still more power will be required. Without the water powers on the Winnipeg River there would be no paper industry at Pine Falls in Manitoba. It takes almost 35,000 h.p. to support this community of approximately 1,100 people and to provide an economic use for 2,000 square miles of bush land. The lack of cheap power in either of these instances would have resulted in the wastage of resources which otherwise could be and indeed have been enormously productive.

It is against this background that we must examine Manitoba's interest in and concern about the Saskatchewan River.

I think it would be safe to say that the co-ordinated development of the water and related resources of the Saskatchewan River watershed represents one of the most important and one of the most complex problems in the field of resources management with which Canada is faced to-day.

There are two national governments, three provincial governments, one state government and literally hundreds of municipal governments, each having its own general or special interest in the Saskatchewan River.

There are at least six separate and distinct geographic regions each with its separate and distinct problems and possibilities relating to the control and use of water, not all of which are by any means compatible with all others.

First there is the mountain and foothills area where forest protection, power and storage will probably remain the dominant problems respecting the Saskatchewan River.

Next there are the south-western prairie regions characterized by relatively steep river gradients, semi-arid climate, high summer temperatures, long growing seasons and, not the least important, populated by experienced irrigation farmers. These characteristics have been particularly favourable to irrigation. The steep slopes have made it possible, with a single dam and with a minimum of flooding damage, to command the maximum acreage solely by gravity. The climate has been favourable to irrigation not only because of the high summer temperatures and long growing seasons, but also because of the low precipitation which makes irrigation an annual necessity for the wide variety of cultivated crops grown in these localities. The steep river gradients which make it possible to command large land areas at relatively little cost also provide favourable conditions for the generation of hydro electric energy.

Then comes the central prairie portion of the Saskatchewan River watershed. Through this region the Saskatchewan and its tributaries flow through relatively deep valleys, usually several hundred feet below the general prairie level and the river gradients are relatively flat. As the river flows easterly it passes through areas that have somewhat lower summer temperatures, higher annual precipitation and where dry land farming is relatively less hazardous and where very great difficulties would be encountered in using water either for irrigation or for power purposes.

Between the prairie regions and Cedar Lake just above Lake Winnipeg, the river flows through a broad flat valley which is generally lightly wooded but which is dotted with numerous shallow lakes and large open marshes. Throughout the eastern portion of this broad flat valley and for many years the main economic return has been from aquatic fur bearing animals which thrive in the immense marsh areas wherein the water is periodically replenished as the Saskatchewan River overflows its low banks. Much of the eastern portion of this area is a flood plain or delta formation built up through the deposition of silt. During recent years two very interesting experiments have been going forward simultaneously in those portions of the Saskatchewan River delta or flood plain which lie between the Saskatchewan-Manitoba boundary and Cedar Lake.

From 1936 up to the present time the Province of Manitoba in co-operation with other agencies, including the Dominion Government and Ducks Unlimited (Canada) has carried out a large program of engineering work to permit the close control of water levels in the large areas of the Saskatchewan River delta. The primary purpose of this work was to increase and stabilize the muskrat crop upon which approximately one

thousand Indian and halfbreed families have depended for a major source of their livelihood. Since 1940, when these areas first came into production, muskrat pelts to a value of \$2,914,125.00 have been harvested from these marsh areas and \$1,872,985.00 have been distributed either in monthly payments or supplies issued to trappers.

The second experiment which has been going forward simultaneously with muskrat rehabilitation in this region is with respect to agriculture. During recent years increasing use has been made of the rich soils of the delta for agricultural purposes. Along the higher lands of the lower Carrot River valley new areas are being brought under cultivation each year and there is now a thriving dairying and farming community just west of The Pas.

These two uses of the Saskatchewan delta, namely, muskrat ranching on the one hand and agriculture on the other, are not altogether compatible. For successful muskrat ranching the periodic peak flows of the Saskatchewan River are an essential requirement, since it is only under these conditions that we can be sure of adequate water for marsh purposes. From the standpoint of successful agriculture these same periodic peak flows, particularly July and August peaks which are caused by the mountain water, hold out a constant threat of flooding and constitute the primary hazard.

The large lake basins of Manitoba might be considered as the fifth natural geographic region of the Saskatchewan-Nelson system. Lake Winnipeg, with an area of approximately 9,400 square miles is the main lake of this region. This is the central collecting basin for the entire upper Nelson System. Lake Winnipegosis, with an area of 2,086 square miles, and Lake Manitoba, with an area of 1,817 square miles, lie parallel to and immediately west of Lake Winnipeg. Lake Winnipegosis, the upper of these two lakes, lies at approximately the same elevation as Cedar Lake on the Saskatchewan River and is separated from that lake by an isthmus which is four miles across at its narrowest point. By excavating a canal across this isthmus, by constructing a control dam at the outlet of Cedar Lake, and by channel enlargements between Lake Winnipegosis and Lake Manitoba as well as between Lake Manitoba and Lake Winnipeg it would be possible to divert the main flow of the Saskatchewan River through the course which I have described and to concentrate a head of approximately 90 feet at a single site between Lake Manitoba and Lake Winnipeg. The immense storage which would thus be afforded by Lakes Winnipegosis and Manitoba would be particularly advantageous from the standpoint of low load factor power plant. It is partly for this reason that in planning future water

power developments in Manitoba especial consideration is given to the Saskatchewan River diversion and the development of power at what is called the Dauphin River site.

The main lake basins of Manitoba, comprising Lakes Winnipeg, Winnipegosis and Manitoba, are of substantial economic importance to the Province. These lakes are the mainstay of a large and important fishery which keeps Manitoba in either first or second place amongst the Provinces of Canada with respect to the production of freshwater fish. These lakes are important to transportation and navigation and bring large areas of the Province within economic hauling distance for forestry and other purposes. There are foreshore values which are of economic importance. These include summer resorts, hunting and trapping rights as well as haying and ranching areas.

The sixth important geographic region of the Saskatchewan-Nelson system comprises the valley of the Nelson proper, lying between Lake Winnipeg and Hudson Bay. Over this reach the Nelson River falls through slightly over seven hundred feet from Lake Winnipeg to sea level at Hudson Bay. While no accurate long term hydrometric measurements are available, it is estimated that the flow at the outlet of Lake Winnipeg has ranged from a high of approximately 140,000 c.f.s. in 1927 to a low of 28,400 in January, 1941. By adding slightly to the latter figure, out of regard to the improved regulation which could be obtained on Lake Winnipeg and assuming the natural flow of the watershed were available, it would appear as though approximately 2,000,000 h.p. of 24 hr. power could be developed on the Nelson proper. Manitoba now has approximately 600,000 h.p. either developed or under development. The undeveloped water power resources are estimated at approximately 3,500,000 h.p. (ordinary minimum power). It will be seen, therefore, that something between a five-fold and six-fold increase in water power development would completely exhaust our known water power resources. It should be noted in passing that Ontario experienced a five-fold increase in water power development in the fifteen-year period between 1917 and 1931. It should also be noted that the Nelson River represents something over 57 per cent of Manitoba's reserve of undeveloped power. Having regard to the overriding importance of Nelson River power in Manitoba's overall power picture on the one hand, and having regard to the further fact that, other than water powers, we have no important known fuel and energy reserves, Manitoba's concern about what happens to Nelson River power will be readily understood.

It is in the light of these considerations that Manitoba must examine the overall economic effects which would be likely to follow upon large scale water losses from the Saskatchewan River.

In July 1915 Mr. Ben Russell prepared a very excellent paper entitled "The Saskatchewan Drainage Basin, Water Development Possibilities and Problems". In that paper Mr. Russell stated in part as follows:—

"It has been estimated on the basis of gravity diversion that the irrigation requirements of the Saskatchewan River Drainage Basin in Alberta may ultimately be 2,799,000 acre feet and in Saskatchewan 1,228,000 acre feet, or a total of 4,207,000 acre feet or sufficient for 2,539,000 acres. If and when pumping on a large scale is resorted to the limit will be raised considerably....."

In the same paper Mr. Russell estimates that on the basis of the normal year diversions to the extent of 4,207,000 acre feet would represent a 23 per cent reduction in the total flow of the Saskatchewan River at The Pas, Manitoba. In the low water year, which, of course, would be the critical year, these diversions would reduce the flow into Manitoba by approximately 40 per cent.

What are the effects which would follow upon these large diversions in so far as the Province of Manitoba is concerned?

While I am quite prepared to accept Mr. Russell's estimates as to the amount of water which could be used for irrigation in Saskatchewan and Alberta, I am not altogether prepared to accept his appraisal as to the downstream effects of these diversions.

In the report to which I have already referred, Mr. Russell says,—

"There is the problem of water levels in Manitoba . . . . When some 4,000,000 acre feet of water is diverted each year in Alberta and Saskatchewan for irrigation, such a diversion is bound to affect the lake levels in Manitoba and therefore protest will undoubtedly be made by that Province. The solution to this is simple and consists of a control structure at the outlet of the lake to the Nelson River and less water wasted to Hudson Bay and therefore more water for the lakes."

It will be noted that in the matter of the deleterious effects which Manitoba would suffer as a result of large scale diversions from the Saskatchewan River, Mr. Russell confines himself to a consideration of the effect upon the levels of Lake Winnipeg. This would not be the total effect nor even the most important one.

We might get a clearer picture of these deleterious effects and the rather profound influence which they

would have upon Manitoba if we consider the various reaches of the Saskatchewan-Nelson system in order—starting at the Saskatchewan-Manitoba border.

I have already mentioned the very successful muskrat rehabilitation work which has been carried out in the marsh lands of the Saskatchewan River delta in the vicinity of The Pas. These projects are regarded as amongst the most advanced and successful marsh management schemes that have ever been attempted. They provide a sound economic use for very large areas of what previously had been waste lands. These projects now supply the major source of income to something between 700 and 1,000 families and have added well over \$3,000,000.00 of new wealth to the Province during the eight or nine years they have been in operation.

Since adequate water supply for these projects depends very largely upon the high summer peak of the Saskatchewan River, and since the western diversion schemes would necessitate the creation of large storage reservoirs and the radical reduction of summer peaks, there is every likelihood that Manitoba's muskrat scheme in the delta area would be an early casualty of the proposed diversion.

I have already mentioned something about water power matters and pointed to the probability that well within the next decade we will be required to develop power from the Saskatchewan-Dauphin scheme and from the Nelson River. It is important, therefore, that we examine the effect which large scale diversion of Saskatchewan River water would have upon our potential water power resources.

The first enlargement of the Saskatchewan River in Manitoba is at Cedar Lake which happens to lie at the same elevation as Lake Winnipegosis, namely, 831 ft. above sea level. A simple calculation will show that at 80 per cent efficiency, the loss of 4,207,000 acre feet per year represents the loss of approximately 440,000 h.p. of 24 hr. power. Depending upon the load factor which is used this would probably represent a loss in potential power installations, probably in the range of 650,000 to 750,000 horse-power. In a region which suffers an acute deficiency with respect to fuel or energy sources, 700,000 horse-power represents a lot of power. For purposes of comparison I should point out that when the present expansion program on the Winnipeg River has been completed the four large plants on that stream will have total installed capacities of something less than 600,000 h.p.

I have referred to Manitoba's potential water power resources as our major, in fact, our only source of low cost energy. Let me translate 440,000 h.p. of 24 hr. power into terms of fuels. For this purpose let us

assume that it would cost \$200.00 per installed horsepower to develop this power. Let us assume further that the annual costs of delivering the power would be, say, 8 per cent of the capital investment.

If 440,000 h.p. of 24 hr. power were to be developed by the use of coal of say the grade of Alberta bituminous, it would require 1,880,000 tons of coal per year.

If this power were to be made available at a cost corresponding with the costs which I have assumed for hydro electric power, it would be necessary that the coal be laid down near the site of Manitoba's power requirements at something slightly under \$1.90 per ton.

If we were to attempt an evaluation of these large energy losses, on the basis of substitute sources of energy in Manitoba, we would arrive at some very interesting figures. On the basis of the assumptions which I have stated it would be necessary for us to use 1,880,000 tons of Alberta bituminous grade coal each year to develop 440,000 h.p. of 24 hr. power from steam plants; also it would be necessary to deliver this coal to Manitoba plants at something under \$1.90 per ton if the costs of energy were to be kept in line with those likely to be experienced in hydro power. But the present cost of Alberta coal, or coal of equivalent grade in Manitoba runs from \$12.00 to \$15.00 per ton. One method of arriving at the cost of substituting steam power for the 440,000 h.p. loss of firm hydro power would be to evaluate the difference between the actual cost of coal and the hypothetical hydro electric equivalent. This would amount to something between \$10.10 and \$13.10 per ton. The annual difference, on the basis of 440,000 h.p. firm would be something between \$19,100,000 and \$24,600,000. In so far as there might be an element of permanency to the situation which we are discussing, figures of hypothetical annual losses fail to give a clear picture. For this purpose it would be necessary to capitalize the annual figures to which I have referred. If this were done at say 3 per cent, it would produce figures in the neighbourhood of \$500,000,000 to \$300,000,000.

I do not suggest that this is an adequate method for fixing a dollar value upon potential water power resources nor upon the damage which would result from their diminution or loss. This method simply indicates the offsetting amounts which would be necessary if we were to attempt to produce equivalent amounts of power at equivalent costs. It does not take into account the economic loss which would be suffered by the nation, or a province, or a region if, through lack of power we were unable to develop our forest or base metal resources. It does not take account of the marginal nature of some water power sites, where a potential development may be an economic undertaking

under certain conditions of river flow, but may become a wholly uneconomic undertaking under radically different conditions of flow.

In this latter connection I might mention the power project which we refer to as the Dauphin River scheme. In this case and with the natural flow of the Saskatchewan River available it is estimated that up to 250,000 h.p. could be installed at the Dauphin River site. The costs would be relatively high but the probabilities are that it would be an economic undertaking if the full natural flow of the Saskatchewan River were available. If during the critical or low water year, however, the Saskatchewan River flows were reduced to say 60 per cent of the natural low water flows, the result might be to reduce the potential installation from 250,000 h.p. to 150,000 h.p. Having regard to the fact that a major portion of the costs of this project would be represented by canals, diversion dams and channel improvements, and that the costs of these would be roughly the same for 150,000 h.p. as for 250,000 h.p., it will be seen that a drastic reduction of flow in the low water year might very easily change the Dauphin River scheme from an economic to an uneconomic undertaking.

From the fuel or energy standpoint, Manitoba's concern about large scale diversions of water from the Saskatchewan River will be readily understood if we keep the following points clearly in mind.

1. Manitoba has no important known reserves of coal, petroleum or natural gas. Our water power resources, therefore, constitute our only known energy source or energy reserve.
2. In relation to probable industrial demands for power and in relation to the nature of our other resources, such as forests and base metal deposits, our water power resources are not large. Our total water power resources both *developed* and *undeveloped* are something less than 57 per cent of Quebec's *installed* capacity.
3. Manitoba would require only a five-fold or six-fold increase in power development to completely exhaust our water power resources. In the Dominion of Canada as a whole, there was better than a four-fold increase in water power development from 1920 to 1945. In Ontario there was a five-fold increase in power development during the fifteen-year period 1917-1931.
4. Diversions from the Saskatchewan River, to the extent which have been proposed for irrigation by gravity alone would represent a direct loss to Manitoba of approximately 440,000 firm horse-

power or between 12 per cent and 13 per cent of our entire water power potential.

Mr. Russell states that

"If and when pumping on a large scale is resorted to the limit will be raised considerably". It follows, of course, that "if and when pumping on a large scale is resorted to", Manitoba's energy position would be worsened considerably. It should also be pointed out that to whatever extent otherwise economic sites are made uneconomic, Manitoba's reserve of economic power will be, to that extent reduced.

5. In this day and age almost every jurisdiction which has any industrial aspirations whatever is examining very closely into its energy resources and energy reserves. The Province of Alberta, which is bountifully supplied with fuel and energy resources, is now examining into its position with respect to natural gas before permitting export. Having regard to the fact that Manitoba is in a chronically "short" position with respect to fuel and energy sources, our concern about water power, our sole source of energy, will be understood.

Mr. Chairman, this paper was not prepared as an argument against irrigation. The fact is that economic conditions in Manitoba will be favourably affected by whatever steps are taken to produce and maintain higher levels of prosperity throughout the Prairie Provinces. If I were to argue against anything in this matter, I would argue only against what might be called a piece-meal approach to the development of this particular watershed. I think we need a comprehensive approach and that we should treat the watershed as a whole. If we are to do this, it becomes necessary for us to fully examine the needs and interests of each region of the watershed and determine how these needs and interests can best be met. When we have done this, it is necessary that we examine the extent to which these various interests are compatible and how the interests of each region can be met with the least possible deleterious effect upon all others.

I have already offered the opinion that the co-ordinated development of the water and related resources of the Saskatchewan River watershed represents one of the most important and one of the most complex problems in the field of resources management with which Canada is faced today.

Fundamentally it is a problem of inter-relationships and integration. Steps have already been taken with respect to forest protection on the eastern slopes of the Rockies and which recognize the inter-relationships between forest cover and river control. Immense strides have been taken in irrigation which recognize the values which soils and water can give to one another. Investigations have been carried out to determine the possibilities of greatly expanding this work and of enhancing the productivity of other large areas. Some studies have gone forward with respect to the further integration of power and irrigation. Earlier investigations had held out an encouraging prospect that, when additional agricultural lands were required, it would probably be feasible to reclaim for agricultural purposes several million acres in the lower Saskatchewan valley. Still other studies have been made and are going forward with regard to power development in Manitoba; studies which recognize the values which power can give to forest and mineral resources as well as the values which these resources can give to water power.

We have now reached the stage where planning within individual regions of this watershed is not enough. We have reached the time when inter-regional studies should go forward; when the effects upon each region which are likely to follow upon works in each other region should be thoroughly appraised and understood. The setting up of a Western Water Board, which has recently been agreed upon by the Governments of Canada, Alberta, Saskatchewan and Manitoba will be accepted by the people interested in the Saskatchewan River as a most constructive step. This Board, with representatives from the four major jurisdictions concerned in the Saskatchewan River should provide an excellent medium for the co-ordination of engineering work relating to this stream and in addition facilitate the inter-regional studies to which I have referred.

# PROVINCE OF SASKATCHEWAN

## Submissions of the Province of Saskatchewan to the Royal Commission on the South Saskatchewan River Project

### *Foreword*

The briefs contained in this volume are the results of individual and collective efforts of members of a provincial Irrigation Committee, which has been engaged in a study of the Central Saskatchewan Development for several years. The permanent members of the Committee are: I. C. Nollet, Chairman, W. H. Horner, E. E. Eisenhauer, J. W. Tomlinson, W. B. Cliphsham, J. A. Arnot, B. Boyson, R. E. Mackenzie, E. J. Seammell, M. Brownstone, Secretary. In addition to these individuals valuable advice has been rendered by Harold W. Pope, Q.C., Counsel for the Government of Saskatchewan to the Commission, Dr. L. B. Thomson, G. L. Mackenzie, Gordon Watson and W. B. Berry of the Prairie Farm Rehabilitation Administration, Professor David Case-Beggs, W. H. Harding, T. K. Shoyama and Professor F. R. Scott.

We have also benefited greatly from technical studies prepared under Prairie Farm Rehabilitation Administration auspices and wish to acknowledge our debt to the many individuals concerned. Without the concerted research effort of these groups it is doubtful whether an objective and scientific appraisal of the project would have been possible.

Finally, I wish to extend the appreciation of the Government of Saskatchewan to the many individuals and organizations presenting briefs to you, and others who have worked hard for many years to make this great project a reality. While largely composed of Saskatchewan residents this group also includes many individuals from other provinces whose support has been of unquestionable value, demonstrating, as it has, the national importance of the Central Saskatchewan Development.

I. C. NOLLET,  
*Minister of Agriculture.*

GOVERNMENT OF THE PROVINCE OF SASKATCHEWAN

September 11, 1952.

Dr. T. H. Hogg,  
Chairman,  
Royal Commission on the South  
Saskatchewan River Project,  
406 Elgin Building,  
Ottawa, Ontario.

Dear Sir:

I have the honour to present herewith Submissions of the Province of Saskatchewan to your Commission.

You will please note that six separate Submissions are contained, one a general brief, which I will present and the others covering different phases of the project and presented by various agencies of the Government.

I must note with regret two impediments to a complete statement of Saskatchewan's case in these briefs. First, the details of the Commission's cost estimates were not available to the government for study and comment. In fact, the summarized costs which were made available were reserved by the Commission from comment by this government. Secondly, relevant submissions by other governments were also not available in time for detailed comment in the Submissions. Despite these difficulties, it is the intention of Saskatchewan Government representatives to discuss both questions during the course of the hearings. At the same time, the Government of Saskatchewan wishes to discuss the question of costs more fully when the Commission's detailed estimates are made available.

It is the earnest hope of the Government of Saskatchewan that these Submissions will be of assistance to the Commission.

Yours sincerely,

HON. I. C. NOLLET,  
*Minister of Agriculture.*



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## PART I

## GENERAL SUBMISSION

## 1. Introduction

The Royal Commission on the South Saskatchewan River Project was appointed by the Government of Canada, under the terms of Order in Council P.C. 4435, dated August 24, 1951, and charged with the following terms of reference:

1. Whether the economic and social returns to the Canadian people on the investment in the proposed South Saskatchewan River Project (Central Saskatchewan Development) would be commensurate with the cost thereof;
2. Whether the said Project represents the most profitable and desirable use which can be made of the physical resources involved.

Comparative measurement of costs against economic and social benefits can often be quite abstract and nebulous. For instance, an indication of economic and social benefits as justified by costs might be compared to the fact that the people of Canada in 1951 spent \$1,446,000,000 on alcoholic beverages, tobacco, race tracks, soft drinks and commercial recreation, but the justification of this type of expenditure on the basis of economic and social returns and desirable resource use has not even been questioned by governments.

When the economic and social benefits of irrigation and power development are balanced against capital costs, it is well to be reminded of the fact that water harnessed as a source of energy, unlike other resource energy, is unexpendable both for electric power and irrigation purposes. It is true that costs of public projects have increased materially. It is, nevertheless, also true that as a result of economic expansion and development generally in Canada in recent years, purchasing power and ability to carry costs, have also increased very materially. Increased costs have not deterred public investment in useful public enterprises. Never in the history of Canada have so many public projects been undertaken at all government levels, with many more public projects being planned for the future. In fact, Canada is committed to the gigantic St. Lawrence Seaway. All of these factors must be considered in dealing with the Commission's terms of reference.

In these introductory remarks I would like to briefly outline Saskatchewan's agricultural production problems and the effects of these problems on the provincial and national economies together with a summary of the impact of the development on these areas.

The total area of Saskatchewan is over 161 million acres, the land area being over 152 million acres, and the area of water well under 9 million acres. These figures clearly illustrate the disproportionate amount of land to water. By far the largest area of water exists in the northern part of the province outside the agricultural area. The above figures, when coupled with low, uncertain precipitation and a high evaporation factor, leave no doubt that agricultural and economic instability in Saskatchewan is related principally to moisture deficiency.

There are approximately 60 million acres of land covered by soil surveys in the occupied agricultural portion of the province. Of this area, over 33 million acres are under cultivation, or approximately 40 per cent of the total cultivated acreage in Canada. It is worthy of note that only 7,833,000 acres of cultivated land is classified as "best to very good wheat land" leaving 25½ million acres which require balanced rotation land use farm practice. This acreage, together with an additional 27 million acres unsuitable to cultivation, strongly implies increased emphasis on livestock production in the interest of full and proper utilization of land resources and a stable agricultural industry. Livestock, in turn, depends on an assured supply of feed obtainable through irrigation development. Thus, an irrigation green spot in the centre of the agricultural area of Saskatchewan will be of immeasurable benefit to agricultural stability.

Saskatchewan is a province of great potential production under favourable moisture conditions. On the other hand, no other province has experienced Saskatchewan's violent and disastrous economic fluctuations. Saskatchewan's production history is marked by drastic fluctuations due to moisture hazards; for example, wheat production in 1942 was 305 million bushels; in 1937, it dropped as low as 36 million bushels; and in 1936, 110 million bushels were produced despite the fact that the larger acreage was sown to wheat in the latter years. As a result of these conditions private businesses and public services, both municipal and provincial, are under a constant threat of disruption. The latter organizations have been and are exposed to the financial burden of relief liability which is shared to an important extent by the Federal Government.

What role has the Government of Saskatchewan played in overcoming our production problems? Let me say, firstly, that the Saskatchewan Department of Agriculture considers the need for agricultural stability to be of paramount importance to a sound provincial economy. In fact, the cornerstone of the Department's agricultural policy is, first, agricultural stability and,

second, increased production resulting from good land use practice and optimum development of all irrigation and reclamation possibilities. The Department of Agriculture has directed all its major activities to this end and has increased expenditures with these basic objectives in mind. To make this possible the votes for the Department of Agriculture have been increased from \$826,000 in 1945-46 to \$3,666,000 in 1952-53.

Part of this increase is reflected in a greatly expanded field extension service for the primary purpose of improved land use practice and the initiation of worthwhile projects that will bring greater security to our farmers. The Agricultural Representative Service covers the entire province with Agricultural Representatives living within their respective districts. The Agricultural Representatives work in close association with local agricultural committees whose principal attention has been focussed on Saskatchewan's major problems. Innumerable valuable land use and settlement studies have been made by these committees that indicate clearly the comprehensive steps necessary to bring stability and security to Saskatchewan agriculture.

In order to meet present and anticipated needs, the department has set up a new branch known as the Conservation and Development Branch charged with the responsibility of undertaking physical development of irrigation drainage and dry land projects. This branch itself has an appropriation of nearly \$1,350,000 for 1952-53. It is well to mention that previous to the inauguration of this branch there were no engineering specialists and no equipment in the department to implement the above programme. Since the establishment of the C. & D. Branch, the scope of activities of this branch can be gauged by the fact that 45 water users associations are now organized; water has been brought to 50,000 acres of land; 145 miles of ditch has been constructed; 475,000 acres of dry land projects developed; and 1,000,000 acres of land affected by drainage improvements. Thirty-three field survey parties are in the field this summer. I refer to the activities of this branch merely to indicate that the department has a well organized expanding agency staffed with competent technical personnel to meet present and future requirements for irrigation, reclamation and other activities associated with overcoming the many natural hazards facing Saskatchewan agriculture. Trained technical staff, equipment and experience places the department in a good position to undertake the responsibilities associated with the Central Saskatchewan Development.

I should make brief reference to the activities of the Lands Branch. The administration of Crown lands in Saskatchewan is devised to fit into the general policy aimed towards agricultural stability and security. Provincial Crown lands are utilized wherever possible to establish community pastures, fodder projects of various types, including irrigation, reclamation and dry land projects. Crown lands have been made available for the establishment of P.F.R.A. community pastures, provincial community pastures, co-operative pastures and co-operative community fodder projects, and the establishment of as many economic farm units as possible with available Crown lands. Earned assistance is made available to municipalities or groups of farmers who wish to develop pasture or fodder projects within the resources of such groups, with the department paying 50 per cent of the actual development costs. Larger projects of this nature are constructed exclusively by the provincial department and, of course, as mentioned above, P.F.R.A. has made a very substantial contribution in the establishment of community pastures on Crown lands made available by the provincial government. Administration of Crown lands in Saskatchewan is characterized by meticulous inspection by competent soil specialists in order to determine the proper utilization of land for grazing or cultivation purposes, and also to determine the size of a potential economic farm unit in accord with the productive classification of the land. The Lands Branch exercises every caution against permitting land to be utilized for wheat production that is not suited to this type of agriculture. The department is primarily interested in good land use practice and the optimum utilization of our total Crown land resources in order to assist in stabilizing Saskatchewan agriculture and increasing production to the optimum. The Lands Branch has also inaugurated new settlement projects in the limited area remaining in north-east Saskatchewan.

It should be quite clear from the foregoing that this government, working with federal and local groups, is making every effort to cope with our agricultural problems. What can the Central Saskatchewan Development contribute?

With respect to agriculture, the development will remove the threat of crop failure from almost 450,000 acres of land which is now extremely vulnerable to drought conditions. It will permit changes in land settlement patterns which will eventually place upwards of 4,000 farm families on a secure and permanent basis. It will allow essential changes in land use both within the project and in a considerable area surrounding the project and will permit widespread

diversification in the economy. If this project is not constructed there is little hope of avoiding the effects of adverse climatic conditions on the economy. The only basic solution within agriculture is, firstly, to provide assured feed supplies, and secondly, to provide more land to farmers in the arid areas by resettling a portion of the farm population. It will be shown that Saskatchewan is suffering acute land hunger at present. There is simply not enough land to permit needed adjustments. But irrigation development does provide "new" land with eight to ten times the population carrying capacity of dry land and it is for this reason that the development can play a vital role in promoting a stable agriculture in the province, apart from its purely local stabilizing effect on the project area. Without this vital contribution little progress can be made in Saskatchewan towards modification of the effects of natural hazards inherent in our soil and climatic conditions. By this token there is no assurance that the tragic occurrences of the "thirties" can be avoided including the huge relief expenditure of \$187,900,000 and the immeasurable destitution of the land and its people.

I wish to stress briefly at this point that, in particular, agricultural resettlement problems in Saskatchewan are more pronounced than in any other province. New land settlement opportunities in Saskatchewan are now very limited and confined largely to reclamation and irrigation possibilities. No new land areas of consequence remain available for dry land settlement. By contrast, Alberta has at least ten acres of new dry land settlement opportunities to every one acre still available in Saskatchewan, including drainage-reclamation projects. Alberta has irrigation water already allocated from interprovincial streams for 1,256,000 acres of land, while Saskatchewan, from such interprovincial streams has an allocation for only about 30,000 acres. Furthermore, Alberta has 700,000 acres of irrigable land for which water has been allocated and on which development has not, as yet, taken place.

It is quite evident that by comparison, and on the basis of need, Saskatchewan should now be favourably considered for irrigation settlement opportunities. Very little large scale irrigation development will be possible in Saskatchewan apart from the Central Saskatchewan development and limited development based on diversions from the North Saskatchewan.

A second major contribution of the project will be food. If Canada is expecting to support a large industrialized, urban population within the next few decades it will be necessary to increase existing food supplies. Already the highly industrialized provinces are deficient in certain needed foods and this will be

aggravated as industrialization proceeds. There are few remaining areas for agricultural development in Canada. The only real alternative to more intensive use of land, such as would occur under irrigation, is to look to other countries for our supplies. But the opportunity for large-scale food imports is rapidly shrinking in the world. Furthermore, it is difficult to assume reliance on imports in the face of unsettled world conditions.

A third contribution is hydro-electric power. If the project is not constructed an annual potential of upwards of 400 million kilowatt hours will be wasted and downstream power potential will be reduced. This power is crucial to the electrification of our rural areas and to industrialization.

Saskatchewan has only two main sources of hydro power, the North and South Saskatchewan Rivers. The development will assist immeasurably towards providing electric power to Saskatchewan people on a more equitable basis with other provinces.

Fourthly, there are important contributions in the fields of municipal water supply, flood control, recreation and industrial development stemming from the Development. While perhaps not as dramatic or as large as the agricultural, food and power benefits, they will be important contributions to urban development, standards of living, and diversification of our economy.

Over and above the foregoing contributions we must also consider the general national benefits. This, when measured in terms of additions to national income, amounts to many millions annually. These millions will be added to income in every corner of the nation, in food processing plants, in transportation facilities, in electric appliance factories, in mines, mills and smelters and in the farm implement industry, the fertilizer industry and many others.

But what is perhaps even more important, it will result in a more stable national economy and a more united nation. The threat of an unstable wheat economy will be greatly modified by the stabilization effects of the Development and its industrial opportunities. In terms of a national development policy, which has not been evident in Saskatchewan for many decades the prospect of investment in the Development provides the federal government with an excellent opportunity to demonstrate its interest not only in redistribution of income in welfare schemes as a national policy but also in the development of resources.

The Central Saskatchewan Development represents a unique potential productive unit, composed of available soil, water and human resources, which can be utilized most effectively only through the completion of the Project. The Central Saskatchewan Develop-

ment presents the most feasible and practical use of water for irrigation and power. It represents the cheapest and most efficient way to convey water to the point of development, that is, by natural channel flow. Furthermore, it is important to note that free waters in the South Saskatchewan River Drainage Basin will remain unutilized and lost unless this greatly needed project is proceeded with. It is evident that on the basis of greater need and benefits, both provincial and national, Saskatchewan is entitled to the utilization of these interprovincial waters as a matter of right and in the interest of an equitable division of these great water resources between the provinces concerned. This nation cannot afford to waste these resources any longer. It cannot permit the problem of an unstable economy to drift on the tides of natural and economic fortune. Nor can it ignore an annual loss of many millions of additional national income through failure to make an investment in the Development. The Development has been thoroughly studied and the results of these studies indicate that construction should be undertaken without delay.

The Saskatchewan Government urges the early construction of the Central Saskatchewan Development.

## *2. The Project and Its Potential Development*

A survey of the project area will indicate clearly that it is a typical prairie problem area. It is characterized by a low and uncertain precipitation, a very low proportion of good dry land soils, generally undersized farms and a predominance of wheat production. As a result of these factors, farm incomes have been historically low and unstable, the incidence of relief payment very high, and depopulation has occurred since 1930. The entire structure of the rural community has been thereby adversely affected.

On the other hand, some of these very factors combined with others make the Area one of the most favourable for irrigation purposes. Let us examine them briefly.

With respect to soils, intensive surveys of soil conditions within the Development Area have indicated a superior irrigable area, perhaps unequalled in Western Canada. In sharp contrast to the very low proportion of soils in the Area rated as good for dry land wheat production (8.3%) over 71 per cent of the net irrigable acreage (430,000 acres) are in the two top grades for irrigation farming. Furthermore, topographical conditions are such as to permit relatively easy irrigation.

With respect to climate it has been established that the Elbow-Outlook district is one of the most arid on the Prairies and, furthermore, that effective precipitation in the Development Area is probably less than

in the arid sections of Alberta. Frost free periods in the Area are approximately of the same duration as those in irrigation areas of Alberta. There is no doubt that large seasonal deficiencies of moisture prevail in the Development Area and that it would benefit greatly from ample water supplies.

It is quite clear, therefore, that this is an Area which needs water and can use it effectively. In physical terms, therefore, only the availability of irrigation water and the practicability of bringing it to the soil remain to be established. There is little doubt that these two criteria can be fulfilled.

Independent studies have indicated that sufficient water is available in the South Saskatchewan River to meet all irrigation requirements of the Development (960,000 acre feet annually). Furthermore, a report of the Prairie Provinces Water Board shows that there is enough water to produce annually 50,000,000 kilowatt hours of pumping power, 325,000,000 kilowatt hours firm commercial power, and 100,000,000 kilowatt hours secondary energy over and above satisfying all irrigation needs.

On the basis of P.F.R.A. reports which have been substantiated by recognized authorities such as Gen. H. B. Ferguson, U.S. Corps of Engineers, and Dr. A. Casagrande, Harvard University, the Saskatchewan Government is satisfied that the suggested main dam is feasible from an engineering viewpoint. This structure will create a reservoir whose capacity (8,000,000 acre feet gross and 4,000,000 acre feet live) assures virtually perfect river control.

The planned distribution system is also considered feasible. It is a compact system and thus avoids the necessity for construction of a multiplicity of reservoirs, as well as minimizing the transportation and evaporation problems encountered with lengthy canals.

Having established the agricultural and engineering feasibility of the project we might proceed now to examine its potential development. What can be done with the water stored in this immense dam and reservoir? What is the expected utilization of this virtually new resource?

### *(i) Agricultural Development*

The nature of the transformation of agricultural output on the Central Saskatchewan Development rests basically on two broad factors. The first may be described as "natural" and "engineering" and the second "economic."

On the basis of engineering and soils data, it is suggested that at least 430,000 acres of land or about 2,700 farms, in the Development Area itself (and an additional 20,070 acres in the Qu'Appelle Valley) can be

irrigated with satisfactory results. Soils and climatic data just reviewed suggest that a wide range of irrigation crops can be grown successfully.

Economic factors, while of great importance, do not readily lend themselves to precise analysis. In the main, two broad economic questions are involved: the nature and extent of demand for food, and production alternatives. Demand factors, as will be shown later, indicate an overall increase in demand for food, as well as a relatively larger demand for meat, milk, vegetable and fruit products. While necessarily stated in general terms, this projection should serve as a guide to expected tendencies in food consumption in Canada. The needs of the national market can be expressed in terms of a shift from cereal consumption to animal products and various row crops.

Given the foregoing conditions, it is then necessary to integrate them with production factors, in order to arrive at some estimate of agricultural development under irrigation. The irrigation farmer, in brief, is faced with a situation where natural factors permit him to produce a wide variety of crops and where demand conditions favour a relatively larger output of animal and vegetable products as compared with cereals. He must utilize his productive factors to yield him the highest possible net income over a period of time.

By taking all of these basic and other related factors into account it is possible to project the development of agricultural output under irrigation in the Central Saskatchewan Area.

(a) *Types of Farming.*—A general assumption of a livestock-cereal grain economy receives ample support from demand and production requirements. When land is first brought under irrigation on the project and during the first few years of settlement, grain will be the principal crop grown. This must be so while land is being levelled and ditches properly located. However, once this is accomplished, new irrigation farmers can start planning towards a cropping program which will be aimed at obtaining the highest income per acre and maintaining soil fertility. Experience in other irrigated regions has shown clearly that continuous grain cropping cannot be carried on profitably under irrigation. A rotation which includes forage crops and legumes must be established if high production is to result. The typical farms envisaged in Part II of these Submissions are based primarily on livestock-forage crop and grain production with specialty crops replacing wheat production in the mature phases. Further integration of these farms with surrounding agriculture will, undoubtedly, take place. In fact, it is essential that an optimum integration be developed as quickly as possible. Further

expansion of feeder enterprises would be made possible by utilization of by-products of certain specialty crops. Specialty crop production with attendant livestock feed by-products will also develop into significant enterprises in the area. Under market conditions expected, both specialty crop production and the livestock feeding business would probably be more profitable than the beef-cereal enterprise.

(b) *Expected Changes.*—With the above in mind, it is possible to visualize the changes in agriculture which will take place as a direct result of the development. These are based on initial development:

- (1) On the basis of 160 acre farms the farm density in the area will be more than doubled.
- (2) Total agricultural output will be at least three and probably four times the present output. This is derived from the expected increase in yields and a more intensive use of land made possible by elimination of summerfallow practices. It is expected that the area will produce for commercial disposition nearly 3 million bushels of wheat, more than 40 million pounds of beef, about 3,750,000 bushels of coarse grains and over 60,000 tons of hay. This output is in sharp contrast to the present relatively low average annual output in the Development Area.
- (3) Grain production will be largely replaced by livestock, grass and forage crop production, together with expanding possibilities for specialty crops.
- (4) Feed supplies for livestock production throughout large areas of the province will be assured. The availability of feed will permit a more intensive use of pasture areas; and the periodic decimation of herds because of drought conditions will be avoided.

The Central Saskatchewan Development can thus play two major roles. Firstly, it can add greatly to agricultural stability by rehabilitating not only farmers in the project area but also farmers from other problem areas who will be settled on new farms created; by providing assured feed supplies for livestock throughout the province; by providing a large area of permanent and stable agriculture in the heart of the province. Secondly, it will supply needed food for our citizens.

(c) *Settlement and Utilization Problems.*—Notwithstanding the general validity of the foregoing description of expected agricultural results of the development, the question of ways and means of assuring the actual realization of projected farm sizes, types and output must receive careful consideration. This involves problems of land tenure, education, colonization and

finance. Policies must be developed in each of these aspects to insure optimum conditions for the achievement of the expected results. It is essential, in short, that the public investment contemplated be adequately protected.

Some of the common hazards of irrigation development are well known. These include lack of experience on the part of settlers; speculation in land values; overburdening of the financial capacity of settlers in early stages of settlement; and deficient utilization of land due to large holdings or excessive charges.

Lack of experience in irrigation farming can be dealt with by well planned extension and demonstration services. Experience with the Soil Conservation Service in the United States indicates that farmers can plan very satisfactorily for better land use through new farming methods with the assistance of qualified technicians. Some of the reservations about the ability of dry land farmers to adapt to irrigation farming would not seem to be well founded in a situation where an imaginative extension program was instituted.

Demonstration stations would also serve to overcome lack of experience of the new irrigation farmers. It is gratifying to note the excellent progress of the P.F.R.A. predevelopment farm at Outlook which will serve both as an experimental unit and a demonstration farm. This could be combined with the settling of experienced irrigation farmers at random through the area, thus making their experience available to the entire neighborhood.

The other problems of irrigation farming (apart from financing the project itself) hinge largely on land policies. Speculation in land and the creation of large holdings must be dealt with by developing strong government policies. Generally speaking, there are two types of land policy which may be employed to insure financial stability and proper utilization of resources. The first would rely on private ownership of land together with comprehensive regulatory devices to control abuses. The second could be based on public purchase and long term leasing or resale provisions. It is possible to pursue either of these alternatives or a combination of the two.

The Saskatchewan government is willing to proceed in any negotiated method of land control either by itself or in conjunction with the Federal government which will avoid the abuses from speculation under private ownership and which will guarantee good land use, in that way protecting the public investment in irrigation development.

#### (ii) *Power Development*

The impounding of South Saskatchewan waters will not only provide for irrigation but make available a large supply of sorely needed hydro-electric power.

The Coteau Creek Dam alone will permit the annual generation of 475 million kilowatt hours of energy (325,000,000 Kw. hrs. firm commercial energy, 100,000,000 Kw. hrs. secondary power and 50,000,000 Kw. hrs. pumping energy). In addition, the excellent river control provided by this dam will directly increase the potential of the proposed Fort a la Corne project by another 100,000,000 kilowatt hours of energy. It is highly likely that other downstream sites will benefit in the same way in the future.

The immediate additional power output which will result from completion of the Central Saskatchewan development will, therefore, amount to 575 million kilowatt hours, assuming the probable completion of Fort a la Corne by that time. As an alternative to more expensive types of generation, this large block of energy will be integrated with other generating centres into a provincial grid which must be built up very soon to meet rising demands.

The power made available by the project will have many uses. It will be used to provide pumping power to lift irrigation water. Secondly, it will be used within the project and the area contiguous to it to supply farms and rural communities with power. Thirdly it will be used for increasing domestic and industrial loads, and fourthly, it will be used as an important element in the overall provincial power system.

#### (iii) *Municipal Water Supplies, Recreation, Flood Control and Industrial Development*

These will all be important aspects stemming from the initial construction of the main dam and reservoir, as well as the irrigation project itself.

In dealing with municipal water supply it must be recognized that drought presents a serious problem to urban communities as well as to rural areas. Lack of a proper water supply can effectively limit domestic and industrial expansion, power production and living amenities.

The proposed development would be of significant financial assistance to the Buffalo Pound Lake water supply scheme for Regina, Moose Jaw and other municipalities. The present design of this project calls for pumping of water from the South Saskatchewan River to a canal leading to Buffalo Pound Lake, where it will then be filtered, treated and pumped by pipeline to the cities. Construction of a dam at Coteau Creek will eliminate this pumping. Some pumping equipment will, of course, be purchased immediately.

However, additional pumping equipment required by 1980 and involving a capital expenditure of \$350,000, would be saved by completion of the dam. In addition, annual pumping costs of \$150,000 will be saved. Other municipalities in the Qu'Appelle-Assiniboia River system will also benefit from improved quantity and quality of water supplies.

Vast potential recreational facilities will be possible with the completion of the Central Saskatchewan development. An immense main reservoir with 400 to 500 miles of shoreline will be created. Lake levels of Last Mountain Lake and of the Qu'Appelle Valley Lakes will be restored and maintained, to the lasting benefit of many resorts. These advantages will serve the double purpose of providing more accessible recreation areas for Saskatchewan residents and of attracting a larger tourist trade.

The creation of the large reservoir proposed will also have a marked effect on the flooding problem in Western Canada. The river control provided will contribute materially to the reclamation of lands in the Carrot River Triangle, which are now subject to annual floods.

Finally, considerable industrial development will occur as a result of the development.

The new investment which will result from the project will cause increased expenditures for both consumer and producer goods. This will aid in attracting new industries to Saskatchewan and will encourage expansion of existing facilities. The increased purchasing power and farm investment which will result from greater production will also bring about an increased demand for goods. New processing industries, to process the added production of the area, will be established, and existing industries will be expanded. In addition, manufacturers will find many more factors favourable to the establishment of new industries.

It is essential to note that the industrial effects will be nation-wide in scope not only with respect to food industries, farm supplies industries, fuel industries and others but to the primary industries as well. The mining industry of Nova Scotia, the lumber industry of British Columbia, the packing industry of Ontario and many other industries and areas will feel the impact of the development.

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In the foregoing chapter the actual project and its potential development were outlined. The remainder of this submission will be devoted to discussing the actual impact of the development on the provincial and national economy and largely in terms of the needs of these areas for this project and its products.

### 3. *The Need for Further Stabilization of Saskatchewan Agriculture*

An abnormal degree of instability and insecurity still prevails in the agricultural economy of Saskatchewan. This is due primarily to limited annual rainfall and periodic drought. The high incidence of crop failure is further aggravated by price fluctuations, thus causing an instability and insecurity of income which is much more severe in Saskatchewan than in other provinces. While considerable progress has been made by federal and provincial agencies in developing conservation and reclamation programs we have not yet realized the large scale changes which are required, thus leaving the provincial economy in a dangerously vulnerable position.

What must be done to overcome these deficiencies which are so highly injurious to the economic and social fabric of both the province and the nation? Leaving aside consideration of general national economic and social policies, several possibilities within agriculture present themselves:

- (1) The economy can be diversified and stabilized by irrigation production.
- (2) Individual income can be stabilized, by adjusting the size and use of production units.

In discussing the above problem and its solutions, it may be most useful to deal first with the problem of diversification and, second, with resettlement.

#### (i) DIVERSIFICATION OF PRODUCTION IN SASKATCHEWAN

Our Department is making great efforts towards increasing the production of livestock and livestock products. In this we are supported enthusiastically by a great many farmers who contribute to our extensive program in Municipal Agricultural Committees and District Boards. In spite of this, our present livestock population, excluding horses, remains at about the 1921 or 1922 level. We have, now, including horses and poultry, less than one animal for every 15 acres of cultivated land.

One of the important reasons for our lack of livestock is the uncertain supply of winter feed. Our history as a Department includes a long list of fodder problems, of buying hay and shipping it by rail at tremendous expense to keep cattle alive throughout the winter. In the prairie areas of the provinces grasses and clovers are uncertain low yield crops—without water. Only in better than average years will they produce as much as a ton per acre. Efforts to obtain stands result in a percentage of failures depending on the area and the weather following seeding. As a result most of the cattle in the prairie areas are



wintered on slough hay or on straw. Winters may start in October or late December and end in March or mid-May.

Farmers throughout the prairie parts of Saskatchewan know only too well what a crop failure means when livestock are kept. Our worst experience was in 1937. Between September 1, 1937 and August 31, 1938, more than 450,000 tons of fodder were shipped by governmental agencies—this even after a liquidation of 611,574 cattle for canning purposes at 1-1½ cents per lb. had occurred. In that year alone more than \$3,500,000 was spent in freight moving hay, feed grain and seed.

We hope that this will not happen again—but in each of the years, 1945, 1947, 1948 and 1949, it was necessary to ship hay into Saskatchewan to supply areas that had suffered a failure of hay crops. During that period hay has moved from The Pas, Manitoba to Prince Alberta and Saskatoon, from Brook, Alberta to Moose Jaw and Swift Current, even from the Inter Lake country of Manitoba as far as Saskatoon, with freight charges, as far back as 1948 running to \$10 per ton.

Perhaps it is little wonder that many farmers, in this area, even though they would like to do differently, refuse to accept the risk of keeping livestock. That they have done so is illustrated by a cattle population in Census Division 11, which contains a large part of the project, of 51,000 cattle as compared to populations of 75,000 and 90,000 cattle in Census Divisions 9 and 10 respectively.

The Saskatchewan Government has viewed this matter of recurring fodder shortages as one of our major production problems. We have established a Conservation and Development Branch to bring into production every acre of irrigable land as quickly as possible. We have undertaken very sizable expenditures to reclaim clay land for fodder production, accepting the fact that yields are low and uncertain. We have undertaken to accumulate fodder reserves in the hands of the Department even though we recognize that it is extremely expensive and that such reserves can, at best, be totally inadequate to meet a real emergency. We share the cost equally with any municipality or groups that wish to develop an area to grow winter feed. Accepting the fact that fodder production in much of the prairie area is hazardous we have undertaken an all out extension program and have offered assistance in the sale of forage seed to encourage farmers to try to grow more fodder.

None the less, we are today probably even more vulnerable to crop failure and fodder shortages than in 1937. Fifteen years ago we had sizable reserves in the form of straw piles that are now a thing of the past. It is no exaggeration to say that another year such as 1937 would deal our livestock industry and the whole concept of conservation through livestock production a crippling blow which might be effective for decades.

In 1949 a total crop failure (less than three bushels per acre) occurred in about 63 municipalities and L.I.D.'s. A most serious situation was averted only through an intensive campaign, a good hay crop in south-eastern Saskatchewan and south-western Manitoba, the movement of more than 30,000 tons of hay with government assistance, and a reduction in size of many herds in the area. The use of a few thousand tons of hay in our reserves forestalled a major disaster in the late spring of 1948, following a poor hay crop over about one-half of the province. Many farmers within a few miles of the irrigable area of this project carried their cattle through with seed wheat and the old straw roofs of sheds.

\* \* \*

It is apparent, therefore, that little progress can be made towards diversification without considerably more protection against feed deficiencies. The Central Saskatchewan Development provides us with an opportunity to establish sure crop areas, a high yielding area within only a few miles of some 25 municipalities in the heart of a very dry region and within almost 150 miles of our whole crop failure area. This area would provide assured production of fodder, of feed grain and of seed grain. It is completely surrounded by an area of farming land in which production is anything but certain.

#### (ii) ADJUSTMENT OF FARM SIZES—RESETTLEMENT

In the light of production experience and various other factors it has been evident for some decades that the original pattern of settlement in Saskatchewan has resulted in a problem of undersized farm units. Over large areas our farmers have found that they have insufficient land to combine with modern, efficient machinery in order to produce a satisfactory farm income. To counteract this serious condition, slow and painful adjustments have taken place over the years. Since 1911, for instance, improved acreage per farm in Saskatchewan has almost tripled (Table 1).

TABLE 1—Changes in Farm Sizes, Saskatchewan, 1911-1951

Year	Occupied Acreage/Farm	Improved Acreage/Farm
1911	205.7	125.0
1916	353.8	188.7
1921	368.1	200.6
1926	300.1	235.3
1931	407.0	245.8
1936	399.6	236.2
1941	452.3	256.5
1946	472.5	283.7
1951	550.4	346.4

Source: Census of Canada, 1911 to 1951, inclusive.

That this process has been accompanied by great cost in both economic and social terms is evidenced by the huge relief and similar expenditures from 1907 to 1951 (Table 2).

TABLE 2—Financial Assistance to Saskatchewan Farmers 1907-08-1950

Debt adjustment and tax cancellation	\$125,000,000
Relief*	186,500,000
Federal programs**	153,600,000
<b>Total</b>	<b>\$465,100,000</b>

\*—Including relief advances for agricultural assistance and direct relief, 1907-08 to 1940-51. Most of this sum was actually paid out in the decade 1929 to 1939.

\*\*—Including P.F.A.A., P.F.I., and W.A.R., payments, 1939-1950 inclusive.

Source: Statistics Branch, Saskatchewan Department of Agriculture. D.B.S., *Handbook of Agricultural Statistics*, Part II, February, 1952.

Nevertheless, uneconomic farm units still persist in large numbers and present a continuing threat to our economy. Our Department of Agriculture in attacking this problem has stated:

"The average minimum size of farm required for an economic unit in Saskatchewan, even on some of the better soils, is three-quarters of a section. In 1941, two-thirds of Saskatchewan farmers had less land than this minimum. At least one-quarter of these have an urgent need for additional land, to the point where they have an actual problem of resettlement. In other words, there are approximately 20,000 Saskatchewan farmers with an urgent resettlement problem and an additional 40,000 who require additional land to make their present units economic and secure."<sup>1</sup>

<sup>1</sup> Province of Saskatchewan, Department of Agriculture, *The Allocation of Northern Lands*, 1952, p. 2.

I would like to stress here that the problem of lack of sufficient farm acreage is not confined solely to the southwestern or central portion of the province but is also a feature of the pioneer areas in the north where similar settlement errors have been committed. Settlers were moved from the drought areas to those regions only to find themselves faced with years of backbreaking struggle to carve out workable acreages. Their needs for land must receive a high priority.

Although it is difficult to state categorically the desirable size of farms in the various areas of the province, it can safely be assumed that as a bare minimum alternative employment must be found for operators of 10,000 units throughout the province. The need for alternative employment might be avoided by technological, physical or economic changes which would result in a greater population carrying capacity in presently depressed areas. But the scope for such changes is severely limited. More drought resistant crops, higher wheat prices and lower costs of input factors are all rather distant possibilities. A redistribution of land holdings in some very limited areas where excessive land concentration has taken place must also be regarded as similarly remote. Probably some progress could be made by making satisfactory credit available in certain areas but, in the main, the use of this credit would involve purchase of additional land and consequent displacement of some farmers. By and large, therefore, the solution is one of economically resettling a considerable number of Saskatchewan farmers. Such resettlement will permit the absorption of vacated farms, as a means of increasing farm sizes in deficient areas. It is necessary, then, to consider what avenues are available in Saskatchewan to provide for such a resettlement program.

(a) *Irrigation*—The only known irrigation resettlement possibilities of any consequence in Saskatchewan are those of the Central Saskatchewan Development. It is quite apparent that, apart from the South Saskatchewan River, practically all of the streams have already been allocated to existing projects or projects which are in some stage of completion. In fact, shortages in some of the watersheds are preventing complete utilization of some projects. It will be pertinent to review these briefly.

(1) *Small Projects*—In the main, small projects<sup>2</sup> do not permit the establishment of new or additional settlement units. These small projects are limited in their usefulness to stabilizing existing dry land units.

<sup>2</sup> Including dugouts, stock watering dams and individual projects.

- (2) Organized Projects—These range in size from several hundred up to 20,000 acres and are largely located in south-western Saskatchewan. Because of water shortages and soil restrictions, it is expected that a maximum of 120,000 acres will comprise the organized project category. A considerable portion of this acreage has already been developed and settled.
- (3) Special Projects—This category includes major developments in Alberta and Saskatchewan such as the Red Deer Project, the Canada Land Project, St. Mary's Project and the Central Saskatchewan Development. The development of these relatively large projects in Western Canada offers excellent opportunity for resettlement of what are now relatively unproductive farms and will also permit stabilization of farmers within project areas. Use of the projects for resettlement purposes will permit desirable enlargement or change in land use by the use of vacated dry land farms.

The total land area contained in these projects is in the neighbourhood of some 1.4 million acres which would contain approximately 9,000 farms (assuming irrigation farms to be 160 acres in size). However, some allowance must be made for dry land farmers existing now on these irrigation areas and it is quite probable, making this deduction, that only about 5,000 units will be available. Of these available units it is doubtful whether more than 50 per cent or 2,500 farms will be made available to Saskatchewan farmers. In fact, the figure of 50 per cent appears unduly optimistic since the Provincial Government of Alberta will control the St. Mary's and the Red Deer Projects and may not be in a position to offer irrigation farms to Saskatchewan farmers when the needs of Alberta farmers have to be met.

(b) *Northern Settlement.*—Various estimates have been made regarding the amount of land susceptible to settlement in the northern areas of Saskatchewan. These estimates must be modified for purposes of planning resettlement since a portion of the land must be made available to undersized units within the pioneer regions. C. C. Spence makes this adjustment in his estimate,<sup>2</sup> and estimates that 3,000 units are available for resettlement.

While this may seem unduly conservative, it is even more liberal than the estimates of the Provincial Department of Agriculture which states that a maximum of 2,400 new units can be made available in the north.

From this brief survey of settlement possibilities it is clear that every feasible project must be fully

exploited, in order to alleviate the pressure for readjustment of uneconomic farm units in Saskatchewan. Complete development of all foreseeable irrigation or northern settlement schemes can, at best, provide for 5,500 additional units whereas the actual requirement is in the neighbourhood of 10,000 new farms or its equivalent acreage.

The Central Saskatchewan Development presents an excellent opportunity for rehabilitation of depressed and insecure farmers. Furthermore, the vacating of farms in certain arid areas of the province will permit enlargement and stabilization of remaining farms.

### (iii) SUMMARY

I have attempted to touch on two of the major needs of agriculture in Saskatchewan (apart from market and price considerations). There is great need firstly for assured feed supplies to permit increased diversification of the economy through livestock production and, secondly, for new land on which to resettle insecure farmers. Neither of these needs can be adequately filled without the Central Saskatchewan Development. Construction of this project will be a great step forward towards meeting the need for a mature and stable agricultural economy in Saskatchewan. How can we merely calculate in terms of dollars and cents what it might be worth to us. Is it any wonder that the Government of this province is anxious and ready to make its investment in the project—that we are so eager to see it started.

#### 4. *The Need for Hydro-Electric Power in Saskatchewan*

The lack of abundant low cost electric power has limited the economic development of Saskatchewan. Saskatchewan's relatively inferior position is illustrated by the following table which shows that this province ranked eighth in annual per capita electric power consumption in 1951.

The deficiency in electric power is evident throughout the provincial economy. In urban centres the rate of industrialization has been retarded, and in many communities the numerous amenities made possible by availability of abundant electric power are still lacking. In rural areas, and particularly on farms, lack of this and other facilities has had a profound effect on the very structure of rural life. Steps are being taken to correct this situation but the potential demand is many times greater than available generating capacity.

<sup>2</sup> C. C. Spence, *Land Settlement in Western Canada*, "Economic Annalist", May, 1946, p. 40.

TABLE 3—Total and Per Capita Electric Power Consumption in Canada, 1951

	Total	Popu- lation June 1, 1951	Per Capita Con- sump- tion	Rank
	000 Kw. Hrs.			
Canada.....	55,031,924	13,981,329	3,935	
Newfoundland.....	125,607	301,416	347	9
Prince Edward Island.....	23,390	98,429	237	10
Nova Scotia.....	875,330	642,581	1,362	6
New Brunswick.....	716,915	515,697	1,390	5
Quebec.....	24,124,977	4,055,681	5,948	1
Ontario.....	20,571,220	4,597,542	4,474	2
Manitoba.....	2,928,912	776,511	3,772	3
Saskatchewan.....	477,465	831,728	550	8
Alberta.....	1,021,073	939,501	1,087	7
British Columbia.....	4,186,972	1,165,210	3,593	4

Source: D.B.S., *Central Electric Stations*, December, 1951.  
Department of Resources and Development, *Water Power Resources of Canada*, March, 1952.

The following estimates of present and potential loads on the provincial power system have been made:

Year	Load (million kwh)
1949 .....	346
1954 .....	635
1959 .....	1,172
1964 .....	1,764
1969 .....	2,411

Almost eight times the present power will be required by 1970 to meet expected demands. The large block of energy which will be made available by construction of a dam on the South Saskatchewan River near Côteau Creek could, therefore, play a vital role in the future progress of Saskatchewan.

In relating the province's obvious need for economical and abundant electric power to the Central Saskatchewan Development, data on consumption of electric energy in the area adjacent to the Development have been compiled and projected to 1968.

The loads include all consumers in the North Battleford-Saskatoon-Prince Albert system, the Unity-Kindersley system, the Swift Current-Moose Jaw system, and the Cities of Moose Jaw and Regina, together with associated rural loads. The compilation was based on 1949 consumptions and has been extended for urban centres, as well as the rural electrification program, which by 1969 will include approximately

75,000 farms. It may be noted that the actual consumptions for 1950 and 1951 in the Saskatchewan Power Corporation system, (which does not serve the Cities of Moose Jaw and Regina) lie on the projected curve.

The consumption for this adjacent area in 1964 is estimated to be approximately 1,100,000,000 Kw. Hrs. This consumption is the bulk energy delivered to the distribution system in the case of cities, and to the consumer meters in towns, villages, hamlets and rural areas. The addition of system losses increased the required generation by some 20% or to 1,350,000,000 Kw. Hrs. annually.

If the completion date for the Central Saskatchewan Development is assumed to be not earlier than 1964, the required generation in the contiguous area will be approximately 1,350,000,000 Kw. Hrs. or four times the estimate of 325,000,000 Kw. Hrs. of firm output for the project. The Moose Jaw-Regina area alone could absorb the available output.

#### 5. The Need for Increased Food Output in Canada

A major economic and social contribution flowing from the proposed development of the Central Saskatchewan Development will be the significant increase in the production of food and foodstuffs made possible by bringing the lands under irrigation. Output on the 430,000 acres contained within the project area will be increased three or even four-fold. Saskatchewan, however, is already well established as an important surplus producer of certain basic foodstuffs. Hence the potential expansion in output might be regarded as of doubtful economic significance, were it not for the fact that present and future requirements for food at provincial, national and even international levels are likely to absorb the whole of the anticipated increased production. Existing trends suggest more strongly and the continued rising demand for foodstuffs, and particularly for animal products, will provide economic and accessible markets for the full output of the developed project.

The demand for food is based primarily on two major factors,—population and income. The former will indicate total expected consumption determined most realistically by existing patterns of consumption. The latter is closely related to the qualitative aspects of consumption, that is, the kinds of food people eat. In addition to these basic factors are such other influences as international policies, national trade policy, industrialization and urbanization, age distribution, nutritive standards, and so forth. It is not proposed to examine all these ramifications, but rather to consider markets in Canada chiefly from the point of view of future population.

## (i) THE FUTURE CANADIAN FOOD MARKET

Beyond the boundaries of Saskatchewan itself lies a rapidly-growing and accessible market for all manner of foodstuffs. In terms of demands resulting from increased population, the Dominion Bureau of Statistics has projected forecasts of future population size based on data up to the 1911 census.<sup>4</sup> The Bureau's most realistic estimate suggested a Canadian population of approximately thirteen millions by 1951 and fifteen and a half millions by 2001. It is quite obvious from the 1951 Census that a significant error in growth rates had been made since the total Canadian population in 1951 was over fourteen millions. It would seem that the entire trend should be revised, on the basis of a higher fertility rate, to forecast a considerably larger population by 1970 or 2000.

It is of interest to note that similar and even more serious errors in population forecasting were experienced in the United States. These are reported in an article by Professor Joseph S. Davis of Stanford University, dealing with future demands for food.<sup>5</sup>

"Ten months ago the standing official forecast for 1970 was, in round figures, 160 million, and this was the figure commonly used by economists. Six months ago, the revised official forecast indicated that this figure would be reached in 1960. Evidence now available strongly suggests that our true population will reach 160 million during 1955, if not earlier."

Professor Davis relates this unexpected population increase to food needs and asserts that projected food demands should be revised upwards. He declares: "in conjunction with our higher consumption standards, I believe that our demand for milk, meat and other animal products will become such as to put pressure upon our ability to expand the output of these products."

On the basis of developments in Canada and the United States, it would appear reasonable to expect a Canadian population approaching 20 million between 1975 and 2000.

This projection is by no means liberal in view of the statement of Mr. St. Laurent in the House of Commons, recently (Hansard, June 28, 1952, p. 3946). The Prime Minister stated at that time: "This means that at the end of the century there will be no less than 35 million people for whom the country will have to provide agricultural sustenance."

What does this mean in terms of actual food and acreage requirements? An estimate has been prepared

<sup>4</sup> Dominion Bureau of Statistics, *The Future Population of Canada*, Bulletin F-4, 1949.

based on the assumption that current levels of per capita consumption of various foods will be maintained and that relative levels of imports and exports will remain constant. The details are contained in Annex I and only a few figures are quoted here. The following table lists estimated additional acreage requirements to feed a Canadian population of twenty millions.

TABLE 4—Additional Acreage Requirements to Feed a Canadian Population of Twenty Millions

Food	Additional Acreage Requirement ('000 acres)
Butter .....	2,260
Beef and veal .....	3,055
Pork .....	1,500
Fluid Milk .....	2,377
Sugar beets .....	30
Dry beans and peas .....	60
Total	9,882

It is quite obvious from this list that either new agricultural land will be needed or more intensive use of present acreage instituted if we are to feed a population of 20 millions without major reliance on imports for many of our foods. The former possibility does not appear to offer significant opportunities. The era of expanding agricultural acreage experienced on this continent from 1900 to 1930 is now over. Only small areas still await development. Mechanization has already freed large acreages for production of food, but no comparable physical or technological frontier can be foreseen. Canada will thus have to rely on more intensive use of soil resources in the future in order to meet growing requirements for food.

## (ii) SUMMARY

In summary, anticipated population changes in the next twenty-five or thirty years strongly suggest much larger food requirements on the part of the Canadian people. This rising demand can only be met by a significant expansion in total food production and a relatively larger output of meat, milk, vegetables and fruit products, if exports and imports of these particular foodstuffs are to be maintained at present levels.

There is, moreover, a considerable weight of evidence to suggest that the demands for exports of food from Canada is likely to increase at a rate comparable to that within the country. Growing

<sup>5</sup> Joseph S. Davis, "Our Amazing Population Upsurge", *Journal of Farm Economics*, November, 1949.

populations and limited soil resources have made self-evident the basic necessity for increasing total world food output. It is not proposed here to attempt to appraise the economic effectiveness of rising world food demands, since it is contended that the entire increased output of the Central Saskatchewan Development will be absorbed by domestic food requirements. At the same time, the vastly greater needs of the world at large give still greater importance to the potential returns from this major irrigation project.

#### 6. National Benefits

Up to this point in the submission the need for the Central Saskatchewan Development, together with its potential contribution in terms of increased agricultural stability and security, food supply, hydro-electric power, recreational facilities, municipal water supply, flood control and industrial development, have been discussed. It remains to associate this development with the national economy. I propose to do this in two ways. Firstly, the actual contribution to national output will be measured and, secondly, the place of this investment in a national policy will be discussed.

##### (i) INCREASES IN NATIONAL OUTPUT RELATED TO THE CENTRAL SASKATCHEWAN DEVELOPMENT

In the Interim Statement by my Government to the Commission "benefits" were estimated on a basis of direct returns to the irrigation farmer or to power. While this measure is a useful one, in terms of planning individual farm organization and determining repayment ability of irrigation farmers, or in planning power organization and determining its repayment ability, it does not indicate the total impact of increased production on national income. To do this, as is done in measuring national output it is necessary to follow each product through its marketing and processing stages where value is added throughout, arriving finally at the value of the product at the final consumption level. This technique has been applied here. Certain assumptions have been made in order to justify its use and these are contained in Annex II.

##### (a) Increases Related to Agricultural Production.—

In general, additions to national output are measured here by adding the margin between farm and consumer to the farm price. This has been done for six products, wheat, oats, barley, hay, cattle and sugar beets. A composite output for the project as a whole is derived from the average production figures indicated in the alternative types of farm organization presented in Part II.

The following table summarizes the expected contributions to national output from the Central Saskatchewan Development.

TABLE 5—Gross Annual Agricultural Contributions of the Development to National Output

Product	Value	
	Initial Development	Mature Development
	\$	\$
Wheat.....	5,370,000	4,350,000
Barley.....	1,434,375	1,636,875
Oats.....	679,000	742,500
Hay.....	1,188,000	2,160,000
Cattle.....	32,400,000	32,400,000
Sugar beets.....		16,774,080
	41,071,375	57,463,455

This, of course, is a gross contribution since the existing farm in the area are at present producing income. It is necessary to estimate the value of this production under assumptions used above.

TABLE 6—Present Annual Agricultural Contribution of the Project Area to National Output

Product	Value
	\$
Wheat .....	3,580,000
Barley .....	403,200
Oats .....	696,018
Livestock .....	2,241,000
	6,920,218

The net contribution of the project in terms of agricultural products is obtained by taking the difference between the values under irrigation and under present dry land practices. At initial development the net contribution is \$34,151,157 annually; at mature development the net contribution is \$50,543,237 annually.

There are, in addition, other contributions stemming from intensified agricultural production in the area. Not only will increased production of agricultural products from the Development increase national output but increased demand of irrigation farmers for goods and services will also have a considerable effect. Each new farmer will spend about \$4,500 annually for goods and services, (see Part II). For the 1,455

new farms this totals approximately \$6,500,000 added to national output annually. In addition, the existing farm population will increase its expenditure because of more intensive production. In all, about \$10,000,000 will be added annually to national output.

\* \* \* \*

Thus, it may be anticipated that agricultural development on the project will result in the addition of from \$14 to \$67.5 millions annually to national output. That this contribution will be widespread is implicit in the above estimate. Food processing, transportation, implement, fertilizer, and marketing establishments and many others will all feel the impact of these dollars. Tax collections at all levels of government will increase as a direct consequence.

(b) *Increases Related to Power Production.*—This contribution is measured by applying retail prices of power to the expected output from the Coteau Dam. The annual report of the Saskatchewan Power Corporation indicates that the value of power sold in 1951 was approximately three cents per kilowatt hour. Since the output of firm power from the Coteau Creek installation is expected to be 325 million kw. hrs. annually, this output, at present prices, is worth almost \$10 million. This estimate could be extended to include other hydro-electric power made available as a result of the Coteau Dam.

Availability of power will, at the same time, stimulate a great demand for electrical appliances of various kinds and, undoubtedly, the annual investment in these items will be far greater than the annual value of power. It is estimated, for instance, that investment in domestic appliances on an electrified farm approximates \$1,500 today. Added to this is the value of numerous pieces of electrical equipment used in farm production. It is apparent, therefore, that the provision of power will have far-reaching effects on the national economy.

(c) *Summary.*—It may be expected that production of food and power and increased demand for goods and services arising from the Development will add from \$54 to \$77.5 millions to national output annually. This estimate cannot be considered extravagant in view of a number of related contributions which were not evaluated. It is of cardinal importance to note the national impact of this investment. One could note the industries, areas, and people affected for many pages—without exhausting the list. It is also of importance to

note that if the total investment of \$100 millions is spread over the lifetime of the project it is a very small fraction of the anticipated annual contributions to national output. Two essential criteria are thus satisfied. Firstly, the national impact of this investment in Saskatchewan is marked and widespread. Secondly, the investment is a paying proposition.

Can Canada afford to incur the substantial losses to her economy implied in failure to proceed with the project?

(ii) THE CENTRAL SASKATCHEWAN DEVELOPMENT AND NATIONAL POLICY

Having definitely established the feasibility of the Development in engineering and agronomic terms, in terms of provincial and national economic value, in terms of provincial agricultural stability and economic security and in general provincial social terms, there remains the question of the relationship of this project to national policy.

What should this relationship be? It is submitted here that national benefits mean not only dollar returns to the nation from a national investment but social and political returns in terms of national policy and national interest. It is insufficient to argue that national interest in the redistribution of income or in the creation of equal opportunities lies wholly within the field of welfare programs. Equal opportunity in resource development must become a principle of equal force. It is within the context of this principle that we argue for construction of the Central Saskatchewan Development.

It is submitted here that Saskatchewan has been largely by-passed in federal resource development programs since the early days of its settlement despite its wealth of undeveloped resources and actual known projects awaiting development. Reference might be made here to federal investment in the various provinces. This neglect has not escaped public notice. In fact, it might be well to quote the thoughts of Mr. St. Laurent:

"This third project was the South Saskatchewan River Project. This is of particular interest to the central provinces, but it is also of interest to the whole of Canada to have Canada developed in such a manner that there will be no depressed areas in this country.

These three projects (St. Lawrence Seaway, Canso Causeway and South Saskatchewan River Project) appear to fill out the picture, because we

know what huge developments are taking place in British Columbia; we know what huge developments are taking place in Alberta; we know what developments are in prospect in northern Manitoba for the promotion of which authority was given at the last session of parliament to the Canadian National Railways to construct a line of railway. I think all members of this house realize that these projects, though located in particular areas, are of national importance if they are sound and if we can get evidence reasonable men will accept that they constitute a proper investment of the capital of this country." (*Hansard*, June 28, 1952, p. 3945).

Construction of the Central Saskatchewan Development will serve to strengthen and unify our nation. Certain investments of this nature have been made in Saskatchewan in the past and have made valuable contributions to the province and nation but much more must be done if Saskatchewan is to be considered a full partner in a national development policy. Support for the project as a national responsibility is in evidence throughout Canada. No other single project in recent Canadian history has received such consistent and unqualified public support from both western and eastern Canada.

The Federal Government recognizing the national merits of the scheme has already made its commitment. In the same address noted above Mr. St. Laurent stated:

"I hope this Commission will find that the South Saskatchewan project would constitute a proper investment of the amount of capital required to bring it into existence. If it does there will be a commitment by this government, and I am sure there would be a commitment by any government in office, to carry out the project provided there are satisfactory reports...."

\* \* \*

In conclusion, I wish to stress that Saskatchewan has only two rivers as a source of extensive irrigation and power development; the most important being the South Saskatchewan. The people of Saskatchewan have looked hopefully for many years towards the construc-

tion of the Central Saskatchewan Development. We trust that this hope will not be turned to despair. Construction of this great project will provide a tremendous boost to the morale of Saskatchewan people. The people of this province have contributed greatly to the national wealth of Canada and have an undeniable right to an equitable share in the development of our great water resources. They have also experienced great hardship and despair because of the natural and economic handicaps imposed upon them. They have a legitimate right to expect that our national government will recognize these facts and proceed with this long awaited development.

The people of this province are weary of being relegated an inferior position and subjected to criticism for being subsidized by relief measures because of conditions beyond their control. You may be assured that this province will be forever grateful for the benefits made possible by the construction of this project. You may also be assured that nothing else will do more towards renewing confidence in confederation and nationhood on the part of the people of Saskatchewan.

The Government of Saskatchewan urges the Commission to recommend immediate construction of the Central Saskatchewan Development.

#### Annex I

#### ESTIMATE OF FOOD AND ACREAGE REQUIREMENTS OF A CANADIAN POPULATION OF TWENTY MILLIONS

The estimated food requirements of a Canadian population of twenty millions are contained in Table 7, together with an estimated deficit based on present production. It is assumed here:

- (1) that the food consumption pattern will be maintained (This probably biases the emphasis in favor of "non-protective foods");
- (2) that import levels will not change;
- (3) that 1949-50 production levels of the various foods are typical.



TABLE 7—Estimated Supply and Requirements of Food in Canada

Food Groups	Available from Domestic Production, 1949	Per Capita Consumption 1949	Indicated Total Food Requirements Basis 1949 Consumption 13,549,000 Population	Indicated Total Food Requirements Basis 20,000,000 Population	Surplus (+) or Deficit (-) of Supplies Over Domestic Consumption 20,000,000 Population
		lbs.	000,000 lbs.	000,000 lbs.	000,000 lbs.
1. <i>Flour and Cereals</i> .....	15,738 million lbs. (in terms of flour).....	167.7	2,260	3,354	+12,384
2. <i>Potatoes</i> .....	5,352 million lbs.....	211.5	2,866	4,230	+ 1,122
3. <i>Dry Beans and Peas</i> .....	212 million lbs.....	13.6	184	272	- 60
4. <i>Fruit</i> (citrus and tomatoes, etc. fresh, canned, and frozen).....	1,146 million lbs.....	177.4	2,404	3,548	-2,402
5. <i>Vegetables</i> (fresh, canned and frozen).....	1,560 million lbs.....	80.5	1,091	1,610	- 50
6. <i>Oils and Fats</i>					
(a) <i>Lard</i> .....	110 million lbs.....	8.1	123	182	- 72
(b) <i>Butter</i> .....	320 million lbs.....	23.5	326	470	- 150
7. <i>Meat</i>					
(a) <i>Meat</i>					
i. <i>Beef</i> .....	867 million lbs.....	56.5	766	1,130	- 263
ii. <i>Veal</i> .....	124 million lbs.....	9.1	123	182	- 58
iii. <i>Mutton and Lamb</i> .....	44 million lbs.....	3.0	41	60	- 16
iv. <i>Pork</i> .....	911 million lbs.....	59.2	803	1,184	- 273
v. <i>Canned Meats and Edible Offals</i> .....	132 million lbs.....	9.4	127	188	- 54
8. <i>Poultry</i> .....	292 million lbs.....	21.2	287	424	- 132
9. <i>Eggs</i> .....	334 million doz. or 459 million lbs.....	33.5	453	670	- 211
10. <i>Milk</i> (or its equivalent).....	6,476 million lbs.....	474.7	6,476	9,494	-3,018
11. <i>Sugar and Syrups</i>					
(a) <i>Sugar Beets</i> .....	291 million lbs. of sugar equivalent when manufactured.....	15.4	208	308	- 100
(b) <i>Honey</i> .....	31 million lbs.....	2.4	32	48	- 14
(c) <i>Maple Sugar and Syrup</i> .....	23 million lbs.....	1.0	13	20	- 3

Having estimated food deficiencies it is now necessary to translate these into acreage requirements.

ADDITIONAL ACREAGE REQUIRED TO MEET FOOD REQUIREMENTS ASSUMING A POPULATION OF 20 MILLION IN CANADA

1. *Flour and Cereals*—No additional acreage requirements.
2. *Potatoes*—No additional acreage requirements.
3. *Dry Beans and Peas*—The long time average yield per acre of peas and beans in Canada is 17 bushels to the acre. This would indicate that an increase of some 60,000 acres would be required.
4. *Fruit*—Fruit acreages for Canadian crops are not available. However, judging by the huge deficit in supplies over domestic requirements at 20

million population, it might be concluded that the acreage required would approximate three times the present acreage devoted to fruit crop production in Canada.

5. *Vegetables*—The average yield per acre of vegetables in 1950 was 12,470 lbs. Applying this figure to the deficit of 50 million pounds on the assumption of the increase in population, it is estimated that an additional 4,000 acres would be required.
6. *Oils and Fats*—The butter deficit indicated is 150 million pounds or converted to pounds of milk some 3,500 million lbs. of milk equivalent. With an average production of 5,000 lbs. of milk per cow, some 700,000 additional dairy cows would be required. To feed these additional cows would require at average yields,

about 1,750,000 acres of pasture, about 260,000 acres of grain, 75,000 acres of corn for silage and 175,000 acres of hay.

This added production of butter would still only compensate for half of the incipient deficiency in the supply of oils and fats in Canada on the assumption of a 20 million population.

#### 7. Meat—

(i) *Beef and Veal Requirements*—The increase in the production of beef to provide the additional quantities required to feed a population of 20,000,000 would be about 265,000,000 lbs. of beef and 60,000,000 lbs. of veal. During 1951 the average carcass weight of inspected slaughtered beef was 507 lbs. and that of veal was 122 lbs. This would mean that to produce this additional quantity of beef and veal would require an additional 520,000 head of cattle and 475,000 calves, or a total of 975,000 cattle and calves. To feed these additional cattle and calves would require at average yields and in round figures about 2,440,000 acres of pasture, 730,000 acres of grain and 485,000 acres of hay.

(ii) *Pork Requirements*—The deficit in pork supplies over requirements were the population to increase to the 20 million level would be approximately 275,000,000 lbs. With an average dressed weight of 163 lbs. per hog, required additional increase would be equivalent to an increased production of 1,680,000 hogs.

Assuming a production of 1,200 lbs. of grain per acre sufficient to feed 1.12 live hogs the total grain acreage required to feed 1,680,000 hogs would be approximately 1,500,000 acres. No allowance has been made for the additional acreage requirements to meet the deficiencies in the production of canned meats and mutton and lamb.

8. *Poultry*—The increase in acreage required for poultry is quite difficult to estimate. The deficiency in anticipated supplies over requirements is roughly 45% of 1950 production.

9. *Eggs*—Egg production would be required to increase by almost 50 per cent to make up anticipated deficiencies at the assumed population level of 20 million.

10. *Milk*—The increase in the production of milk to provide the additional quantities of fluid milk or its equivalent required to offset the requirements of a population increase would be more than 3,000,000 lbs. annually. With an average production of 5,000 lbs. per cow, some 600,000 additional dairy cows would be required. The feed for these additional cows would require at average yields, about 1,500,000 acres of pasture, about 450,000 acres of grain, 127,000 acres of corn for silage and 300,000 acres of hay.

11. *Sugar Beets*—It would be necessary to increase present sugar beet production in order to make up an anticipated deficiency in sugar production over requirements of 100,000,000 lbs. or 590,000,000 lbs. of sugar beets. The long time average yield per acre of sugar beets in Canada is some 19,200 lbs. Thus, the required additional acreage of sugar beets would be approximately 30,000 acres.

NOTE:—The estimates on additional acreage requirements for beef, pork, milk, and butter deficiencies are projected from calculations made by W. C. Hopper, "Food Consumption in Post-War Canada," *C.S.T.A. Review*, March, 1945 (Canadian Society of Technical Agriculturists, Inc.), Ottawa, pp. 26-35.

TABLE 8—Summary of Additional Food and Acreage Requirements

Food	Additional Requirement	Acreage Requirement
	million lbs.	thousand acres
Dry beans and peas.....	60	60
Fruit.....	2,402	no estimate
Vegetables.....	50	4
Lard.....	72	no estimate
Butter.....	150	2,260
Beef and veal.....	321	3,055
Mutton and lamb.....	16	no estimate
Pork.....	273	1,500
Canned meats and edible offals.....	51	no estimate
Poultry meats.....	132	no estimate
Eggs.....	211	no estimate
Milk.....	3,018	2,377
Sugar beets.....	100	30
Honey.....	14	no estimate
Maple sugar and syrup.....	3	no estimate
Total.....		9,880

## Annex II

## ASSUMPTIONS UNDERLYING THE CALCULATION OF INCREASES IN NATIONAL OUTPUT STEMMING FROM AGRICULTURAL PRODUCTION OF THE CENTRAL SASKATCHEWAN DEVELOPMENT

In the Interim Statement "agricultural benefits" were estimated on a basis of direct returns to the irrigation farmer. While this measure is a useful one it does not indicate the total impact of the increased agricultural production of the project on national income. To do this it is necessary to follow each product through its marketing and processing stages where value is added throughout, arriving finally at the value of the consumption level which represents a component of national output.

In order to apply this technique it is necessary to make certain assumptions. First, it must be assumed that sufficient effective demand for the products exists. This is established in the submission. Secondly, it must be assumed that sufficient capacity exists in the economy so that the new production from the project generated by demand and supply conditions is not merely "substituting" for other types of production. For instance, in a completely and strictly fully-employed economy additions to national income would not be possible since it would be necessary to transfer already fully-employed resources if additional production were to be introduced. It will be demonstrated, however, that this condition does not obtain and, in fact, processing and marketing facilities in existence at present have considerable excess capacity (see Addendum). Furthermore, expected population increase will form the basis, not only for a demand for food but also an adequate labor supply. The general assumption adopted here is that the increased production that is over and above present primary and secondary production can be assumed an addition to national income.

Thirdly, it is necessary to assume that the production, marketing and processing of foods is the best way to utilize the resources involved and in any case that net addition to national output is the difference between the suggested and the *next best* use of the resource. If it is assumed that effective demand for food will exist, then the only alternative to increasing Canadian food production is to import food. Taken by itself, this alternative does not appear promising since the type of foods which the Development will produce is not available in the world market at reasonable price levels. Furthermore, there appear to be some necessity for assured national food production in the world today. Despite these general arguments it is still necessary to establish

some differential between the alternatives in resource use, simply because there are real alternatives available at certain price levels. Unfortunately, the means for doing this are not available and any arbitrary application cannot be justified. A differential can actually be established in the primary phase of production, that is, the difference in output between present dry land and future irrigation output of the resources involved. The same kind of differential is applied in secondary production with the assumption that the resources employed today will be operating more efficiently on the basis of increased volume.

With these basic assumptions in mind, it is possible to proceed with the task of estimating the additions to national output generated on the one hand by demand requirements and on the other by production resulting from the Development. This is done in Part II of these submissions.

## Addendum

## CAPACITY OF FLOUR MILLING AND MEAT PACKING INDUSTRIES IN CANADA

(a) *The Flour Milling Industry.*—In the *Report on the Grain Trade of Canada, 1948-49*, a joint publication of the Dominion Bureau of Statistics and the Board of Grain Commissioners, it is stated that in 1949 the percentage of milling capacity utilized by the flour milling industry of Canada averaged only 67.3 per cent.

(b) *The Meat Packing Industry.*—No similar figure is available as to the rated capacity of the meat packing industry in Canada. However, present indications are that the industry as a whole is operating well under its full capacity potentialities. The Dominion Bureau of Statistics, *Report on the Slaughtering and Meat Packing Industry 1950*, shows a considerable reduction in the number of animals slaughtered in the meat packing industry in 1950 as compared with 1944, when it is assumed the industry was operating at or near full capacity. The number of cattle slaughterings show a drop of 8.37 per cent, sheep and lambs show a reduction of 46.7 per cent, while hogs declined by 47.3 per cent. The overall decrease in the number of animals slaughtered in 1950 as compared with 1944 was approximately 40 per cent.

Much the same conclusion is reached in a publication entitled "*Livestock Marketing in Western Canada*" which was published by the Saskatchewan Department of Co-operation and Co-operative Development in co-operation with the Economics Division of the Federal

Department of Agriculture. On page 80 of the Report attention is drawn to the problem of estimating the capacity of the meat packing industry. The Report gives the following information:

"Some idea of the relationship of recent slaughtering to plant capacity as judged by highest

monthly slaughter during the heavy wartime runs may be seen by an examination (of the following table) which compares numbers of livestock processed in each of the western provinces of the peak months of 1949 with numbers processed in the peak months during the war.

*Inspected Slaughtering of Cattle, Calves, Hogs and Sheep in Western Provinces, Highest Month in 1949 Compared with Highest Month During the War Years*

(Number of Head)

	Cattle		Calves	
	1949	Demonstrated Capacity	1949	Demonstrated Capacity
Manitoba.....	43,030 (Nov.)	71,148 (Nov. '45)	16,697 (Sept.)	17,634 (June '45)
Saskatchewan.....	11,643 (Oct.)	24,423 (Nov. '45)	3,423 (Sept.)	4,055 (Aug. '45)
Alberta.....	24,510 (Nov.)	46,561 (Nov. '45)	9,303 (Sept.)	9,673 (July '45)
British Columbia.....	11,310 (Nov.)	15,513 (Nov. '45)	4,054 (Oct.)	3,444 (Nov. '45)
	Hogs		Sheep and Lambs	
	1949	Demonstrated Capacity	1949	Demonstrated Capacity
Manitoba.....	75,940 (Nov.)	239,269 (Dec. '43)	16,786 (Oct.)	61,270 (Nov. '45)
Saskatchewan.....	39,994 (Dec.)	134,613 (Dec. '43)	3,014 (Oct.)	9,951 (Nov. '45)
Alberta.....	98,335 (Dec.)	247,585 (Mar. '44)	10,092 (Oct.)	17,551 (Nov. '45)
British Columbia.....	27,105 (Nov.)	24,514 (May '45)	10,061 (Oct.)	16,270 (Oct. '45)

In view of the foregoing information, it would be fair to conclude that the meat packing industry today is operating at much less than full capacity.

PART II

September 11, 1952.

Dr. T. H. Hogg,  
Chairman, Royal Commission on  
the South Saskatchewan River Project,  
406 Elgin Building,  
Ottawa, Canada.

Dear Sir:

I have the honour to present a submission to your Commission from the Plant Industry Branch of the Saskatchewan Department of Agriculture.

This submission deals with the potentialities of crop production on the Central Saskatchewan River Project. I trust it will be helpful in the deliberation of the Commission.

Yours very truly,

R. E. McKENZIE,  
Director, Plant Industry Branch.

AGRICULTURAL POTENTIAL OF THE CENTRAL  
SASKATCHEWAN DEVELOPMENT

The fundamental problem of agriculture over the open plains region of Saskatchewan is drought. The history of farming in this province during the past 50 years shows clearly the unstable nature of production. This history is marked with the records of recurring droughts, crop failures, lack of feed reserves for livestock and the expenditure of many millions of dollars for agricultural aid.

One of the solutions to drought and resulting agricultural instability is irrigation development. By building a dam, as proposed at the Coteau site on the Central Saskatchewan River, it will be possible to command nearly half a million acres for irrigation. The best engineering advice available indicates that it is entirely feasible to construct such a dam. It has been stressed that the building of this dam would produce many important benefits. Electric power would be developed for rural electrification and industrial use, stream flow would be regulated, recreational facilities would be provided and municipal water supplies would be improved. However, the most important reason for constructing the dam is to bring water to some half million acres of farming land now subject to drought and in that way to rehabilitate the agricultural of this area as well as surrounding dry land area and thus give greater stability to the whole agricultural economy of Saskatchewan. This brief proposes to show very clearly that the Central Saskatchewan Development is sound from an agricultural standpoint, that it is essential to future Canadian and world food needs and that high production and returns will be obtained.

#### *1. Agronomic Aspects*

The basis of successful irrigation farming in any area is suitable soil types, desirable topography, good water supply and an arid climate with a comparatively long frost-free season.

Approximately 430,000 irrigable acres in the proposed development area have been classified in the three top grades according to suitability for irrigation. A high proportion of these soils are lighter textured and represent the most desirable types from the standpoint of applying water. They will take water readily, provide good sub-surface drainage and are practically free from alkali salts. From a fertility standpoint the soils can be regarded as equal to that of similar soil types in any other irrigated area of Western Canada.

Topographic features of the development area are very favourable to irrigation. The absence of steep slopes or very flat areas and the existing opportunities for natural drainage are all factors which will allow water to be applied efficiently without the danger of waterlogging the soil or the formation of a high water table.

From the standpoint of soils and topography, it cannot be denied that the proposed development area rates very highly. These extremely favourable soil and topographic conditions are a striking contrast to other irrigation projects developed to date in Saskatchewan which have had to be confined principally

to low-lying areas of heavy textured soils containing moderate to heavy concentrations of soluble salts. These soils have presented obvious problems. The proposed Central Saskatchewan River Development is an entirely different picture. Here, for the first time on a large scale, it will be possible to develop irrigation on upland soils of good texture, fertility and topography. There can be no doubt but what high production a permanent type of irrigation agriculture will develop in the area.

With respect to climate, available data have been shown that the mean annual precipitation is too low for anything more than a subsistence type of dryland agriculture. On the other hand, experience has shown that the drier the area, the more highly developed irrigation farming becomes. Planned irrigation practices develop and the farmers count less on rainfall as a factor in crop production.

The mean temperatures and the length of the frost-free period prevailing in the area indicates that much the same kinds of crops as are grown in the irrigated districts of Southern Alberta can be produced in Saskatchewan.

With regard to water supply, studies and records show that there is sufficient available to meet the requirements for a full duty of water on the project.

Thus from an agronomic standpoint, the soil, topographic, climatic and water supply features of the project are equal or superior to any other project yet developed in Western Canada. There is every reason to believe that high crop production will occur and this assumption is being borne out by preliminary results obtained on the Experimental Area on the Pre-Development Farm at Outlook.

#### *2. Agricultural Development*

When land is brought under irrigation on the project and during the first few years of settlement annual crops such as coarse grasses will be grown principally. However, once the land is levelled and ditches properly located, a cropping program based on sound rotational and fertility principles, along with the efficient use of water, will be required to achieve high production and develop a permanent type of agriculture. This will be accomplished in a relatively short time, much sooner than has been the case on older projects. Today, there is an immense fund of knowledge based upon experience, research and experimentation available to the new irrigation farmer. In addition we have the benefit of experience on older projects to assist in avoiding mistakes which have been made in the past and in expediting proper development. Furthermore, considerable experimental data from the work being conducted by

Experimental Farms Service at Outlook, as well as the results from a large-scale, well-planned, practical farm rotation being carried on by the P.F.R.A.'s Pre-Development Farm at Outlook will be available as a guide and demonstration for new settlers. By the time the project comes into operation there will be more sound, practical information available for new irrigation farmers than on any other project developed in Western Canada to date. This fact is one of the most significant but perhaps overlooked features of agricultural development on the Central Saskatchewan project. Coupled with a sound extension program which will be instituted by the Saskatchewan Department of Agriculture, it means that individual farm cropping programs, aimed at realizing and maintaining high production, will be developed in a very short time.

Experience in other irrigated areas has demonstrated clearly that straight grain production cannot be carried on under irrigation at a profitable level. The need for rotations which include forage crops along with the use of fertilizers and manure is essential for maximum production. In a proper rotation in this area a minimum of 50 per cent of the acreage should be devoted to perennial forage crops for hay, pasture or seed production and the remainder used for annual crops such as cereals and the various specialty crops. In the early years of development a forage-cereal, crop-livestock economy is visualized. In later stages some cereal crop production would be replaced by specialty crops such as sugar beets, potatoes and peas, beans and corn for canning.

A new and rapidly developing feature of irrigation farming is the use of seeded pastures. Evidence to date indicates that irrigated pastures can give returns comparable to any known specialty crop. In Washington, irrigated pastures have produced nearly 1,000 pounds of beef per acre. In Utah, dairy cattle have given gross returns on irrigated pasture of over \$200 per acre. In Southern Alberta, the use of irrigated pastures is fast developing as a profitable enterprise for beef and dairy cattle and for sheep. At the Swift Current Experimental Station irrigated pastures carry 11 head of mature sheep per acre, compared to one head for 6 acres on native pastures. In the development area irrigated pastures will undoubtedly assume an important place and will in effect be a specialty crop.

We believe the agricultural development of the Central Saskatchewan area will be based on a livestock economy. Various types of livestock enterprises can be carried on such as (1) farm beef herd (2) the purchase of calves or yearlings in the fall for winter feeding and spring sale, or for winter feeding and summer pasturing

for fall sale (3) dairy herds for fluid milk or cream production (4) farm flocks of sheep (5) hog production, particularly in conjunction with dairying.

### 3. *Expected Production and Returns from a Typical Irrigated Farm in the Central Saskatchewan River Development*

In order to establish what the project will contribute to the national economy in terms of production and revenue, it is proposed to examine the returns which can be expected from a typical irrigated farm in the development area. A typical farm is envisaged as being 160 acres in size of which 144 acres are available for crop production after making allowances for the farmstead, non-irrigable portions and loss from ditches. Two stages of development will be projected, the first being based on a livestock, cereal grain economy and applicable to the initial development stage; the second based on livestock, cereal grain and specialty crop production and applicable to the mature development stage.

At both stages a minimum of 50 per cent of the acreage in forage crops and 50 per cent in annual crops is assumed. These crops are grown in a systematic rotation which includes regular application of fertilizers and manure to maintain fertility.

The livestock enterprise is illustrated in two ways (A) a farm beef herd is maintained (B) calves are bought in the fall, wintered on the farm, and pastured during summer and sold in the fall.

Yield levels assumed envisage good operation and management but are short of the maximum which could be obtained.

The price levels forecast are less than current prices and, based on expected future world food requirements, are considered to be most conservative.

#### (1) ORGANIZATION, PRODUCTION AND COSTS OF A TYPICAL LIVESTOCK-CEREAL CROP FARM, CENTRAL SASKATCHEWAN RIVER PROJECT—INITIAL DEVELOPMENT STAGE

*Cropping Program.*—A 160 acre farm is selected as an average sized unit. On this farm 144 acres are available for cropping. This acreage is divided into 12 fields of 12 acres each for rotation purposes. The remaining 16 acres are taken up by the farmstead, non-irrigable portions and loss through ditches.

*Livestock Program.*—Two examples of livestock enterprises are used. In the (A) enterprise a herd of 26 beef cows is maintained, 23 calves are wintered each year 21 yearlings are sold each year in the fall. All cattle are pastured entirely on the farm.

In the (B) enterprise 70 head of beef calves are purchased in the fall, fed during winter and pastured on the farm in the summer. These are sold in the fall. Sales are based on 67 head, allowing for a mortality of 3 head.

## (A) CROPPING PROGRAM, YIELDS AND PRODUCTION

Crop	Fields	Yields/acre	Total Production
Hay.....	3(36 acres)	2.5 tons	90 tons
Wheat.....	3(36 acres)	35 bu.	1,260 bu.
Oats.....	1(12 acres)	80 bu.	960 bu.
Barley.....	2(24 acres)	50 bu.	1,200 bu.
Pasture.....	3(36 acres)	2 head carrying capacity	

## Hay and Grain Consumed by Livestock

## Livestock Enterprise (A)

Hay—65 tons (surplus 25 tons)  
Oats—295 bus. (surplus 640 bus. excluding seed)  
Barley—295 bus. (surplus 855 bus. excluding seed)

## Livestock Enterprise (B)

Hay—70 tons (surplus 20 tons)  
Oats—960 bus. fed on the farm and used for seed  
Barley—1200 bus. fed on the farm and used for seed

(B) INCOME AND EXPENDITURE SUMMARY  
Income

Livestock Enterprise (A)		Livestock Enterprise (B)
\$		\$
1,375 00	Wheat—1,100 bus. @ \$1.25	1,375 00
769 50	Barley—855 bus. @ 90c.....	
320 00	Oats—960 bus. @ 50c.....	
500 00	Hay—25 tons @ \$20.00.....	
	20 tons @ \$20.00.....	400 00
3,024 00	Cattle—(A) 21 x 900 @ 16c.....	
	(B) 67 x 900 @ 16c.....	9,648 00
Total 5,988 50		11,423 00

## Expenditures

Livestock Enterprise (A)		Livestock Enterprise (B)
\$ cts.		\$ cts.
1,350 00	Total machinery cost—15% of \$9,000.....	1,350 00
300 00	Gas, oil and grease.....	300 00
100 00	Taxes.....	100 00
800 00	Hired Labour.....	800 00
350 00	Threshing.....	350 00
350 00	Buildings, fences etc. 7% of \$5,000.....	350 00
80 00	Fertilizer.....	80 00
156 00	Servicing costs.....	
300 00	Miscellaneous supplies.....	300 00
	Purchase of calves 325 lbs. x 18c. x 70.....	4,095 00
3,786 00		7,725 00
2,202 50	Gross returns.....	3,698 00
1,000 00	Living costs.....	1,000 00
1,202 50	Return to Irrigation.....	2,698 00
7 62	Per Acre Return to Irrigation....	16 88

## (ii) ORGANIZATION, PRODUCTION AND COSTS OF A TYPICAL LIVESTOCK AND SPECIALTY CROP FARM—CENTRAL SASKATCHEWAN RIVER PROJECT—MATURE DEVELOPMENT STAGE.

*Cropping Program*—The same sized farm unit as was selected for the initial development stage will be used in this budget estimate. The rotation is the same with the exception that one field of wheat is replaced by 12 acres devoted to a specialty crop. For the purpose of illustration, sugar beets are selected although the specialty crop could conceivably be potatoes, peas, beans or corn.

*Livestock Program*—Returns are based on the same two types of livestock enterprises used for the initial development stage.

## (A) CROPPING PROGRAM, YIELDS AND PRODUCTION

Crop	Fields	Yields/acre*	Total Production
Hay.....	3(36 acres)	3.0 tons	108 tons
Wheat.....	2(24 acres)	40 bus.	900 bus.
Oats.....	1(12 acres)	85 bus.	1,020 bus.
Barley.....	2(24 acres)	55 bus.	1,320 bus.
Sugar beets.....	1(12 acres)	13 tons	156 tons
Pasture.....	3(36 acres)	2 head carrying capacity	

\* A slightly higher level of yields is assumed in the mature development because of previous rotation of crops and continued use of manure and fertilizer over a period of years.

*Hay and Grain Consumed by Livestock*

## Livestock Enterprise (A)

Hay—65 tons (surplus 43 tons)  
Oats—295 bus. (surplus 700 bus. excluding seed)  
Barley—295 bus. (surplus 975 bus. excluding seed)

## Livestock Enterprise (B)

Hay—70 tons (surplus 32 tons)  
Oats—1,020 bus. fed on the farm and used for seed  
Barley—1,320 bus. fed on farm and used for seed

(B) INCOME AND EXPENDITURE SUMMARY  
*Income*

Livestock Enterprise (A)		Livestock Enterprise (B)
\$ cts.		\$ cts.
1,125 00	Wheat—900 bus. @ \$1.25.....	1,125 00
350 00	Oats—700 bus. @ 50c.....	
877 50	Barley—975 bus. @ 90c.....	
860 00	Hay—43 tons @ 120.00.....	
	33 tons @ \$20.00.....	760 00
2,184 00	Sugar beets—156 tons @ \$14.00.....	2,184 00
3,024 00	Cattle—(A) 21 x 900 @ 16c.....	
	(B) 67 x 900 @ 16c.....	9,648 00
Total 8,420 50		13,717 00

*Expenditures*

Livestock Enterprise (A)		Livestock Enterprise (B)
\$ cts.		\$ cts.
1,800 00	Total machinery cost—15% of \$12,000.....	1,800 00
300 00	Gas, oil and grease.....	300 00
100 00	Taxes.....	100 00
800 00	Hired Labour.....	800 00
350 00	Threshing.....	350 00
350 00	Buildings, fences, etc., 7% of \$5,000.....	350 00
120 00	Fertilizer.....	120 00
156 00	Servicing costs.....	
300 00	Miscellaneous supplies.....	300 00
1,500 00	Cost of producing sugar beets (12 x 125.00).....	1,500 00
	Purchase of calves 325 lbs. x 18c. x 70.....	4,095 00
5,776 00		9,871 00
2,644 50	Gross returns.....	4,002 00
1,000 00	Living costs.....	1,000 00
1,644 50	Return to Irrigation.....	3,002 00
10 28	Per Acre Return to Irrigation.....	18 76

The budget estimates presented for two types of livestock enterprises in the initial and mature development stages represent returns to irrigation which can be readily realized on this project. The yields assumed are modest, the prices are conservative. It is realized that the two types of livestock enterprise illustrated cannot be universally applied. If the farmer is to purchase calves in the fall, he would be required to make a fairly large capital outlay. Not all would be able to do so. This problem could be partly overcome by co-operative credit financing. At the same time, the availability of supply of calves might place some limitation on the extent to which this enterprise could be followed, and thus, beef production on many farms would be along the lines of the farm beef herd. Alternative farm livestock enterprises, producing similar or slightly higher returns, would be sheep and dairy production.

In regard to specialty crop production in the mature development phase, while sugar beets are used for illustrative purpose they would not necessarily be grown over the entire project. Other specialty crops will no doubt be grown. The returns from sugar beets as given in the budget is used to illustrate the approximate returns from specialty crops.

On this basis it may be expected that irrigated land on the Central Saskatchewan River Development will produce a return to irrigation of between \$7 and \$16 per acre in the initial development stages, with the figure of \$10 per acre as an average value.

In the mature development stage the project can be expected to return between \$10 and \$18 per acre to irrigation with \$14 per acre as an average value.

On the basis of 430,000 acres under irrigation the project can be expected to return over \$4,000,000 annually to irrigation in the initial development phase and slightly over \$6,000,000 annually in the mature development phase.

## (iii) CONTRIBUTIONS OF THE CENTRAL SASKATCHEWAN DEVELOPMENT TO NATIONAL AGRICULTURAL PRODUCTION

By projecting the budget estimates of yields over the entire project it is possible to arrive at the major contributions, in terms of production which the development will make to the Canadian agricultural economy. This will be done for six products: wheat, oats, barley, hay, specialty crops and livestock.



## Royal Commission on South Saskatchewan River

**Wheat.**—In the initial development stage the project will produce 1,100 bushels of wheat for sale per farm or a total of nearly 3 million bushels. Using the 1951 export price of \$1.79 per bushel for No. 3 Northern wheat, the value of wheat production would be \$5,370,000.

In the mature development stage less wheat would be produced; some 2,430,000 bushels which, on the above valuation would be worth \$1,350,000.

**Barley.**—On the basis that well over half the barley produced on the project would be fed to livestock, an average of 425 bushels per farm in the initial development phase and 485 bushels in the mature development stage would be available for sale, or a total production of 1,147,500 bushels and 1,309,500 bushels.

Assuming the 1951 export price of No. 1 feed barley at \$1.25 per bushel, the value of barley production would be \$1,431,375 and \$1,636,875, for the two development stages.

**Oats.**—Assuming again that well over half the oats produced would be fed on farms, about 320 and 350 bushels per farm or a total of 861,000 bushels in the initial development stage and 915,000 bushels at the mature development stage would be available for sale. The value of production using the 1951 export price of 78.6 cents per bushel for No. 1 feed oats would be \$679,000 and \$742,500 respectively.

**Hay.**—The surplus production of hay in the initial development stage would amount to an average of about 22 tons per farm and 40 tons in the mature development stage. The total amount of surplus hay would be 59,400 tons and 108,000 tons, which at a value of \$20 per ton would be worth \$1,188,000 and \$2,160,000.

**Specialty Crops.**—In the mature development stage 12 acres per farm will be devoted to specialty crops. Using sugar beets as an example with an average yield of 13 tons per acre, the project would produce 421,200 tons of sugar beets. Assuming 16 per cent sugar content this tonnage would yield 151,784,000 pounds of sugar. At a retail price of 12 cents per pound the value of production would be \$16,174,080.

**Livestock.**—Beef production would vary from 20,700 lbs. per farm, assuming a farm beef herd, to 38,525 when calves are purchased and fed for a year. Based on a nearly equal division between these two types of enter-

prises, a per farm beef production of 30,000 lbs. is indicated. Assuming a farm selling price of 24 cents which is 60 per cent of retail value, a price of 40 cents is used to calculate the value of livestock production. For the project this would amount to \$31,104,000.

### SUMMARY

#### ANNUAL CONTRIBUTION TO NATIONAL OUTPUT FROM THE CENTRAL SASKATCHEWAN RIVER DEVELOPMENT

	Initial Development Phase	Mature Development Phase
	\$	\$
Wheat.....	5,370,000	4,350,000
Barley.....	1,431,375	1,636,875
Oats.....	679,000	742,500
Hay.....	1,188,000	2,160,000
Specialty Crops.....		16,174,080
Livestock.....	32,400,000	32,400,000
Total.....	41,071,375	57,463,455
Per Farm.....	15,211	21,282

The above amounts must be considered a gross contribution from which it is necessary to subtract the present value of production of the area under dryland conditions.

On the basis of 1,245 farms, averaging 382 acres of cultivated land, a total dryland acreage of 475,590 is indicated, roughly comparable to 2,700 irrigated farms averaging 160 acres in size for a total acreage of 432,000.

At least a third of this acreage would be in summer-fallow each year, leaving 288,000 acres for crop production. At present this cropped acreage is devoted mainly to cereal production; 70 per cent in wheat, 16 per cent in oats, 8 per cent in barley and the remaining 6 per cent in other grains and feed crops. Livestock numbers are few and marketings of about 5 head per year are indicated. Production is estimated as follows:

	Acreage	Yield	Total Production
Wheat.....	201,600	11 bus.	2,217,600 bus.
Oats.....	46,080	22 bus.	1,013,760 bus.
Barley.....	23,010	17 bus.	391,680 bus.
Hay.....	17,280	1 ton	17,280 tons
Livestock.....			6,225 head

*Value of Production\**

(Less feed and seed requirements)

Wheat	..... 2,000,000 bus. @ \$1.79	= \$3,580,000
Oats	..... 885,520 bus. @ 78¢	= 690,018
Barley	..... 322,500 bus. @ \$1.25	= 403,200
Hay	..... No surplus	
Livestock	..... 6,225 x 300 lbs. @ 40¢	= 2,241,000
	Total.....	\$6,020,218
	Per Farm (1,245 farms).....	\$ 5,558

\* Based on 1951 prices as used for irrigated farms.

*Net Annual Contributions of the Central Saskatchewan River Project to National Agricultural Production*

Initial Development Stage.....	\$34,151,157
Mature Development Stage.....	\$50,513,337

*4. Food and the Central Saskatchewan River Development*

There is much evidence to show that there is little reason to look back at food surpluses and low relative prices for food products, as a guide to what may happen in the future.

The era of expanding agricultural acreage that continued from 1900 to 1930 in North America is now over and only small areas still await development. Mechanization has since freed large acreages (estimated at about 65 million in the United States) for production of human food. No similar frontier can be foreseen for the next 2 or 3 decades at least.

Populations continue to increase. The following table sets out population statistics in Canada's major customers countries since 1931:

	1931	1941	1951
Canada .....	10,377,000	11,507,000	14,000,000
United States ...	123,043,000	132,638,000	150,161,000
Great Britain ....	44,795,000	46,467,000	50,363,000
Total.....	178,815,000	190,612,000	214,533,000

It seems likely that an era of considerable economic expansion, sparked by discoveries of oil, natural gas, iron ore and uranium as well as by a mounting requirement for food, is in store for Canada. A forecast of well over 20 million people in Canada by 1971 is not optimistic. If the rate of growth and development experienced during the past decade were to continue, and there is every indication it will, this figure will be reached easily.

Regarding forecast of population in the United States, Joseph S. Davis of Stanford University, in an article, "Our Amazing Population Upsurge", *Journal of Farm Economics*, November 1949, had his to say:

"Ten months ago the standing official forecast for 1970 was, in round figures, 160 million, and this was the figure commonly used by economists. Six months ago, the revised official forecast indicated that this figure would be reached in 1960. Evidence now available strongly suggests that our true population will reach 160 million during 1955, if not earlier."

In discussing future food requirements he went on to say—

"In conjunction with our higher consumption standards, I believe that our demand for milk, meat and other animal products will become such as to put pressure upon our ability to expand the output of these products."

It may be assumed that Great Britain has reached a static point in population but it is at a considerably higher level than during the thirties. However, F.A.O. estimates that since 1936 world population has increased by thirteen per cent. In the *Demographic Year Book of the United Nations Statistical Office* it is estimated that world population since 1920 has been increasing at just under one per cent per year. As against this F.A.O. estimated that production of principal food crops in both 1951 and 1952 would be only about nine per cent above the 1931-1938 average.<sup>6</sup>

Income is also a major factor in determining demand for food. It has an important bearing on the kinds of food required. Again there appears to be justification for assuming that food products will in the future enjoy a more favourable price relationship.

Furthermore, with increased mechanization of farms, production costs have become fixed. In addition the services which rural people now require and which are now in effect cannot be supported by the land without good prices for the products produced.

Governments, generally, indicate a determination to prevent the drastic declines in incomes that have occurred in the past. In addition, governments in Canada, the United States and Great Britain have introduced various measures that will tend to offset depression effects. In Canada, for example, family allowances, universal old age pensions, unemployment insurance and other measures would alleviate the effects of depression.

In balancing agricultural benefits of the Central Saskatchewan Project against escalated construction costs, it seems only fair to assume corresponding increases in future prices for agricultural products; and

<sup>6</sup> S. C. Hudson, *Economic Annalist*, No. XXII, Feb. 1, 1952.

most unrealistic to assess the value of production in terms of prices that have prevailed during the past forty or fifty years. These prices were established during a period that witnessed an increase in improved land acreage between 1901 and 1950 of about 160,000,000 acres in the United States and Canada. The same period also witnessed a revolution in the techniques of agricultural production. It resulted in freeing, for human food production, about two-thirds of the acreage required to maintain a population of horses and mules which reached a total of almost 30 million in the United States and Canada in 1920-21.

Requirements for food will inevitably increase in view of population increases, the industrial expansion taking place in Canada and the role that food now plays in international affairs. There seems ample justification for assuming that:

- (a) There is a need for expanding food production.
- (b) Agricultural products will command higher prices during the next 20-50 years than they did during the past 50 years.
- (c) The Central Saskatchewan River Development will play a vital role in meeting the increased demand for food in addition to making a substantial contribution to national income.

#### 5. Summary

As a means of alleviating the serious effects of drought over a wide area of Southern Saskatchewan, it is submitted that the proposed development offers an opportunity and a challenge to the Canadian people to make the best use of our two most important natural resources—soil and water.

In terms of agricultural production the project will result in a vastly increased food output, particularly of animal products, in addition to saving various assistance and relief expenditures, supplying a reservoir of assured feed and seed production for the drought areas and stabilizing the economy of the province by providing a sure crop area.

Considering only the 430,000 irrigable acres within the project area, the number of farms will be more than doubled and production will be three to four times greater. Hay yields will be increased from an uncertain  $\frac{1}{2}$  ton per acre to an assured 3 tons per acre. Instead of 12 acres required to pasture a cow,  $\frac{1}{2}$  to  $\frac{3}{4}$  of an acre will be enough. In terms of beef, 500 lbs. per acre will be produced compared to 40 lbs. at present. Summerfallow which occupies over  $\frac{1}{3}$  of the acreage will disappear and various types of specialty crops will be grown as well as significant amounts of grains for livestock feed.

On the basis of a conservative valuation of production, the project can be expected to return to irrigation over \$4,000,000 annually in the initial development stage and over \$6,000,000 annually in the mature development stage.

In terms of national production the project is expected to contribute thirty-four million dollars annually in the initial development stage and fifty million dollars annually in the mature development stage over present dry land returns.

The large volume of food which the project is capable of producing will be urgently needed in view of expanding world and national food requirements.

As a national investment the Central Saskatchewan River Development is vital to Canada and should be proceeded with immediately.

### PART III

September 11, 1952.

Dr. T. H. Hogg,  
Chairman,  
Royal Commission on the South  
Saskatchewan River Project,  
406 Elgin Building,  
Ottawa, Ontario.

Dear Sir:

I have the honour to present herewith a Submission of the Industrial Development Office of the Province of Saskatchewan to your Commission.

Your Commission will undoubtedly consider the local and national industrial benefits arising from the Central Saskatchewan Development and it is hoped that this brief will be of assistance in this regard.

Yours sincerely,

D. H. F. BLACK,  
Director,  
Saskatchewan Industrial  
Development Office.

### INDUSTRIAL DEVELOPMENT

As the South Saskatchewan River Project is designed primarily to assist the agricultural industry through the provision of irrigation facilities, the most substantial benefits accruing from this project will take the form of stabilizing and rendering more prosperous the agricultural industry of the development area and other areas of the province.

However, the benefits resulting from the construction of the South Saskatchewan dam will not by any means be limited to the agricultural industry, but will also result in important developments in the fields of industry and commerce, and of tourism.

While the most important benefits will accrue following the completion of the dam and the putting into operation of the irrigation facilities made possible by the dam's construction, benefits to industry and commerce in Saskatchewan, as well as in Canada generally, will become immediately apparent upon the commencement of construction of the dam. Some of these benefits might be listed briefly as follows:

1. Purchase of materials and supplies.
2. Purchases of machinery.
3. Provision of employment for hundreds or possibly thousands of Saskatchewan citizens,
4. Development of a reasonably large community at the dam location providing employment in the construction of houses and at the same time supplementing services to the farming community in the district.

It is difficult to assess accurately what proportion of the expenditure of something over \$100,000,000 will result in increased economic and business activity in the province of Saskatchewan, but it may be assumed that a large proportion of the total capital costs will be spent in this province and will result in considerably more business activity within the province than would be represented by the actual financial outlay for the project itself.

In addition, substantial economic benefits would accrue to eastern Canada, which would supply the larger proportion of the millions of dollars of machinery and other supplies required to construct the dam.

Although many of the benefits accruing during the period of construction of the dam would be of a transitory nature, the actual operation of constructing the dam with the industrial and commercial activity which such construction would create, would effect some changes in the economic life of the province which would continue on after the date of completion of the dam. These would include the manufacturing establishments set up in the province to manufacture certain materials and supplies for construction. In addition, a new community would have been established at the site of the dam.

More important are the developments which would take place following and as a result of the construction of the dam. These might be listed as follows:

1. Services for an expanding community,

2. Manufacturing establishments to process vegetable and animal products,
3. Other industry utilizing power and water facilities at the dam site.

#### 1. Services for an Expanding Community

Completion of the project will result not only in doubling of the farm population of the development area, but should result in a more than equal increase in that segment of the population servicing the needs of the farming community and including those engaged in industry, commerce, and in the professions including machine shops, wholesale and retail establishments, doctors, dentists, teachers, etc. Inasmuch as the farm lands in the development area now produce lower than normal yields in terms of provincial averages, it is reasonable to assume that aside from partially subsidized services such as education and public health, the service facilities in the area fall below the normal for the province, as an area acquires only those facilities which it can afford.

It is not illogical to conclude, therefore, that the economic activity of the area in terms of service industry, commerce and professional services, will quadruple as a result of the construction of the dam for the following reasons:

1. It is estimated that the farm population itself will double,
2. As the earning capacity of each separate farm unit will be greater than at the present time, the expendable surplus or the purchasing power of each unit will be considerably greater,
3. As the operations of the farms themselves will involve greater mechanization with increased operating costs, not only per acre of land, but also per farm unit, the area will need and be able to support a substantially greater service industry,
4. The development of processing and other industries in the area, with increased population which such activity entails, will result in still further increases in the service requirements of the district.

It is very difficult to accurately assess the extent of increase in service activities in the area, but we understand that the experience of communities in the province of Alberta which have been provided with irrigation facilities, amply justifies the approximate estimate of expansion referred to above.

### 2. Processing Industries

There is little doubt that the completion of this project will immediately result in the establishment of innumerable factories for the processing of vegetable and animal products which will be produced in the area. Again we would refer to the developments which have already taken place in the province of Alberta in irrigated regions, and suggest that a similar, if not greater, development will take place in Saskatchewan.

As most of the produce of an irrigated area is perishable by nature, it must be processed within the economic area. Plants would undoubtedly be constructed to can the many vegetable products which would be produced, such as beans, peas, tomatoes, corn, etc. By the same token it is very likely that a large sugar beet refining plant would be established in the area. Increased production of livestock would in turn result in increased industrial activity in the province, serving to increase the productivity of presently existing meat packing plants in the province and undoubtedly resulting in the establishment of additional plants. It should be recognized that the production of packing plants in any area depends not so much upon the market for their products, but rather upon the supply of animals available for slaughtering.

In addition we should look forward to the establishment of a milk canning plant in the area. Consideration has been given from time to time by national milk canning concerns to the establishment of branch plants in western Canada, and although there is more than an ample market for such a plant on the prairies alone, the establishment of such a plant or plants has been postponed due to the fact that the availability of raw milk in any concentrated area is marginal only, and might not provide sufficient assurance of availability of raw materials to an expanding industry. With the concentration of farming in the development area, linked with an important trend towards dairy farming, the marginal aspects of availability of raw material should disappear.

### 3. Other Industries

The completion of the project will make available two very important industrial facilities which are conditions precedent to the establishment of many important industries, namely, cheap hydro electric power and abundant sources of industrial water. The lack of these two important facilities has been the principal cause for the failure of a number of industries seeking establishment in Saskatchewan communities. With a continuation of discoveries of oil and natural gas in the area contiguous to the development area, and probably within the area itself, additional

incentives will exist for the establishment of industry based on the use of oil and natural gas as fuels and raw materials.

### 4. Tourism

One of the most interesting developments which should take place, not only from the point of view of economics, but also from the point of view of social benefits, would take the form of the development of an important tourist industry. It is true that Saskatchewan is blessed with a number of beautiful vacation playgrounds, principally north of Prince Albert, as well as at a number of locations in the southern portion of the province. It is equally true to say, however, that the northland is accessible to only a very small proportion of the citizens of the province, by reason of its distance from the majority of the province, together with the time required and cost involved in vacationing in this area.

Vacation facilities do exist in the southern portion of the province, but these are relatively few in number and again, accessible to only a portion of the population.

With the creation of a lake having a shoreline some 400 to 450 miles long, we can look forward to the creation of a new oasis available equally to the residents of the southwest and west central portions of the province, as well as to the residents of the cities of Regina, Saskatoon, and Moose Jaw and intermediate farming communities.

Based on patterns already developed in the province, we could also expect a substantial influx of tourists from the United States, impelled by a desire to travel to a foreign land in search of clear, fresh waters well stocked with fish.

### 5. Conclusions

The completion of the project would result, not only in the physical developments referred to above, but would have an immeasurable stabilizing effect upon the economy of the province, making it less dependent upon its one crop source of revenue, dependent as it is upon national and international factors. Furthermore, it would have a very decided stimulating effect at this period of the province's industrial development, giving encouragement to our own industrialists to expand their present facilities, and providing a greater advantage to outside capital to establish their plants in an expanding province:

## PART IV

## SASKATCHEWAN POWER CORPORATION

September 11, 1952.

Dr. T. H. Hogg,  
Chairman,  
Royal Commission on the  
South Saskatchewan River Project,  
Ottawa, Canada.

Dear Sir:

The Saskatchewan Power Corporation, as the provincial authority responsible for meeting the growing demands for electric power throughout the province of Saskatchewan, is vitally concerned with the power aspects of the South Saskatchewan scheme.

Not being blessed with natural hydro-electric power sites, we are continuously seeking new power sources especially those which would tend to reduce the overall cost of power.

The load growth on the Saskatchewan Power Corporation system during the last four years has been at the rate of 20% per year compounded. Even with this recent increase (doubling in four years) the per capita consumption in Saskatchewan in 1951 was still very low compared with other provinces, being half that of Alberta and one seventh that of Manitoba. The greater consumptions in Manitoba and Alberta with the attendant economic benefits, are in proportion to the availability of low cost hydro power.

During the past five years the Saskatchewan Power Corporation has been building a high tension network to bring lower cost central station power from large steam plants to areas formerly served by higher cost diesel plants. These high tension lines are designed suitable for higher voltages to carry future loads. Further reduction in power costs will depend upon the efficient use of the high tension network and the development of lower cost power sources.

The Saskatchewan Power Corporation presents herewith a brief to show that the power from the South Saskatchewan River Project could be effectively integrated with the Provincial Power System, thereby substantially reducing the overall cost of electric power to the consumers of Saskatchewan.

Yours truly,

(sgd) J. W. TOMLINSON, B.Sc., E.E., P. ENG., M.E.I.C.,  
General Manager, Saskatchewan Power Corporation.

W. B. CLIPSHAM, B.A.Sc., P. ENG., M.E.I.C.,  
Chief Engineer, Saskatchewan Power Corporation.

## INTEGRATION AND VALUE OF HYDRO-ELECTRIC POWER

1. *Integration of the Hydro-Electric Power with the Provincial Power System*

Present planning for the proposed Central Saskatchewan Development calls for an initial generating capacity of 100,000 Kw. (134,000 H.P.) with provision for additional generating units for an ultimate installed capacity of 150,000 to 175,000 Kw. (200,000 to 234,000 H.P.). This planning is based on estimates by the Prairie Farm Rehabilitation Administration indicating the availability of 325,000,000 Kw. Hrs. of firm commercial energy, 50,000,000 Kw. Hrs. of firm energy for irrigation pumping, and 100,000,000 Kw. Hrs. of secondary energy.

The power plant will be connected to the provincial high tension transmission system and will be operated in conjunction with steam-electric generating stations in the Northern portion of the system and the proposed hydro-electric generating station at Fort a la Corne. The ample water storage facilities to be provided by the Coteau Creek dam will permit great flexibility in the use of the available water, so that the power output can be delivered at times and in quantities most suitable to the efficient operation of the whole system. As will be demonstrated below, the available energy can be utilized with the initial 100,000 Kw. of installed capacity. However, as the system load increases, more installed capacity will be required to supply demands over peak load periods. The installation of additional generating units at the Central Saskatchewan Development from time to time up to a total of 150,000 to 175,000 Kw. will provide the necessary peak load capacity at minimum system cost.

By the time the Central Saskatchewan Development can be brought into production (assumed for this study to be in the latter part of 1963) the contiguous system demand is estimated at 220,000 Kw. and energy requirements of some 800,000,000 Kw. Hrs. There will be available at Fort a la Corne 96,000 Kw. of installed capacity and 598,000,000 Kw. Hrs. There will be steam-electric capacity of 125,000 Kw., which will provide the balance of energy requirements. The Central Saskatchewan Development will have an initial installed capacity of 100,000 Kw. and energy of 325,000,000 Kw. Hrs. available for integration with the then existing plants.

TABLE 1.—Generating capacity and Peak and Energy Allocation for Interconnected Northern Saskatchewan System

Year	System Requirements			Fort a la Corne			
	Peak Kw. x 1000	Kw. Hr. x 10 <sup>6</sup>	Load Factor	Installed Capacity Kw. x 1000	Peak Demand Kw. x 1000	Kw. Hr. x 10 <sup>6</sup>	Load Factor
			%				%
1962.....	210	790	42.8	96	96	584	69.4
1964.....	240	917	43.5	96	96	598	71.0
1966.....	270	1,060	44.8	96	96	598	71.0
1968.....	300	1,200	45.0	96	96	598	71.0
1970.....	330	1,320	45.0	128	128	598	53.0
1972.....	364	1,452	45.0	128	128	598	53.0
1974.....	401	1,600	45.0	160	160	598	42.5
1976.....	441	1,760	45.0	160	160	598	42.5
1978.....	486	1,936	45.0	160	160	598	42.5
1980.....	535	2,130	45.0	160	160	598	42.5
1982.....	588	2,315	45.0	160	160	598	42.5

Year	Steam Electric				Central Saskatchewan Development					
	Installed Capacity Kw. x 1000	Peak Demand Kw. x 1000	Kw. Hr. x 10 <sup>6</sup>	Load Factor	Reserve Capacity Kw. x 1000	Installed Capacity Kw. x 1000	Peak Demand Kw.	Kw. Hr. x 10 <sup>6</sup>	Load Factor	Total Installed Capacity In Reserve
				%					%	%
1962.....	125	114	206	20.6	11					
1964.....	125	44	107	27.8	81	100	100	212	24.2	25.2
1966.....	125	74	175	28.0	51	100	100	287	32.6	15.9
1968.....	150	104	277	30.4	46	100	100	325	37.0	13.3
1970.....	150	102	397	44.4	48	100	100	325	37.0	12.7
1972.....	175	136	529	44.3	39	100	100	325	37.0	9.7
1974.....	200	141	677	51.7	59	100	100	325	37.0	12.8
1976.....	225	181	837	52.8	44	100	100	325	37.0	8.9
1978.....	250	201	1,013	57.6	49	125	125	325	29.6	9.2
1980.....	275	225	1,207	61.3	50	150	150	325	24.7	8.5
1982.....	300	253	1,422	61.3	47	175	175	325	21.1	7.4

Table 1 shows how the annual peak and energy requirements can be allocated between hydraulic and steam plants in 1962, and how the Central Saskatchewan Development can be integrated with these in subsequent years. Operation of the Coteau Creek plant will result in the immediate reduction of active steam plant capacity of 44,000 Kw., leaving 81,000 Kw. of capacity as system reserve for emergent use and for load growth. Additional generating units at Fort a la Corne in 1970 and 1974, and additional steam-electric capacity in 1968, 1972, 1974 and 1976 would be necessary to supply peak load and increased energy requirements.

In 1978, 1980 and 1982 the increase in demand and energy requirements could be met by both steam-electric and hydro-electric installations, the former to supply growth in energy, the latter to supplement the former in providing the necessary peak capacity. The hydro installation would be at Coteau Creek.

It will be noted from Table 1 that the full amount of available energy at Coteau Creek was not utilized until 1968. The difference represents the accumulated surplus of monthly availables at Coteau Creek which were not utilized during the high flow periods at Fort a la Corne, owing to rigid adherence in this study to the

monthly allocations shown on Table 2. In practice these surpluses could be utilized in subsequent months, or the water could be applied to filling the storage reservoir, since it is unlikely that the reservoir will be completely filled by the time the generating plant is ready for service.

The difference in installed capital cost of steam-electric and hydro-electric units in favour of the latter would make economic the increases in hydro-electric capacity to meet peak demands when sufficient energy is available from steam-electric plants. The steam plants would operate at higher load factors, resulting in lower generating cost per energy unit. Increasing the installed capacity of hydro-electric plants, with no increase in total hydro-electric energy, would increase the cost per energy unit. In general, this process could be continued until the costs per unit were equal, or until a limit was reached owing to water storage capacity, or downstream flow conditions. Coteau Creek plant, with its large pondage, is well suited to operation as a peak load station.

TABLE 2—Monthly Allocation of Hydro Electric Energy

	Fort a la Corne	South Saskatchewan River Project
	Kw. Hr.	Kw. Hr.
January.....	28,600,000	29,300,000
February.....	26,000,000	25,400,000
March.....	30,300,000	27,000,000
April.....	53,200,000	24,800,000
May.....	65,700,000	25,000,000
June.....	61,500,000	24,200,000
July.....	63,600,000	24,400,000
August.....	64,300,000	25,800,000
September.....	63,800,000	25,900,000
October.....	66,700,000	20,000,000
November.....	45,200,000	30,200,000
December.....	29,500,000	34,000,000
Total.....	598,400,000	325,000,000

Fort a la Corne—Monthly allocation of energy as in supplement to the 1931 report on Power Development by H. G. Acres for an installed capacity of 96,000 Kw.

Central Saskatchewan Development—Monthly allocation of energy based on the system distribution of energy per month.

Table 1 illustrates the distribution of peak and energy between plants on annual basis. The variation in demand from day to day and from hour to hour will affect the optimum allocation of load between plants.

The accompanying charts will serve to illustrate the ability of the installations to share the peak and energy requirements of typical daily load curves.

Figure 1A represents a load curve for the peak day in December, 1964, and would be representative of the year's peak. The steam plants would carry a base load of 44,000 Kw. (44 Mw.) at 100 per cent load factor. The Central Saskatchewan Development would supply the balance of demand between 0 and 7:00 hours, and would supply 76,000 Kw. (76 Mw.) continuously from 7:00 to 23:40 hours, except during the period between 16:40 and 18:40 hours when additional output up to the capacity of the station would be utilized to carry the peak load. The Fort a la Corne plant would be operated between 7:00 and 23:40 hours to carry the load variation up to its maximum capacity. The available water for the day would be fully utilized at both hydraulic plants, and the steam plant would operate at maximum efficiency.

The high river flows at mid-year would enable the Fort a la Corne plant to operate on base load. On a peak day in June, 1964, as illustrated by Figure 1B, Fort a la Corne could carry the bulk of the energy required for the day, with Coteau Creek plant carrying the variation during the peak period. No steam-electric generation would be required. Surplus water at the Central Saskatchewan Development could be stored for use during low flow periods.

By 1982 the steam plants would be required to supply the greater part of the energy and would operate continuously at high load factors. The available water would be utilized in the hydraulic plants to fill in the heavily loaded portions of the day. Figure 2A indicates that for the peak day in December, 1982, an installed capacity of 175,000 Kw. (175 Mw.) could be utilized with advantage. The energy requirements from the Central Saskatchewan Development for the peak day are in excess of the daily average for the month. Figure 2B indicates how water can be stored on off peak days by using minimum water from the Development and making up the energy requirements from the steam-electric plants.

Figure 2C illustrates again for June, 1982, the practicability of operating Fort a la Corne on base load during the high flow period, and the storage of water at the Central Saskatchewan Development for later use.

It would be noted that in the above discussion new installations were referred to as occurring in specified years. Actually these installations will be required when loads reach the values shown. The time scale applies only if the actual load growth agrees with the estimated growth.



2. *Annual Value of the Central Saskatchewan Development Power to the Saskatchewan Power Corporation*

The value of this hydro power is determined by the cost of steam-electric power. For a large steam-electric station the cost has been estimated at 7.5 mills per Kw. Hr. The estimated cost of extra transmission lines and associated losses for the hydro plant is approximately 2 mills per Kw. Hr. The firm hydro power is thus worth 5.5 mills per Kw. Hr. The non-reliable or secondary energy is worth 3 mills (fuel cost less transmission losses) on account of steam plant capacity required for dry periods.

Taking the firm energy at 325,000,000 Kw. Hrs. and the secondary energy at 100,000,000 Kw. Hrs. annually, the annual savings are:

Income		
325,000,000 Kw. Hrs. at 5.5 mills—	\$1,788,000	
100,000,000 Kw. Hrs. at 3.0 mills=	300,000	\$2,088,000
<i>Costs (on a capital investment of ten millions)</i>		
Interest at 4 per cent .....	\$ 400,000	
Depreciation at 2 per cent .....	200,000	
Maintenance and operation at 2.5		
per cent .....	250,000	
Contingencies at .5 per cent ....	50,000	\$ 900,000
Annual Saving .....		\$1,188,000

The irrigation pumping energy of 50,000,000 Kw. Hrs. annually has not been included in the above since it has been specifically reserved for pumping purposes. Initially, and in wet years, the total of 50,000,000 Kw. Hrs. may not be required for pumping. Whereas energy allotted to pumping and not required might be considered as secondary commercial energy, it could only be valued as such if utilized. Since its use would follow full utilization of the above mentioned 100,000,000 Kw. Hrs. of secondary energy, and the ability of the system to absorb large amounts of secondary energy would be limited, particularly in the early years, the value of the unused pumping energy is somewhat debatable and has not been included above.

Additional savings would also be realized from the increased power available from hydro installation downstream from the Central Saskatchewan Development due to the regulated flow. Fort à la Corne would be the only plant from which savings would be realized immediately since it appears probable that it would be completed before the Development. Some of this energy can be utilized without any additional installation so that it could be valued at 5.5 mills per Kw. Hr. The remainder would require additional installed capacity and would be valued at 3 mills per Kw. Hr., i.e.,

5.5 mills less fixed charges on the required installation. Assuming that 50 per cent of the 100,000,000 Kw. Hrs. is recoverable without additional installations, the additional saving would be:

50,000,000 Kw. Hrs. at 5.5 mills=	\$275,000.00
50,000,000 Kw. Hrs. at 3.0 mills=	150,000.00
	<hr/>
Total=	\$425,000.00

*Conclusions*

1. The Central Saskatchewan Development will provide pondage and flows sufficient for the operation of a hydro-electric generating station with an initial installed capacity of 100,000 Kw., and an ultimate capacity of 150,000 to 175,000 Kw., when integrated with other generating plants on a large inter-connected transmission system. The installed capacity is not limited by the available supply of water, but by the ability of the system to absorb the available energy to best advantage in competition with other sources.

2. With a 100,000 Kw. or larger station, there is adequate installed capacity to provide for 31,000 Kw. of irrigation pumping load during the summer months (see Figures 1B and 2C).

3. Secondary energy which may be available in years of higher flows can be generated during off peak hours with equivalent reduction in steam-electric energy and without increasing the installed capacity.

4. Economically the hydro installation at the Coteau Creek dam appears sound with an indicated annual saving over steam-electric generation of \$1,188,000 and indirectly resulting in an additional annual saving of \$125,000 from Fort à la Corne. Electric energy in Saskatchewan is costly in comparison with provinces having hydro-electric power, resulting in an economic disadvantage to the population of Saskatchewan which has the third lowest consumption per capita in Canada. This disadvantage would be reduced by the development of hydro-electric energy sources within the province.

5. The efficient integration of the hydro-electric energy with the generating facilities in the northern part of the S.P.C. system is demonstrated. The central location of the Central Saskatchewan Development lends itself to integration with the southern portion of the system should such prove advantageous, and is likewise well situated for integration with the system as a whole. It is, therefore, adaptable to trends in load growth which may favour one portion of the whole system more than another.

TABLE 3.—1951 Monthly Distribution of Peak Demand and Energy

Month	% Energy Distribution	% of December Peak	% L.F.
January .....	9.02	89.3	51.3
February .....	7.84	82.2	51.8
March .....	8.30	72.4	56.4
April .....	7.03	63.2	61.1
May .....	7.08	63.5	59.0
June .....	7.45	62.2	60.8
July .....	7.50	61.5	59.8
August .....	7.93	66.0	61.5
September .....	7.95	65.4	61.5
October .....	8.91	80.5	50.5
November .....	9.32	95.0	49.7
December .....	10.00	100.0	51.4
	100.00		

## Annex I

## PROCEDURE IN PLOTTING TYPICAL DAILY LOAD AND ENERGY

The monthly distribution of peak demand and energy, expressed in per cent, for the S.P.C. system for the year 1951 is shown on Table 3. It is assumed that this distribution will apply to subsequent years to a reasonable degree.

The monthly allocation of energy from the proposed Fort a la Corne hydro-electric plant, as determined by H. G. Acres and Company (1916 Supplement to 1931 Report) is shown on Table 2, together with an allocation of available annual energy from the Central Saskatchewan Development based on the 1951 distribution experience. The balance of monthly energy required in any year would be made up with steam electric generation.

A comparison of available hydro-electric energy in months of low water flows with energy requirements indicates that December represents the critical month with respect to the ratio of hydro-electric energy to system requirements. Therefore, from an analysis of the daily load curves during the peak month of December, a load duration curve can be derived to show the number of hours during which a given peak load is equalled or exceeded. From this curve, the graph shown in Figure 4 is derived, which shows the percentage of the total energy for the month which there will be in any given percentage of the maximum or peak demand; e.g., the top 20% of the peak would represent less than 2% of the energy for the month.

A similar graph for the peak day in December is shown in Figure 3.

The required installed capacity for the Central Saskatchewan Development can be determined from the December peak and energy requirements and reference to the peak percentage curve for December shown in Figure 4.

Thus for 1961, the system peak (Table 1) is 240,000 Kw. Assuming 100,000 Kw. installed capacity at Coteau Creek for trial, plus 96,000 Kw. capacity at Fort a la Corne, the total installed hydro-electric capacity is 196,000 Kw., which is 81.7% of the system peak. From Figure 4, 81.7% of the peak represents 63% of the energy requirements for the month, or 60,500,000 Kw. Hrs. Reference to Table 3 indicates that 29,500,000 plus 31,000,000 equals 60,500,000 Kw. Hrs. of hydro energy is available, which is adequate to supply the above requirement of 60,500,000 Kw. Hrs. Had the available hydro energy been less than the requirement, it would indicate that the installed capacities were larger than could be fully utilized.

To plot a daily chart such as Figure 1A, the peak for the day (in this case the annual peak) is known in magnitude and is plotted at 100%. The shape of the curve is taken from current experience. The peak percentage curve on Figure 3 was derived from such a daily load curve.

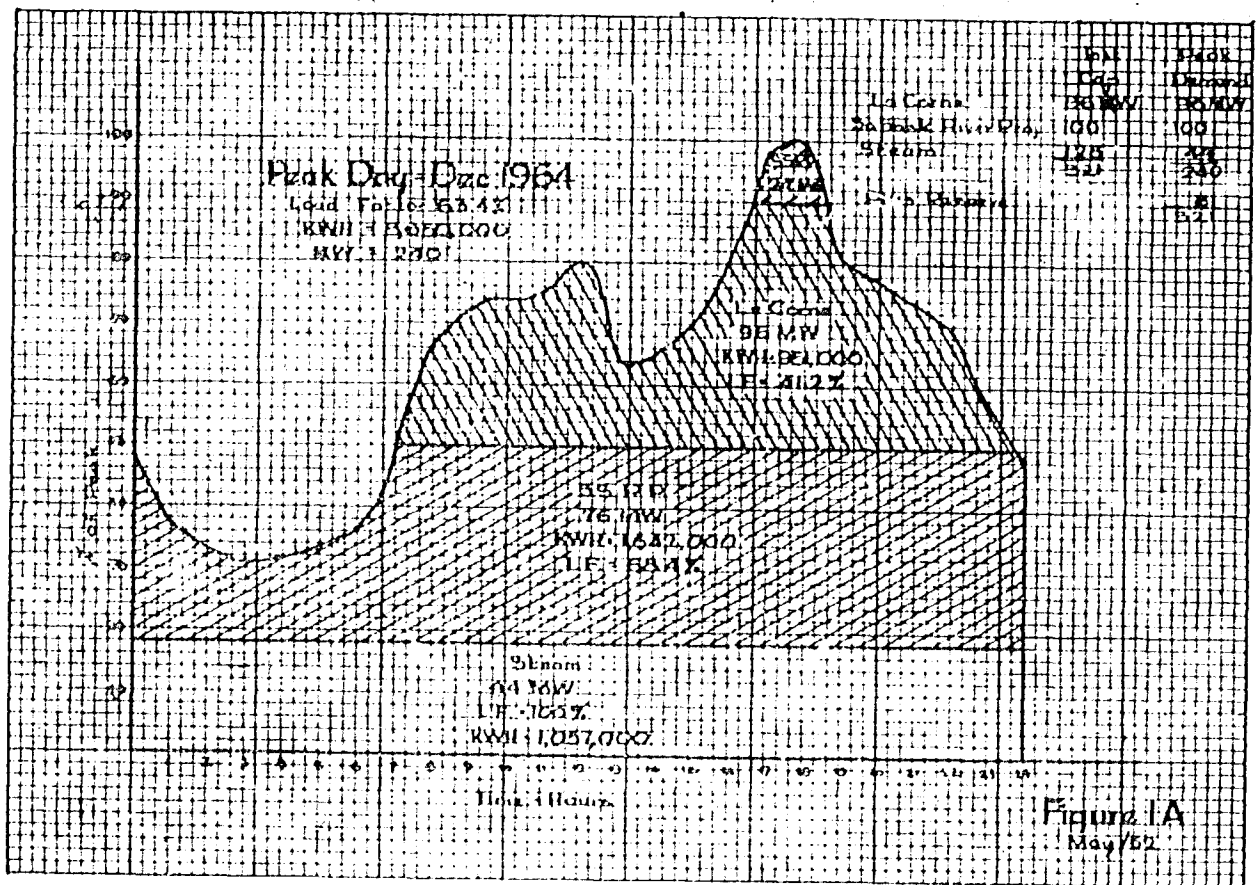
The peak carried by each of the hydro plants and the steam plant had already been established when the installed capacity of the plant was determined.

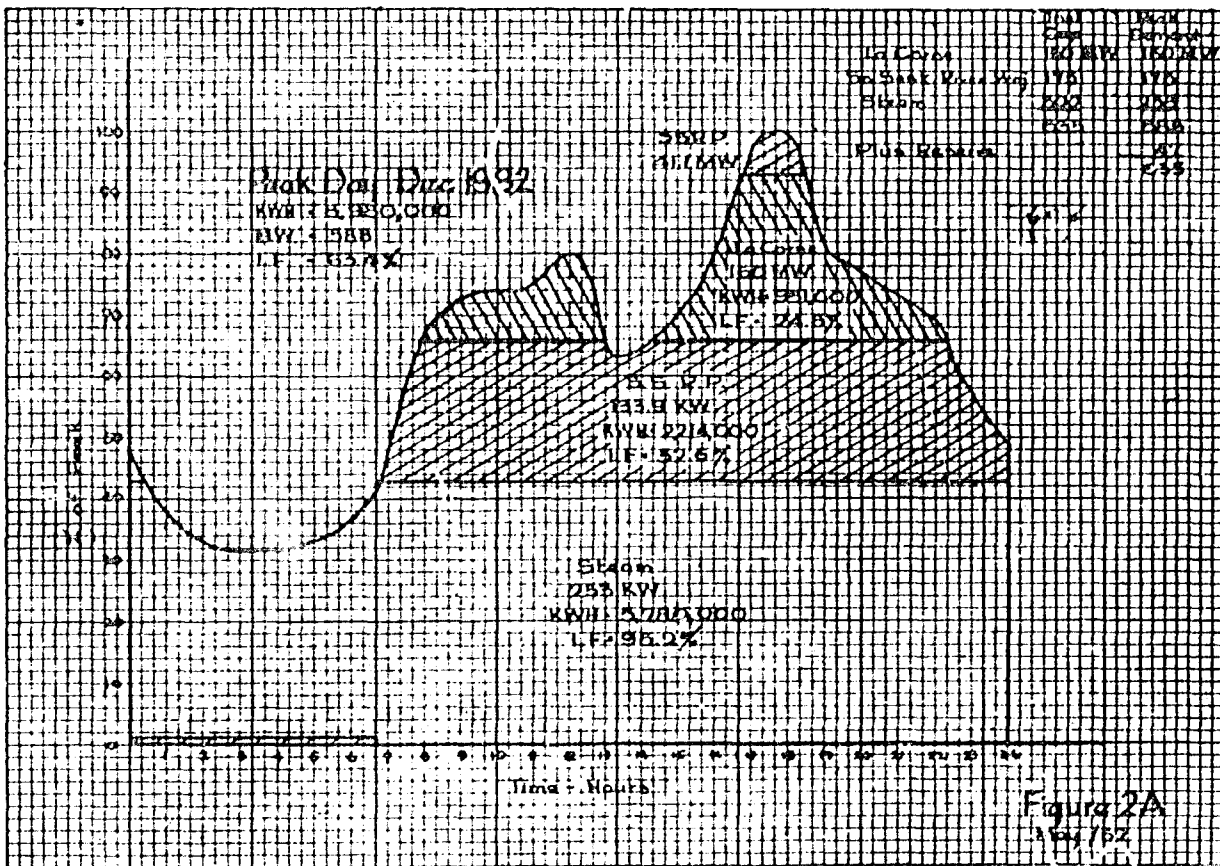
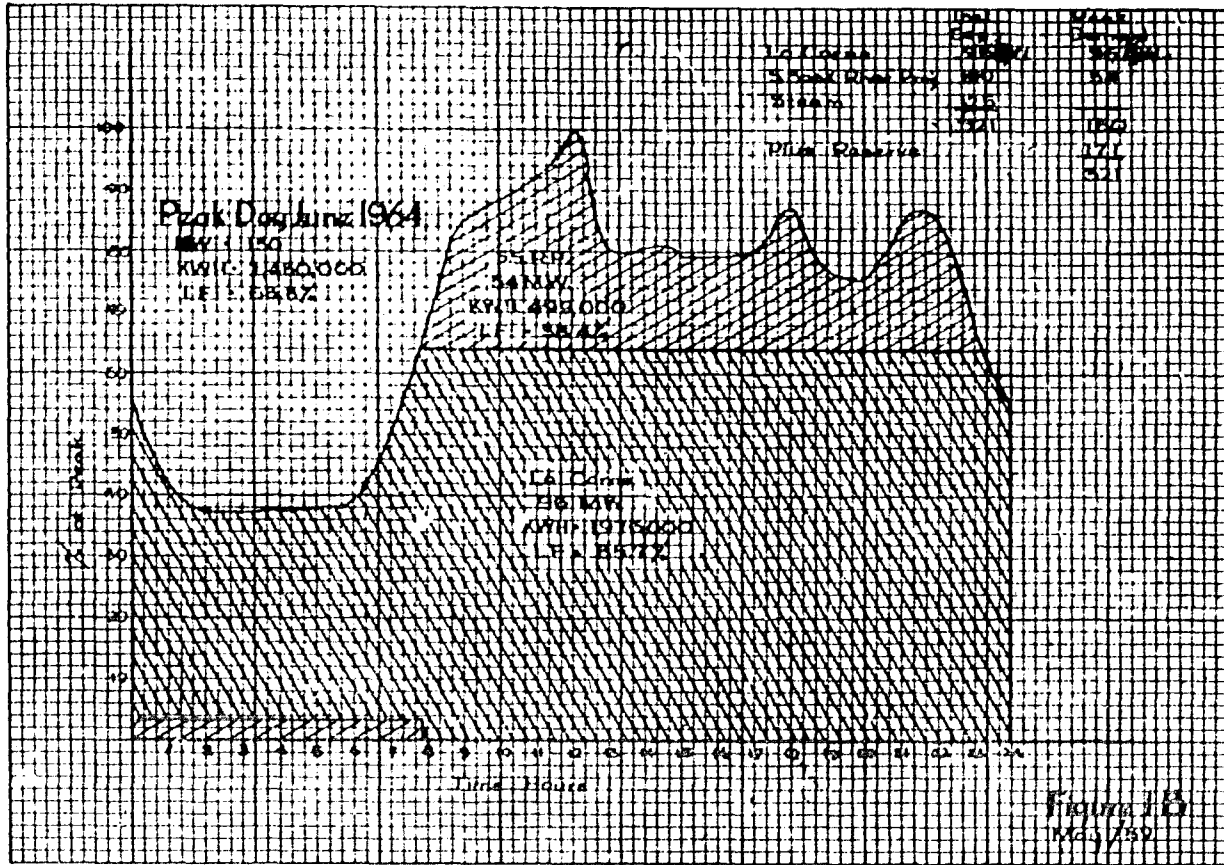
The 44,000 Kw. of steam was put on base load. Assuming that the energy available from Fort a la Corne in any one day was equal to the monthly average of 950,000 Kw. Hrs. a day in December, by trial and error and using Figure 3, the output of Fort a la Corne was fitted into the daily load curve. The Development then had to supply the remaining energy which, for Figure 1A, amounted to 1,612,000 Kw. Hrs. This is more than average daily Kw. Hrs. available for the month of December, but on off peak days assuming approximately the same output from both Fort a la Corne and the steam plant, very little energy would be required from the Coteau Creek plant. In this way the full capacity of the project can be utilized on peak days during low flows. The allocation of energy for a peak day in December, 1952, shown on Figure 2A, was made similarly.

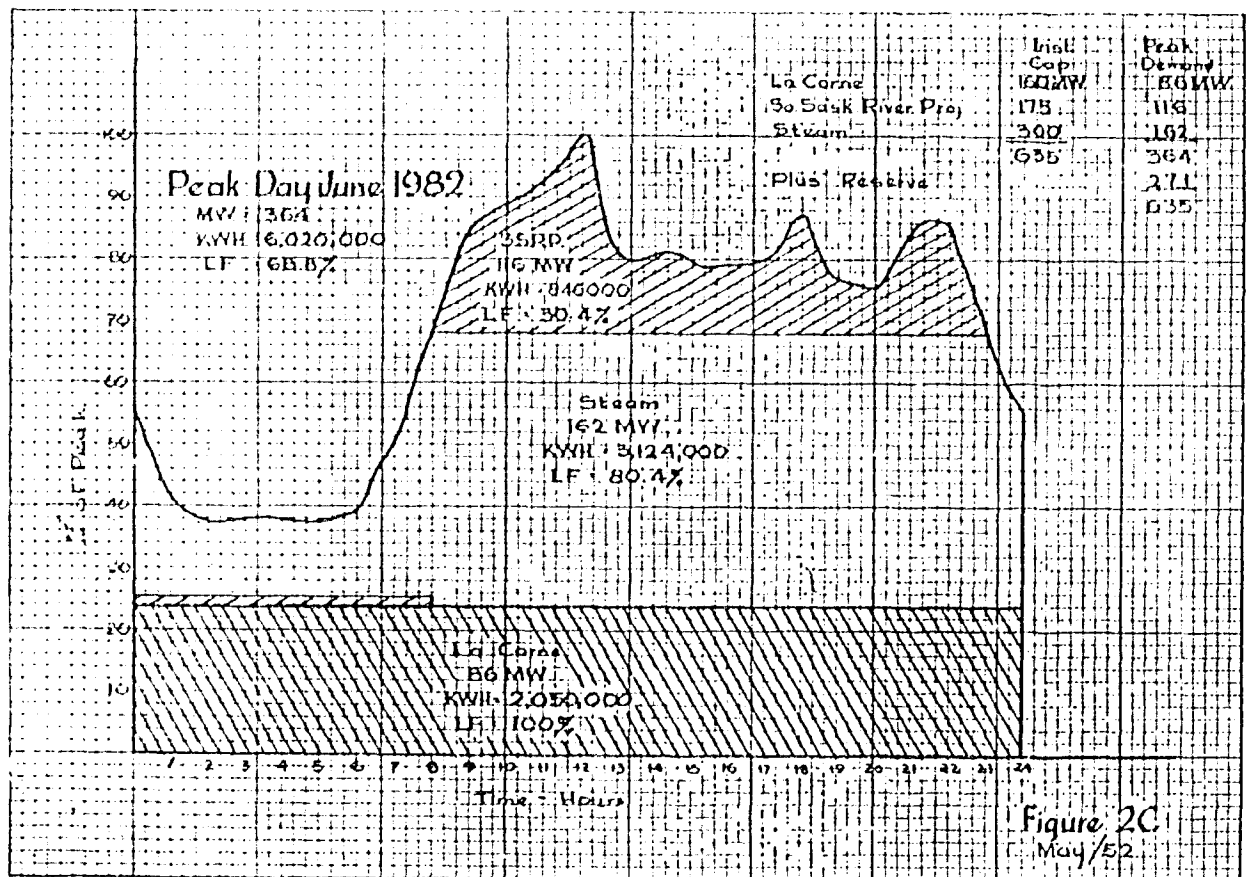
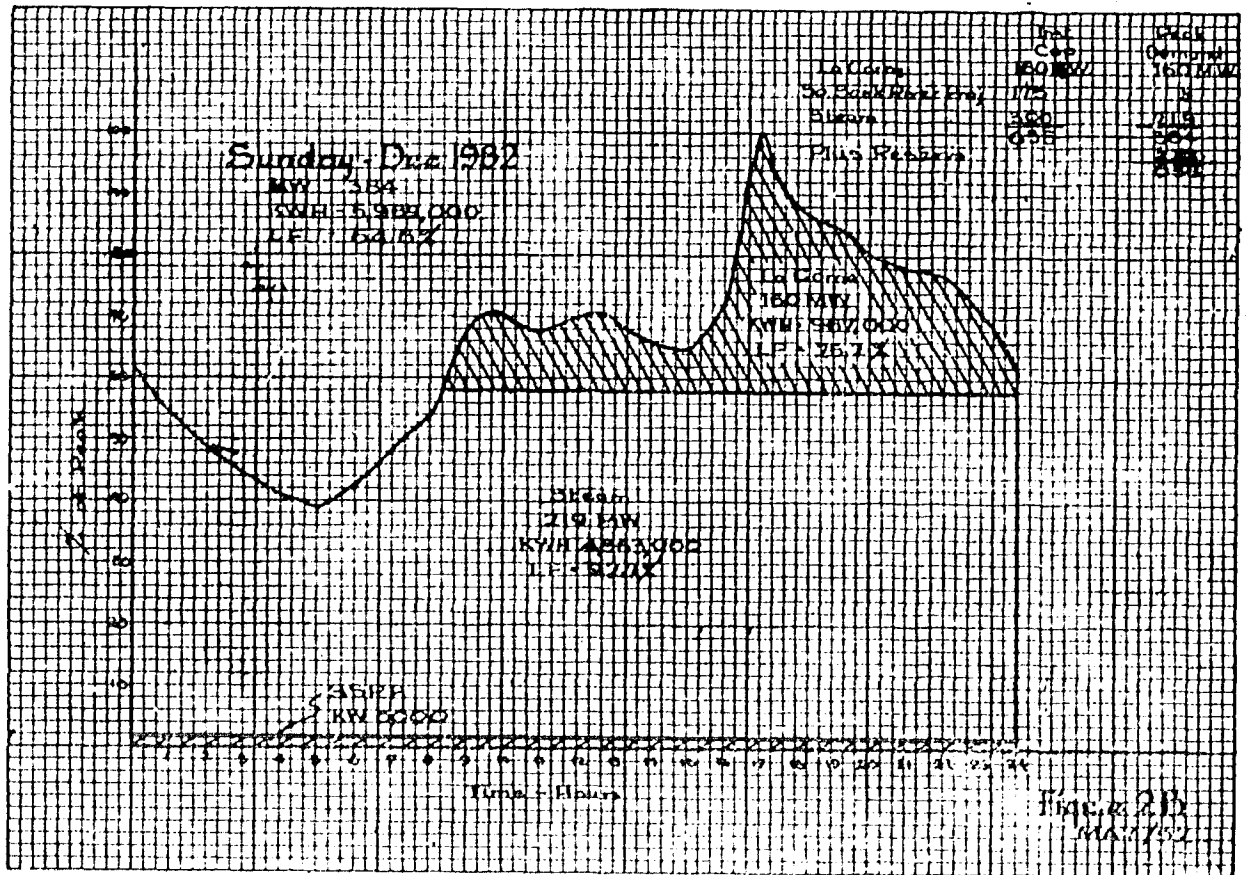
During high flow months the procedure was changed somewhat in that Fort a la Corne was put on base load, rather than the steam plant. This meant that the full installed capacity of the plant could not be utilized in later years with the assumption as to the monthly energy available. However, during flood season, water which would otherwise be spilled

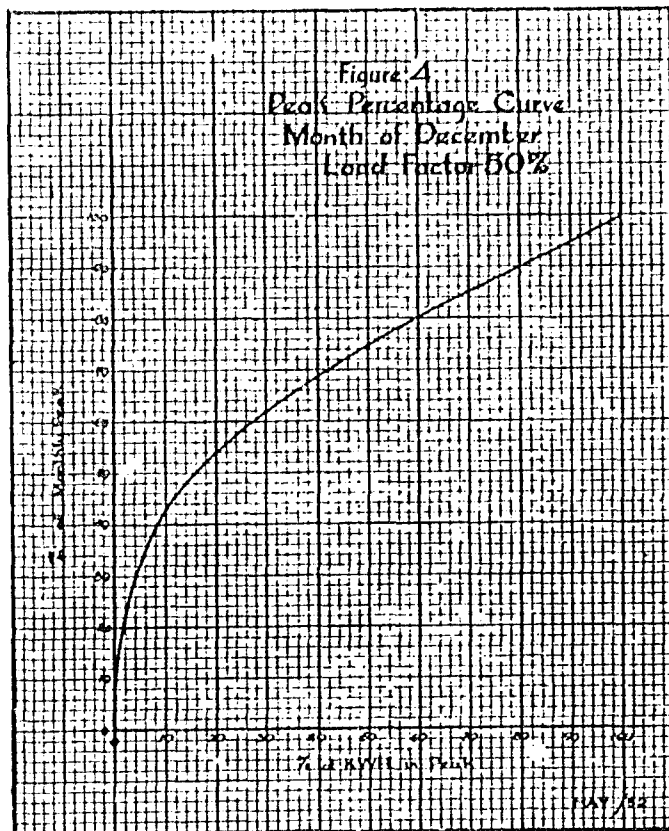
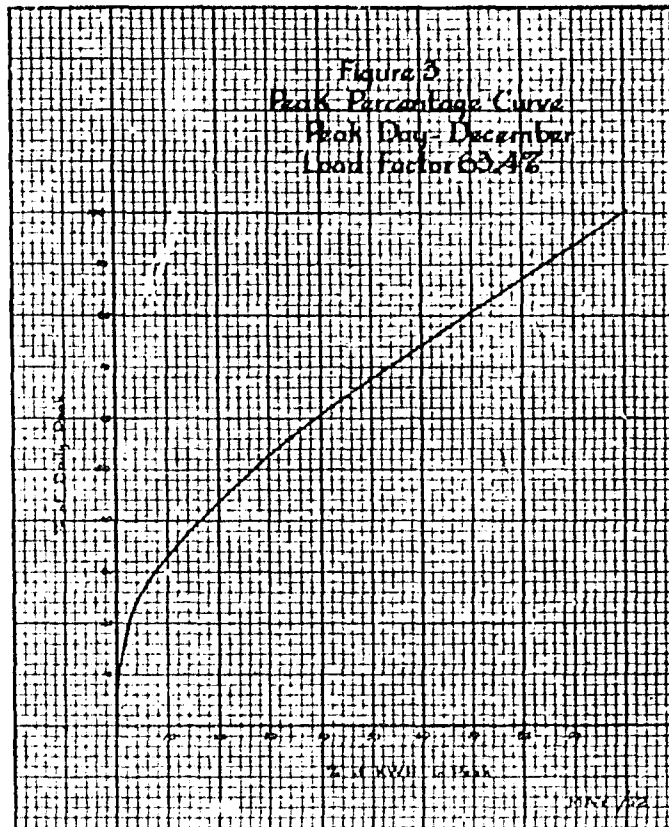
could be utilized up to the full capacity of the installation with consequent increase in the annual Kw. Hrs. developed. The daily energy available from the Central Saskatchewan Development was taken as the

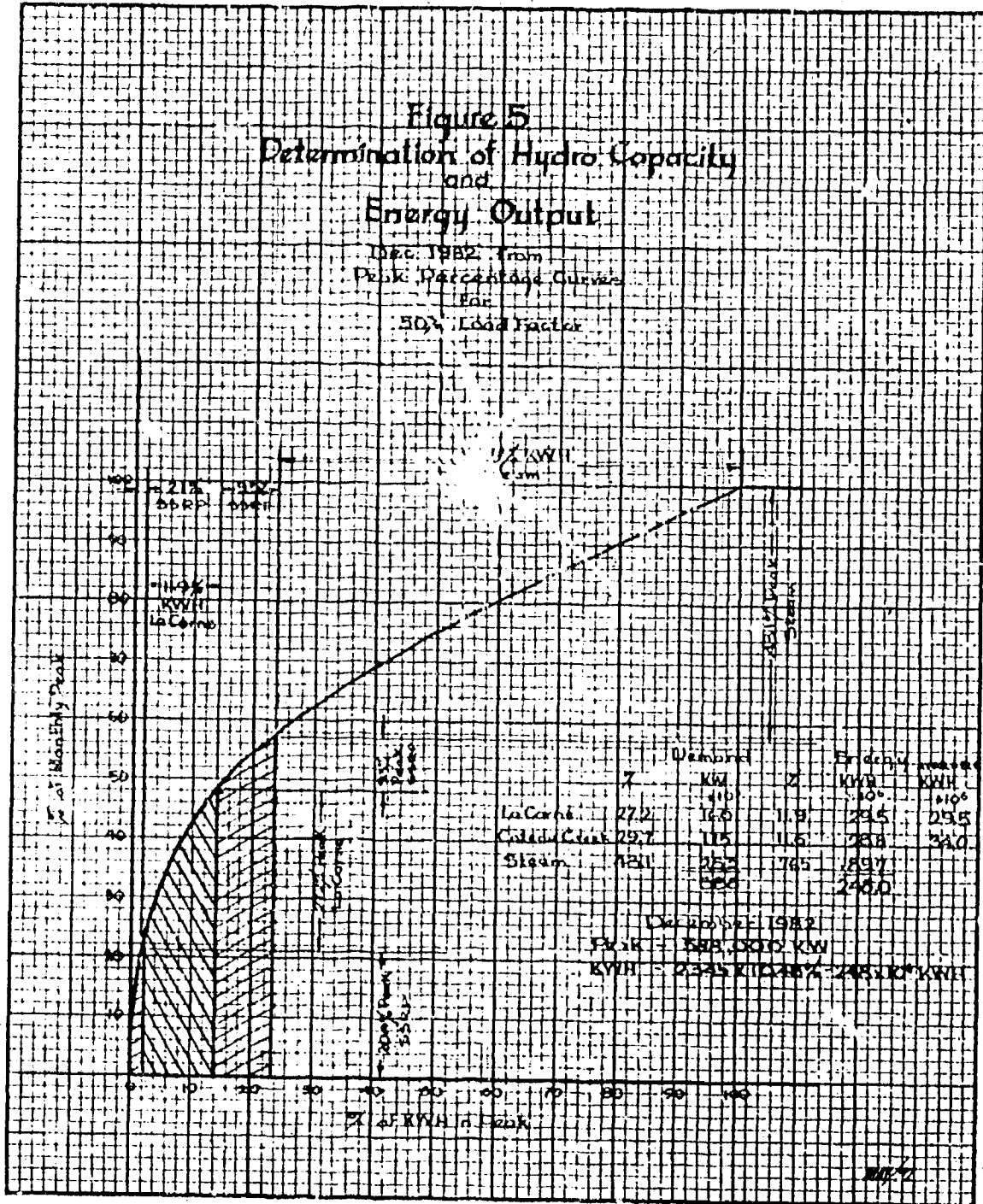
average for that month and fitted into the daily load curve, keeping in mind that 31,000 Kw. of installed capacity had to be available for pumping. The steam plant was then required to make up any deficiency.











## Annex II

## ANNUAL PUMPING COSTS, CENTRAL SASKATCHEWAN DEVELOPMENT

Diversion Number	Pumping Lift (feet)	Acreage	Operation Depreciation and Maintenance <sup>1</sup>	Investment Charge <sup>2</sup>	Power Costs (3 mills)	Total
			\$/acre	\$/acre	\$/acre	\$/acre
1	Gr.	68,300	.12	.06	.....	.18
2	Gr.	15,300	.08	.05	.....	.13
3	Gr.	12,800	.08	.03	.....	.11
4	Gr.	28,800	.08	.03	.....	.11
5	Gr.	22,500	.08	.03	.....	.11
6	15	15,000	.60	.35	.06	1.01
7	15	18,750	.55	.32	.06	.93
8	15	9,100	.33	.18	.06	.57
9	30	12,750	.93	.54	.12	1.59
10	30	15,000	.73	.42	.12	1.27
11	30	9,100	.87	.51	.12	1.40
12	30	39,600	1.38	.81	.12	2.31
13	30	11,700	.77	.45	.12	1.34
14	30	18,000	.65	.38	.12	1.14
15	60	33,200	.58	.53	.23	1.34
16	60	19,600	.30	.47	.23	1.40
17	60	20,600	.82	.47	.23	1.51
18	120	33,700	1.87	1.10	.46	3.42
19	120	10,800	1.08	.03	.46	2.17
20	120	23,100	.93	.54	.46	1.93
21	120	11,000	1.02	.60	.46	2.18
		448,700				

Average cost per acre with investment charges—\$1.28.

Average cost per acre without investment charges—\$0.83.

<sup>1</sup> Based on aggregate rate of 5 per cent on installation cost to cover depreciation and maintenance plus \$0.03 per acre allowance for operation; depreciation estimate based on 50-year 3 per cent sinking fund for buildings and 20-year 3 per cent fund for pump equipment, weighted 80-20; maintenance estimated at 2 per cent of installation costs (rates based on Engineering estimates).

<sup>2</sup> Charged at 3 per cent of installation cost.



## PART V

GOVERNMENT OF THE PROVINCE OF SASKATCHEWAN

September 11, 1952.

Dr. T. H. Hogg,  
Chairman,  
Royal Commission on the South Saskatchewan  
River Project,  
406 Elgin Building,  
Ottawa, Ontario.

Dear Sir:

I have the honour to present herewith a Submission of the Water Rights Branch of the Province of Saskatchewan to your Commission.

I trust that this study will be of some interest to the Commission and of significance to its investigation.

Yours sincerely,

E. J. SCAMMEL,  
Chief Engineer, Water Rights Branch.

## ECONOMIC USE OF WATER

## 1. Present Proposals

Of the many proposed developments for the utilizing of the waters of the Saskatchewan River Drainage Basin there are two at the moment which are under discussion and to which a great deal of study has already been given. A comparison of the two proposals is very completely covered in the Prairie Provinces Water Board Report No. 4, prepared in October, 1951, and the advantages of the separate projects generally concurred in by the investigators. However, although a brief reference is made to the comparison of economic use of water no estimate has been made as to what this amounts to in actual quantity. This study then will attempt to assess the value of the two proposals on the basis of economic use of water.

The two proposals are summarized as follows.

(i) *The North Saskatchewan Project—Proposal No. 1*

To irrigate some 800,000 to 1,000,000 acres in Alberta and Saskatchewan by diverting water from the North Saskatchewan, Clearwater and Red Deer Rivers. (NOTE: The original North Saskatchewan Project (the Pearce Scheme) envisaged some 1,400,000 acres irrigable, of which 480,000 acres were in Alberta and 920,000 in Saskatchewan. Later investigation reduces this area by eliminating less suitable lands and areas where costly canals and siphons were required).

(ii) *Two Separate Projects—Proposal No. 2*

The decision to investigate the irrigation of lands in Alberta and Saskatchewan as two separate projects was arrived at after two independent investigations were made, one by Mr. B. Russell, then P.F.R.A. Senior Supervising Engineer, in 1943, and the other by Mr. S. H. Hawkins, P.F.R.A. Engineer in 1946.

In his report dated June, 1943, Mr. Russell states in part:

"No surveys have yet been made for a possible diversion of the South Saskatchewan River in Saskatchewan, but certain topographical features and elevations would indicate that it may be more desirable and even economical to irrigate the Saskatchewan area from a point in Saskatchewan rather than by a diversion of the Clearwater, Red Deer and North Saskatchewan Rivers in Alberta...."

"Some factors in favor of a diversion in Saskatchewan rather than in Alberta are as follows:

- (1) It enables the Province of Saskatchewan to proceed with irrigation development independent of the Province of Alberta.
- (2) It brings the point of diversion closer to the irrigable lands in Saskatchewan, thus saving losses in transportation and maintenance costs.
- (3) A dam on the South Saskatchewan River will serve as a diversion of water for irrigation and also as a water power development for the generation of power for industry in the province.
- (4) The proposed location of a reservoir on the South Saskatchewan River is such that little property damage would result from flooding.
- (5) The Calgary Power Company is spending large amounts of money on the Bow River above Calgary to increase the winter flow for power development. This winter flow is available for the development of power in Saskatchewan."

Mr. Hawkins, in his 1947 report on the "Proposed Red Deer River Diversion Project" states:

"During 1946 it was established by the writer, with the aid of field parties, that the difficulties in the way of taking Red Deer water into Saskatchewan by means of a diversion are very great. A report was made on the proposed Tramping Lake route in August and later the possibility of getting a canal into Saskatchewan at any point south from Mackim to Empress was investigated.

The conclusion is that this can be done only at one place with any expectation of accomplishing much. This point is the Cabri Lake summit used

by Mr. Strome in 1922, which requires a very long and costly syphon and extremely flat grades which can be used only for very large canals, designed to serve immense acreages. It does not appear that any large area will be commanded west of Elrose, as the Kindersley tract is extremely flat, has no drainage, and consists mainly of heavy lacustrine type clay, unsuitable for irrigation. It is now proposed to complete the project entirely to Alberta with the principal tracts centered on Youngstown and Cessford, the estimated total being about 450,000 acres for this highly concentrated area.

An additional isolated tract of about 50,000 acres lies in the Acadia Valley under Benton Reservoir, bringing the potential total for the project to 500,000 irrigated acres."

These two separate proposals are fully covered in the following reports:

1. South Saskatchewan River Project—Summary Report of Investigations, dated April, 1951. This proposes irrigating about 450,000 acres in Saskatchewan by diversion from the South Saskatchewan River.

2. Proposed Red Deer River Diversion Project, by S. H. Hawkins, dated April, 1947. By diverting the waters of the Red Deer and Clearwater Rivers some 350,000 acres of land could be irrigated in Alberta.

There are two alternatives to the separate projects:

- (a) Plus additional water from the North Saskatchewan River into the Red Deer River for the production of additional water power;
- (b) Plus additional water from the North Saskatchewan River to irrigate an additional 250,000 acres through the Red Deer Project and to produce additional power.

2. Estimated Canal Transportation and Reservoir Losses\*

(i) Proposal No. 1

Canals—	Capacity cfs	Length miles
North Saskatchewan River Canal	6,800	28
Clearwater River Canal	5,500	20
Ardley-Buffalo Lake Canal to Craig Lake	10,000	102
Craig to South Saskatchewan Project	3,500	500
South Saskatchewan Project Canals	various	189

Storage—	Capacity ac. ft.	Area sq. mls.
Buffalo Lake	500,000	57.0
Ardley	370,000	28.0
Hamilton Lake	150,000	28.0
Craig	100,000	24.0
Sounding & Grassy Creeks	160,000	51.0
Small Reservoir	58,000	40.0
Tramping Lake	320,000	25.0
Small Reservoirs	80,000	40.0
	<u>1,748,000</u>	<u>203.0</u>
Sounding & Eyehill Creeks River Storage	252,000	30.0
Total	<u>2,000,000</u>	<u>323.0</u>

(About 200,000 acres)

\*Canal losses estimated at 6 cfs per million square feet wetted perimeter. Reservoir losses estimated at 21 inches net on reservoir area.

Total Estimated Losses for Proposal No. 1.

	Ac. ft.
Canals	1,043,400
Reservoirs	350,000
Total losses—Proposal No. 1	<u>1,393,400</u>

(ii) Proposal No. 2.

Saskatchewan Area (450,000 acres)

South Saskatchewan Project

Storage	Capacity ac. ft.	Area sq. miles
	8,000,000 (gross)	90,000
	4,000,000 (live)	
Canals—Main & Distribution—Various Capacities —189 miles.		
Reservoir Losses	157,500	
Canal Losses	111,600	
Total	<u>269,100</u>	

Alberta Area (350,000 acres)

Red Deer Project

Canals	Capacity	Length
Ardley to Craig	2,700 cfs.	110 miles
Storage	Capacity ac. ft.	Area sq. mls.
Ardley Reservoir	370,000	28.0
Craig Reservoir	100,000	24.0
Hamilton Reservoir	150,000	28.0
Small Reservoirs	120,000	40.0
	<u>740,000</u>	<u>120.0</u>

(About 77,000 acres)

	ac. ft.
Canal Losses .....	130,000
Reservoir Losses .....	135,000
Total .....	<u>265,000</u>
Total Losses—Proposal No. 2.	
South Saskatchewan	
Project .....	260,100
Red Deer Project ....	265,000
Total Losses ....	<u>534,100</u>

To put both proposals on a comparable basis, i.e., ultimate development and maximum benefits for each province in acres irrigated and power generated (see Prairie Provinces Water Board Report No. 4) then we find the following advantages of having separate projects:

(Combined Projects) .....	1,303,400
Total losses—Proposal No. 2	
(Separate Projects) .....	<u>534,100</u>
Difference .....	<u>859,300</u>

There have been alternative routes suggested for bringing water into Saskatchewan. The most recent is referred to in a report prepared in June, 1952, by the Hydrology Division of the P.F.R.A. on "Full Development Possibilities in the Saskatchewan River Basin." It is believed by an extension of the main canal of the Red Deer Irrigation Project, crossing into Saskatchewan near the Town of Laverna, some 200,000 acres of additional land could be served in the Kinderslay, Kerrobert and Rosetown areas. However, it is known that the soils in parts of these additional areas are not suitable for irrigation and reference is again made to Mr. S. H. Hawkins' report of 1947 on the proposed Red Deer River Diversion project: "It does not appear that any large area will be commanded west of Elrose, as the Kinderslay tract is extremely flat, has no drainage, and consist mainly of heavy lacustrine type clay, unsuitable for irrigation." In the Alberta Government brief to the Royal Commission it was suggested that this canal could be extended to spill water into Tramping Lake where it would then be on common ground to the northern route of the original North Saskatchewan (Pearce) Project.

If this alternative route is feasible, then the length of canal necessary to carry the water to the South Saskatchewan Project might be reduced by 100 miles. It could result in a proportionate reduction in transportation losses of about 20 per cent, equal to about 120,000 acre feet of water. This would be offset to some extent by the losses in an enlarged canal

system required to carry the additional water from the North Saskatchewan River to irrigate these 200,000 additional acres, and by increased storage losses due to the addition of the Sullivan Lake and other smaller reservoirs.

The net saving between Proposals No. 1 and No. 2 would consequently be reduced to 859,300 acre feet—120,000 acre feet=739,300 acre feet.

The advantages in favour of Proposal No. 2 (separate projects) may be summarized as follows:

1. A saving in transportation losses of between 700,000 and 800,000 acre feet of water.
2. Operation and maintenance problems will be reduced considerably. The larger and more extensive an irrigation project becomes, the more difficult it is to operate it. Maintenance troubles on long canals could be serious. Since the combined project would be operated in two different provinces, no savings on administration expenses could be expected. Mr. Victor Meek, Director of Water Resources Division, Department of Resources and Development, Ottawa, in a letter dated February, 1944, stated:
 

"I have always been a little sceptical of the feasibility of the original North Saskatchewan Project largely on account of its cost, unwieldy size, and the practical difficulty in including lands within two provinces in one development."
3. More than four times as much storage available, thereby providing greater insurance against drought years.
4. Almost complete stream regulation for Saskatchewan and Manitoba, will afford greater measure of flood control.
5. Increases very considerably available hydro-electric energy by bringing into existence power sites on the South Saskatchewan River. (See P.P.W.B. Report No. 4.).
6. Makes most beneficial use of South Saskatchewan River waters for irrigation purposes. Practically the whole of the flow of the South Saskatchewan River can be utilized as against only about 20 per cent under Proposal No. 1. After taking care of prior commitments in both Alberta and Saskatchewan and making allowances for the proposed Red Deer Project there will be approximately 5,000,000 acre feet of water available in the South Saskatchewan River in an average year. If not utilized to irrigate lands through which it flows in Saskatchewan, this water will continue undiminished to the ocean and be completely wasted.

### 3. Conclusions.

The Government of Saskatchewan wholeheartedly supports any proposal that will fully utilize the water resources of the Saskatchewan River Basin. In the original No. 1 Proposal (Wm. Pearce Project) some 680,000 additional acres of lands in Alberta and Saskatchewan were included as irrigable. These lands

can only be served by diversion from the North Saskatchewan River. Therefore, any other available sources of supply that can be found that will reduce the demand on the North Saskatchewan River cannot be ignored.

The South Saskatchewan River has that available supply and furthermore it places the water naturally right where it is required, with consequent savings in large transportation losses, and it also makes available large supplies of hydro-electric power which otherwise would be an absolute loss.

If the waters of the Saskatchewan River Basin are to be put to the most beneficial use then ultimate development must include full use of the South Saskatchewan River water.

The South Saskatchewan River Project is the answer to that. The development of that project would not be inconsistent with the proposed full development in the Saskatchewan River Basin. It can be constructed as an independent unit and will not affect the development of other projects in the basin.

There would appear to be no logical reason therefore in delaying the construction of the South Saskatchewan River Project.

## PART VI

### Statement of Counsel for Saskatchewan in Reply to the Submission of the Province of Alberta

There appears to be no question but that in order to stabilize the economy of the Province of Saskatchewan, it is necessary that our water resources be utilized to provide a large area of irrigation in the central part of this Province.

In considering irrigation projects in the national interest, consideration must be given as to where such projects should be located. Federal expenditures for irrigation can be justified only if they result in national benefits.

In dealing with this question, Mr. Roy E. Huffman, Associate Professor of Agricultural Economics for Montana State College, in his paper entitled "Economics of Irrigation," stated:

"In brief, long-term public policy with respect to irrigation development involves determination of *how* much irrigation development there should be, *when* it should be developed, and *where* it should be developed. Unfortunately, it involves the difficult problem of submerging local, sectional, and regional interests each to the larger public

interest. It is necessary, however, to a sound national program for the conservation, development, and use of resources."

It is one of the responsibilities of the Commission to determine whether the proposed South Saskatchewan River Project represents the most profitable and desirable use which can be made of the physical resources involved. In this connection, the Province of Alberta in its submission made to the Commission has suggested an alternative proposal. The proposal submitted by the Province of Alberta suggests the irrigation of certain lands in Alberta by a diversion in that province and the servicing of certain lands in the North Western part of Saskatchewan by such diversion and the extension of the project to service lands that are contained in and part of the South Saskatchewan River Project.

The Alberta proposal requires no further investigation to ascertain if it would be suitable as an alternative project.

A similar proposal has already been considered, studied and rejected as unsound as a project for the servicing of the lands in Central Saskatchewan. It was because of this that the South Saskatchewan River Project was first considered. Years of investigation have resulted in a favourable report on the feasibility of the South Saskatchewan River Project. This project was not only thoroughly investigated by the P.F.R.A. Engineers but outstanding consultants were retained to advise on all aspects of the project. A comprehensive report in great detail has already been made to the government.

The project as proposed by the Province of Alberta, is a project for the utilization of a small part only of the waters of the South Saskatchewan River augmented by the water required for this project by a diversion from the North Saskatchewan River.

With all due respect, it is a submission which is provincial in its outlook and disregards entirely three very important factors, namely:

1. The great loss of water through evaporation and seepage that would result through the operation of a canal, 400 to 500 miles in length.
2. That the average natural annual flow of the South Saskatchewan at the proposed point of diversion in Alberta is only 1,350,000 acre feet as compared to 7,610,000 acre feet at Outlook.
3. That the net loss of water under the Alberta proposal would provide almost the entire irrigation requirements of the South Saskatchewan Project.

The Commission is charged with the responsibility of determining the most profitable and desirable use which can be made of the physical resources involved. Certainly, there is no alternative to the South Saskatchewan River Project which can measure up to the profitable and desirable results which can be obtained from a national point of view. The waters which flow in the South Saskatchewan River are a great national asset. These waters should be utilized to give the greatest possible national benefit to Canada. The Alberta proposal would result in a great part of the waters that flow in the South Saskatchewan River being permitted to run to the sea without rendering to the nation any commercial return. The ultimate development of the South Saskatchewan River Basin will result in the waters of the North Saskatchewan being utilized to service certain lands in Alberta and Saskatchewan, but the entire benefits of the South Saskatchewan River can be realized only by the construction and development of the South Saskatchewan River Project in the Province of Saskatchewan.

The water losses which would result by the construction of an overall Alberta-Saskatchewan development as suggested by the Province of Alberta would be tremendous. It has been estimated that these losses would amount to 1,393,400 acre feet annually. These losses, it will be noted, are as much as the entire flow of the South Saskatchewan River at the point of diversion of the Red Deer River in Alberta, which has been recorded as 1,350,000 acre feet. This means that the waters that are to be actually required for the proposed project must come from the North Saskatchewan River, and, possibly, if sufficient water cannot be obtained from that source, from the Athabasca River. Surely, the waters from these two rivers can be utilized to greater advantage in Alberta and in western Saskatchewan without being called upon to service lands which can be so easily provided with water from the South Saskatchewan River, which flows right to the place where it is required in Central Saskatchewan. Surely, the water resources of Canada which flow in the North Saskatchewan and in the Athabasca River should not be depleted, and wasted when there is available water in the South Saskatchewan River to the extent of over 5,000,000 acre feet, after providing for all requirements of the Province of Alberta to service their present projects which if not used, will flow to the sea without rendering to this nation the benefits which could accrue through the beneficial use of this great resource.

Irrespective of the great losses that would accrue to the nation as a result of the use of the North Saskatchewan water and the waters of the Athabasca

River as proposed by the Province of Alberta, it is very doubtful indeed if these waters could be economically brought to the place where the water is so badly needed in the central part of the Province of Saskatchewan, or at all. Suffice it to say that the cost of maintaining a canal of 400 to 500 miles in length would be tremendous and the administration and the maintenance of such a canal would present great difficulties and almost unsurmountable problems.

The Alberta proposal fails to use the great part of the waters under reference. It disregards entirely the development and utilization of the South Saskatchewan River Basin. The Alberta proposal would use the entire flow of the South Saskatchewan River at the point of diversion on the Red Deer, but would obtain the greater part of its requirements from the North Saskatchewan River. The amount of water required would be much greater than that required for the South Saskatchewan River Project. In fact, the increased water losses of a combined project would amount to 859,000 acre feet, which would provide almost the entire irrigation requirements of the South Saskatchewan River Project, which amount to 960,000 acre feet.

On the other hand, the South Saskatchewan River Project is the logical step in the development of the entire drainage basin. It does not affect in any way any contemplated development up stream, including the Red Deer Project. At the point of diversion in Alberta the entire average annual flow of the Red Deer River is only 1,350,000 acre feet. This flow remains available to Alberta even after full development of the South Saskatchewan River Project. The South Saskatchewan River Project is a multiple purpose project providing not only irrigation, but power, stream regulation, flood control, an assured domestic water supply, and other uses. It creates a great storage reservoir right in the centre of the dry belt and makes possible, as nothing else could, the stabilization of one of the most depressed areas in Canada. The water resources of the Nation must be developed in such a way as to benefit the entire Nation. Already the economy of the Province of Alberta has been stabilized by reason of the development that has taken place in that Province through the expenditure of Federal moneys. Already the resources of the South Saskatchewan River have been utilized by the Province of Alberta; but in Saskatchewan there has been no development. Saskatchewan is the only place where this development should be made in the interest of the entire nation *at this time*, not only because Saskatchewan needs irrigation but because by giving to Saskatchewan, the use of this great national resource the economy of this part of Canada will be stabilized and the Nation will benefit.

The Saskatchewan River is an interprovincial stream. It flows from Alberta into Saskatchewan and thence to the Province of Manitoba. The resources provided by this great river must be utilized in such a way as to develop all of the territories through which this great river flows. It would be not only unjust to Saskatchewan but detrimental to the nation if part of the waters of this great river were not utilized in the Province of Saskatchewan.

Disputes have arisen, not only between provinces and states but between nations regarding the utilization of waters that are interprovincial or international in character. It is unnecessary that we consider the law which applies to these interprovincial streams, because we have a Prairie Provinces Water Board that allocates the water as between our provinces, but in the United States of America, disputes have arisen between the different states of that great nation as to the use of water and litigation has resulted because of the claims made by one state against another. Their water law there has, however, been definitely settled by litigation and "equitable apportionment" has been the basis for settlement of disputes in that country. In the case of New Jersey versus New York, 283, U.S. 336, 342, Mr. Justice Holmes of the Supreme Court of the United States said this:

"A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it. New York has the physical power to cut off all the water within its jurisdiction. But clearly the exercise of such a power to the destruction of interests of lower states could not be tolerated. And on the other hand equally little could New Jersey be permitted to require New York to give up its power altogether in order that a river might come down to it undiminished. Both states have real and substantial interests in the river that must be reconciled as best they may be. The different traditions and practices in different parts of the country may lead to varying results but the effort always is to secure an equitable apportionment without quibbling over formulas."

The Boundary Waters Treaty between Canada and the United States of America embodies this principal. "Equitable apportionment" was the basic rule behind the division of the St. Mary and Milk Rivers. What is reasonable, right, fair and just must ever be the controlling principle in order to reach the correct solutions of such controversies, not only between provinces but between nations; but more than that, in this case the national interest must prevail, and it is in the national interest that there be justice in determining

the uses of a great national resource and in seeing to it that federal moneys are expended towards the development of a national resource in such a way as to stabilize all parts of the nation and to see that the most profitable and desirable use is made of the physical resources involved.

It is from this point of view that the Prime Minister of our country, The Rt. Honourable Louis St. Laurent, referred to the proposal to build the South Saskatchewan River Project when he spoke in Parliament on the 28th day of June, 1952.

It is respectfully submitted that the economic and social returns to the Canadian people on the investment in the proposed South Saskatchewan River Project would be commensurate with the cost thereof, and that the said project represents the most profitable and desirable use which can be made of the physical resources involved.

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**Supplementary General Statement presented by Hon. I. C. Nollett, Minister of Agriculture in behalf of the Province of Saskatchewan to the Royal Commission on the South Saskatchewan River Project with reference to Alberta's Alternative Proposal.**

We greatly regret that the Brief submitted by the Alberta Government was not made available to us until very recently. The matter of analysing and replying to this submission was therefore somewhat impaired because of the limited time available.

The unusual nature of the Brief, and its bearing on the South Saskatchewan Project under review by this Commission, makes it necessary that some general reference be made to this Brief. I therefore wish to make some general observations on this Brief which will be dealt with in greater detail by Mr. Pope, Counsel for the Government of Saskatchewan, and Mr. Seammell, in charge of water administration for the Province of Saskatchewan.

I note the Alberta Brief constantly refers to and deals with the entire Saskatchewan River Basin. It is therefore worthy of mention that the Saskatchewan River as such actually begins at a point some forty miles east of Prince Albert, Saskatchewan, where the two rivers—the North Saskatchewan and the South Saskatchewan—join to become the Saskatchewan River from that point on. The two rivers, by virtue of natural physical circumstances, are two entirely separate

and independent watersheds. This is illustrated by the fact that at their points of entry into Saskatchewan, the two rivers are nearly 200 miles apart.

The terms of reference to this Commission are:

- (i) Whether the economic and social returns to the Canadian people on the investment in the proposed South Saskatchewan River Project (Central Saskatchewan Development) would be commensurate with the cost thereof;
- (ii) Whether the said Project represents the most profitable and desirable use which can be made of the physical resources involved.

It can only be assumed that since the South Saskatchewan River Project is mentioned in the first part of the reference, the second part refers to the natural physical resources of the South Saskatchewan River. This has been, and continues to be, our interpretation of the terms of reference placed before this Commission. This point is emphasized by the fact that by far the greater part of the water resources of the South Saskatchewan River beyond the border of Saskatchewan can only be used to advantage for irrigation in Saskatchewan, and for power both in Saskatchewan and Manitoba; and if these waters are not utilized for these purposes in Saskatchewan they will forever run wasted to the sea.

The Alberta Brief proposes a man-made alternative method of diverting water from the Red Deer River and the head waters of the North Saskatchewan River and hence by a lengthy artificial canal approximately midway between the two rivers at point of entry into Saskatchewan. This proposed canal, which follows a circuitous route where seepage loss will be great, will, it is assumed, irrigate lands alongside a huge natural river with its waters running waste. In our opinion, this proposal as an alternative (and that's what it is—not a combined project, as mentioned in the Alberta Brief) confuses the terms of reference to this Commission and, to say the least, is fantastic as an alternative when compared to the Central Saskatchewan Project envisaged. The alternative proposal does not represent a co-ordinated program of water development for drainage basins but the direct opposite since it ignores entirely the utilization of the main waters of the South Saskatchewan River for irrigation, power, flood control and municipal purposes so greatly required in Saskatchewan.

The two projects, by natural features, are completely separate and should be developed separately. Doing so will not impair the development of either project in any way. Co-ordinated separate development of these projects is in no way affected by an artificial

boundary dividing the drainage area, as mentioned in the Alberta Brief. Again, the direct opposite is the case because, as intended by nature, the South Saskatchewan River flows unimpeded across this artificial boundary. The principal question to be decided is: Will this water in this drainage basin, flowing across an artificial boundary, remain unutilized and wasted forever because of an artificial boundary dividing the drainage areas? To propose a man-made alternative would have this precise effect.

The alternative proposal ignores entirely the use of a large body of water in a natural drainage basin. This is also the direct opposite to any co-ordinated program for basin development. This line of thinking indicates that an artificial boundary dividing two government jurisdictions has some influence towards preventing or stalling the development of natural drainage basins. The alternative project is clearly inconsistent with a co-ordinated program of basin development. Wherever possible, waters within such natural drainage basins should first be utilized before trying to do what nature did not do by resorting to artificial alternatives to natural drainage areas.

We are not opposed to two separate projects. In fact, we are greatly interested in any additional irrigation that might be made possible in Saskatchewan as a result of further studies being made of the Alberta proposal as a separate project. We do maintain, however, that these further studies should not occasion any delay in proceeding with the Central Saskatchewan Development Project because this project represents the greatest possible national benefit to be derived from the physical resources involved. The detailed reasons for our attitude in this regard will be presented by Mr. Pope and Mr. Scammell.

In our Brief, already submitted, we have pointed up the urgent need for immediate development in Saskatchewan. The suggestion contained in the Alberta Brief, that the Project be delayed for further study, will occasion some surprise and disappointment to the many people in Canada who support this Project. It is noteworthy that, by comparison, Alberta has already received an allocation of water through the Inter-provincial Board of 1,256,000 acres against an allocation to Saskatchewan of 30,000 acres, and has, in addition, already received extensive assistance from the Federal Government for irrigation development on large projects. The Alberta Brief states that 1,721,400 irrigable acres are allowed for in Alberta, and then follows with the amazing statement that the Province of Alberta can give no assurance that irrigation development in that province will be confined to that acreage. It is encouraging to note that people now generally

consider that on the basis of need and urgency, development of the South Saskatchewan Project cannot be postponed any longer.

It is particularly heartening to note that there are public men in Alberta who take an entirely different viewpoint in support of this Project. For example, on Page 3916 of the House of Commons' *Hansard* for June 28, 1952, Solon Low is quoted as follows:

"Mr. Chairman, I think this has been the finest debate I have heard in this house on the subject of the South Saskatchewan river project. I was delighted to hear both the leader of the opposition and the right hon. Prime Minister express views on the subject tonight. It seems to me that in their cogent statements can be found great comfort and hope for the people, not only of Saskatchewan but of all Canada, who have been wanting to see this great project completed at the earliest possible time."

A further quotation from Solon Low's remarks in the House of Commons, appearing on Page 3917 of the *Hansard* of June 28, 1952, is as follows:

"There is just one thing I would like to say by way of encouragement to my friends in Saskatchewan. I want to see Saskatchewan get that project on the South Saskatchewan river as quickly as they can because I know what it will do for their province and for the rest of Canada as a whole. We in the province of Alberta have recognized so fully the value of that project to Saskatchewan and to the west that we have been prepared for some years to share our waters that rise on the eastern slopes of the Rockies in our province. We have already arranged that allocation of water through an agreement made with the federal government in 1948."

Unfortunately, this is incorrect. An allocation to this project has not yet been made—and in a few moments I will present the reasons why we have not received an allocation. I should mention that Mr. Low went on to point up the great handicaps in Saskatchewan towards carrying the burden of public services in a province of great distances and low-carrying capacity. He mentioned that the provincial burden of financial contribution for this national development project should be less in Saskatchewan than in Alberta because for many years Saskatchewan has been shouldering a heavy burden of cost as a consequence of Dominion settlement policies prior to and after 1931 when the resources were handed over to this province. The

observations of Mr. Low are very encouraging and are in direct contrast to the viewpoints expressed by other public men in Alberta.

The remarks of Mr. Blackmore, M.P., House of Commons, in the same debate, which appears on Page 3956 of the *Hansard* of June 28, 1952, are also worthy of quotation:

"Alberta by good fortune, because of the resources she has, has been placed in a better position financially than Saskatchewan. In my judgment Saskatchewan has done the very best she could with the resources at her disposal. The Minister of Agriculture knows, better than any other person in Canada, how meagre those financial resources are compared with the tremendous responsibilities that rest upon the government of Saskatchewan. I believe the minister will bear me out in that.

"I thought it well to make those three or four comments before closing, just to reinforce what the hon. member for Peace River said. I shall back the member for Peace River every inch of the way. I too do not believe that it is in any degree fair to the people of Saskatchewan to ask them to assume half the cost of building this great irrigation project.

"I should like also to express appreciation to all the members who have participated in this debate. I believe that as a result of this debate it will be made easier for the minister to get the support from all over Canada which he ought to have. As a result of bringing together the support from all of Canada, we shall be able to get this great project completed at an early date and put what we might call the capstone on these irrigation projects as well. This would show our intention, as a nation, to reimburse to some extent at least the people who have settled in that area of the Palliser triangle."

Now I wish to quote from Paragraph 4, Page 7, of the Alberta Summary Brief, as follows:

"The Alberta government believes that until a thorough investigation of one overall Alberta-Saskatchewan Project has been completed, the best uses of the water reservoirs of the Saskatchewan River drainage basin cannot be determined, and they would suggest that such an investigation be initiated by the Prairie Provinces Water Board."

I note, particularly, the suggestion to the Commission that a further study of the combined projects be referred to the Prairie Provinces Water Board. I wish to state in this connection that this matter, at



the suggestion of Alberta's representative on the Prairie Provinces Water Board, has already been referred for study to the Prairie Provinces Water Board and a report submitted by that Board. A copy of this report and minutes of this meeting will be filed for the information of the Commission by Mr. Pope and Mr. Seammell in view of the representations made by Alberta that a further inquiry by the Prairie Provinces Water Board be undertaken. There was also correspondence which I had with Mr. Ure and Mr. Gardiner, and I attach copy of this correspondence to this statement for the information of the Commission. I mention this because, when the Saskatchewan representative on the Board, Mr. Seammell, during the Water Board meeting of September 5 and 6, 1951, moved that in view of the information received and of the fact that the necessary water was available, the Board now recommend an allocation to this project. However, two representatives on the Board—Mr. Hogarth and Mr. Farr—felt that the Board should wait until they had received the report of the Royal Commission (newly appointed at that time) and to treat the Commission's report as additional evidence. Alberta's representative, the minutes of the meeting reveal, agreed with this view but added that the alternative combined project should be looked into, preferably by the Royal Commission. It is most interesting, therefore, to note the suggestion now made to the Commission that the Prairie Provinces Water Board initiate still another investigation.

We are certainly not against, but favour, any further useful studies that might be required to make greater use of our water resources to the benefit of the provinces concerned. However, we are very much opposed to any attempt to directly or indirectly delay or stall this urgently required irrigation and power project in Saskatchewan. We are quite certain that in light of the evidence that we have already submitted, any attempt to do so is not in the national interest or in the interest of the provinces concerned.

We do not agree at all that the alternative proposal would be less costly. Indeed, careful scrutiny of costs balanced against benefits indicate that the alternative would be much more costly from the point of view of original cost, maintenance and loss of irrigation and resource power energy that could not be made up in any other way. It is also clearly evident that if the alternative project were proceeded with, the water supply would be most uncertain and would relegate Saskatchewan to the position of a "tailender". It is borne out by irrigation experience that water users at the end of the ditch in years of low flow often look in vain for water when needed. Saskatchewan does not

relish the thought of being a "tailender" in any irrigation scheme when a large volume of water by natural flow is so readily available. A thin, man-made water lifeline is against all principles of successful irrigation. For irrigation to be successful and justify investment, an ample water supply must be beyond question. A good illustration might be found in the diversion ditch constructed as a source of water supply for the City of Moose Jaw. This emergency source of water supply by artificial canal has been made famous for the little water it actually carries to the reservoir basin—a maximum of 40 per cent of the water pumped into this ditch actually reaches the reservoir. I am informed that the cost of loss of water by seepage in the proposed canal would offset any pumping costs associated with the Central Saskatchewan Development. We submit that it is not in the public interest to expose a costly irrigation project to man-made hazards. We would therefore suggest that the Alberta proposal does not represent the most profitable and desirable use of the physical resources involved.

In regard to the need for pumping at the South Saskatchewan dam site, the Alberta Summary Brief, on Page 2, Paragraph 1, states:

"For some time to come and possibly forever, the construction of irrigation facilities should be confined to those areas which can be reached by gravity canals or by low lift pumps, where exceptional conditions warrant the use of such pumps."

In other words, only those lands that can be reached by low lift pumps or gravity should be irrigated. Alberta has 700,000 acres still to be developed on this basis, and says, in effect, "Saskatchewan should continue to experience all the hazards of drought until these acres are developed". And, perhaps not even then, I take it, even though the alternative proposal is not feasible!

We maintain that it is much more costly and uneconomic to divert water great distances than it is to pump from a large natural reservoir where only a minimum of the power made available is required for pumping. However, by contrast to the above viewpoint, is the further observation made in the last paragraph on Page 4 of the Alberta Summary Brief, which states:

"The point to be noted, however, is that all irrigable lands provided for in Alberta are or can be, and should be, under gravity canals, but if it can be considered economically feasible to pump water to great heights for the irrigation of lands in Saskatchewan, then it must be even more feasible and economical to pump water to the same great heights for lands in Alberta."

This is a surprising statement because, in the first instance, the South Saskatchewan Project is condemned because pumping is involved. The second statement suggests that if it can be done in Saskatchewan, it would be even more feasible and economical to pump water in Alberta. It is surprising how economic things can become in Alberta in the minds of some people. These contradictory viewpoints greatly weaken the objections raised to the South Saskatchewan Project. This merely seems to be "me too-ism" carried to an extreme.

It is well, also, to be reminded that where a great need is manifest at a given point on a natural drainage basin and physical features for a large dam and storage reservoir make possible a multi-purpose project providing irrigation, flood control, municipal and industrial water supply and abundant electrical power possibilities both at the site and down stream, then, surely to Heaven, the commonsense of a layman understands that using a minimum of that power for irrigation pumping is feasible and the proper thing to do. We know that gravity irrigation is desirable, but if you haven't got it at the point of greater need, you haven't got it, and we should not be denied use of South Saskatchewan River waters because someone else can irrigate by gravity flow. The accepted criterion of national investment is predicated on the national benefits that can be derived from the development of physical resources and those national benefits are greatest where the national liability of need is the greater. We hold that the greatest national benefits accrue to the Central Saskatchewan Development.

#### *Equitable Apportionment of Inter-provincial Streams*

As a result of the artificial boundary separating Canada and the United States, the principle of equitable apportionment of water resources flowing from one country to another is accepted as a legal right. No province is more greatly concerned that this principle be adhered to than is the Province of Alberta. We feel that since the provinces have been granted ownership of water resources by agreement with the Dominion Government, the principle of equitable apportionment on the basis of need and beneficial use should also apply to waters flowing across provincial boundaries. It is a fact that water resources do flow across artificial boundaries, and it is also a fact that artificial boundaries define separate governmental jurisdictions and such jurisdictions imply responsibilities for public services at all levels, both provincial and municipal. Standards of services and standards of living for people within such jurisdictions are also involved, for which federal, provincial and local governments have a direct responsibility. Because of this, provinces have certain

recognized fundamental rights to share in the benefits of water resources development on streams flowing across provincial boundaries! The fact that artificial boundaries were created, rather than argue against argue for the South Saskatchewan Project. This does not mean that a co-ordinated program of basin development will be impaired, but it does mean that such a program must be devised to permit a sharing of benefits as far as physically possible as an accepted guiding principle. To approach the matter in any other way would permit greatest benefits to areas most fortunately situated because of natural features. Such an approach, if accepted, would result in permanently depressed areas starved by the lack of resources development and a continued liability to the rest of the nation. We again reiterate that the most profitable and desirable use of physical resources can best be attained by accepting the principle, wherever possible, of equitable apportionment of water on the basis of need and beneficial use.

In summary, may I briefly set out the following points:

1. The two projects by natural features are independent and completely separate developments and no delay in proceeding with the South Saskatchewan Project should be occasioned by further studies regarding possible diversions from the North Saskatchewan watershed.
2. Separate development is consistent with and has all the advantages of a co-ordinated programme of water utilization for the drainage basins.
3. Separate development implies full utilization and use of drainage basin waters for power and irrigation throughout the entire basin.
4. The combined alternative project would result in the failure to utilize some 5 million acre feet of water annually. This waste is absolute and cannot be made up by alternative diversion and represents a loss of millions of dollars annually in waste resources. This water waste represents power and irrigation losses to Saskatchewan and Manitoba.
5. The South Saskatchewan Project will increase the irrigation and power potential of the two river basins.
6. It is not necessary or practical to divert water for the Saskatchewan Project.
7. Natural stream flow available in the South Saskatchewan River should first be developed before diversions are considered.
8. Pumping at the dam site where surplus power is readily available is preferable to uncertain and costly alternative diversions.

9. Finally, the proposed combined alternative project is not a practical alternative because of physical features, cost of construction and maintenance of a long canal, plus loss of water by seepage and questionable supply for irrigation, plus a further cost to replace lost power at the proposed dam site and the benefits of more economic power down stream. The loss of abundant cheap water for municipal supply, particularly to the Cities of Moose Jaw and Regina, cannot be overlooked. The added annual cost of pumping from the present river level would be a continuing financial cost to the national government.

We are sure that the Commission will carefully consider these factors relating to the most profitable and desirable use which can be made of the physical resources involved.

[DOCUMENTS FILED]

REGINA, October 26, 1951.

Dear Mr. Ure:

I have received the minutes of the meeting of the Prairie Provinces Water Board held in Regina on September 5 and 6, 1951. Apparently there are several matters arising out of these minutes requiring inter-governmental correspondence.

Firstly, there is the question raised by the Alberta representative with respect to an alternative development to the South Saskatchewan Project. In my opinion this suggestion should not have been admitted for discussion since it is not really an alternative but an entirely separate and separable project which should have been considered *after* a decision on Saskatchewan's request had been made. This is in keeping with established procedures of the Board. Assuming, as the Board did, that the North Saskatchewan project is an alternative, we now have a report from the Board's Office (Report No. 4, Prairie Provinces Water Board) indicating clearly that it is not a desirable alternative to the South Saskatchewan Scheme as now constituted. I trust that this report is satisfactory to both you and the Manitoba Government, thus permitting early reconsideration of our proposal.

Secondly, Minute 7-16 of the meeting requested clarification of the Board's terms of reference by the participating governments. The question of the Board's terms of reference apparently centered around the relation of the Board to the recently constituted Royal Commission. As you know, the Board, with the exception of the Saskatchewan representative,

voted to postpone a decision on the allocation until the Commission completes its report to the Federal Government, thus binding itself to the findings of that Commission. In my opinion, this constitutes a breach of the spirit and terms of reference. The Water Board itself was constituted as the central planning agency for the utilization of water resources in the Prairie Provinces. It can undertake the widest possible investigation of the use of inter-provincial streams, employing the most expert advice in that task. In the case of the South Saskatchewan Project, it has done this to the satisfaction of my government. It has, I feel, determined that the construction of this project will afford the most effective use of the waters involved without prejudice to either Alberta or Manitoba. With this in mind, it is entirely unnecessary and improper for the Board to place itself in any subservient position to another investigating group employing other experts in the same task. Furthermore, the Water Board has the specific task of allocating waters on the basis of comprehensive consideration of the factors involved, while the Commission was set up to investigate factors employing eventual investment decisions on the part of the Federal Government.

The position of this Government, with respect to terms of reference, may best be stated by direct reference to Clause 2 of the Agreement setting up the Board, which states:

"2. The functions of the Board shall be to recommend the best use to be made of inter-provincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta and to recommend the allocation of water as between each such province of streams flowing from one province into another province."

In short, a more rigorous application of the present terms of reference and agreed procedures is suggested. I might add that I discussed these problems with Mr. Gardiner in Ottawa recently and he is in complete agreement with the above views.

I would appreciate an early reply to this letter since my government wishes to request an immediate reconvening of the Board to arrive at a final and, I trust, favourable decision with respect to the South Saskatchewan Project.

Yours sincerely,

I. C. NOLLET.

Hon. D. A. Ure,  
Minister of Agriculture,  
Edmonton, Alberta.

c.c. Rt. Hon. J. G. Gardiner  
Dr. L. B. Thomson

MINISTER OF AGRICULTURE, ALBERTA

Parliament Building,  
Edmonton, Alberta,  
November 10th, 1951.

Honourable I. C. Nollet,  
Minister of Agriculture,  
Regina, Saskatchewan.

Dear Mr. Nollet:

I have your letter of October 26 last with respect to matters arising out of the minutes of the Prairie Provinces Water Board meeting of September 5 and 6, 1951.

I am not familiar with the established procedures of the Board. However, I should think that in considering an important matter such as an allocation of water for the proposed South Saskatchewan Project, it should be the duty of the Board to consider and discuss all possible plans for the best use of this water. With regard to Report No. 4 Prairie Provinces Water Board, our representative on the Board has recently reviewed this and does not agree that it indicates clearly that a combined Alberta-Saskatchewan development is not a desirable alternative to the proposed South Saskatchewan Project as now contemplated.

With respect to Minute 7-16 and the Board's terms of reference, this has already been considered here. It is the unanimous opinion of Council that the terms of reference must, of necessity, include a study of the most beneficial use that can be made of the water. I agree with you that the Water Board was constituted as a central planning agency with authority to employ expert advice in connection with its investigation, but I cannot agree that it constitutes a breach of the spirit and terms of reference for the Board to profit by the report of a Royal Commission set up to further investigate the South Saskatchewan Project.

It is noted that you suggest a more rigorous application of Section 2 of the terms of reference.

You will remember that this clause was very carefully reviewed by the respective Governments which were parties to the Agreement setting up the Prairie Provinces Water Board, and that it was Mr. Gardiner's view that the Board should itself be responsible for allocations.

It was the opinion of the Alberta Government that the Water Board should function in an advisory capacity only. This is still the opinion of my Government.

Yours very truly,  
D. A. URE,  
Minister in Charge of  
Water Resources & Irrigation.

MINISTER OF AGRICULTURE  
CANADA

Ottawa, Jan. 14, 1952.

Hon. I. C. Nollet,  
Minister of Agriculture,  
Regina, Saskatchewan.

Dear Mr. Nollet:

I received a copy of your letter of October 26th written to the opposite Ministers in Alberta and Manitoba with regard to the question involved in the submission of the South Saskatchewan River Project to the Prairie Provinces Water Board.

My own point of view is that the authority given to the Board to study alternative uses of water resources had no particular project in mind. It was intended that there was nothing to prevent this Board making any kind of study it wished to make with regard to the utilization of water and make any recommendations it cared to make to the different governments concerned. I do not think, however, that it was ever anticipated that it would be the responsibility of any province desiring to use water which had been assigned to it to first submit their plans to the Water Board.

My understanding was that the important task of the Water Board was that indicated in the second part of the subsection to the effect that the amount of water to which a province was entitled from any stream which was interprovincial should be recommended and, if agreed upon by the governments concerned, should be established as the amount of water which could flow out of the Province of Alberta into the Province of Saskatchewan and eventually out the Province of Saskatchewan into the Province of Manitoba, and that any quantity which formed a difference between those two amounts could be utilized by the province concerned so long as they did provide that the average flow was to be allowed to pass annually from one province into another.

I do not think it was ever anticipated that the Board had the right to determine for the Government of Alberta or the Government of Saskatchewan or the Government of Manitoba what should be done with the water while it was within their boundaries. In other words, I do not think it was ever necessary for anyone to refer the South Saskatchewan Project as such to the Prairie Provinces Water Board in order to obtain authority to proceed with the South Saskatchewan River Project. For that reason I cannot see how appointment of a committee by the Federal Government to report upon the engineering which had been done under P.F.R.A. should in any way affect the decision of the Water Board as to how much water

Saskatchewan was entitled to out of the flow of the South Saskatchewan River any more than they would have been asked to determine whether we should have built the St. Mary's River Dam or whether in turn we should build a storage dam in the Province of Manitoba if we were asked to do so.

All we would be concerned about in a matter of that kind is the question as to whether the amount of water which the Board had agreed any one of the provinces was entitled to would take care of the project that we ourselves intended to finance. In my opinion, the question as to whether we are going to finance it or not is one to be decided by the Government of Canada and the Government of Canada would be quite capable of determining from the facts given to it by the Prairie Provinces Water Board as to whether there is sufficient water available.

If anyone is going to experience any difficulty as a result of that decision not being made, it will be the committee that was appointed by the Federal Government to check the records. There could be no difficulty experienced by the Water Board because of the fact that the Committee had not yet made its report. In short, I do not think that the procedure followed by the Water Board at their last meeting was in agreement with the terms of the Order in Council which set up the Prairie Provinces Water Board.

I am very much in agreement with the position which you took in your letter to the other Ministers and am sending a copy of this letter to Mr. McDiarmid and Mr. Ure.

I cannot think that they would be interested in preventing an expenditure of money on the part of the Federal Government. My experience has been that all provincial ministers have been attempting to persuade the Federal Government to spend all the money they can get out of them in their particular provinces. It might be a pleasing experience to find that a Board that was set up at the request of the provinces is going to function to stop the Federal Government from spending money in the provinces, but I had scarcely expected that that would be the result.

Yours sincerely,

JAMES G. GARDINER.

Regina,  
January 23, 1952.

Dear Mr. Ure:

I have your letter of November 10th, last, replying to mine of October 26th, regarding certain matters arising out of the Minutes of the Prairie Provinces Water

Board Meeting of September 5th and 6th, last. I now also have a letter from the Rt. Hon. J. G. Gardiner in which he comments on my letter of October 26th to you.

Your letter suggests that the alternative proposal submitted by Mr. Russell was something new and had not been given any study or consideration before. The Russell proposal is merely a part of the original Pearce Project, first investigated by the Federal Government in 1921-23 and later by P.F.I. A. Engineer, Mr. Hawkins, and by Mr. Russell himself. Reports of these investigations have been available to us because of the conclusions arrived at, particularly by Mr. Hawkins and Mr. Russell, that the South Saskatchewan River Project was the most economical use of water, we proceeded to go ahead with that project at this time. We have no objection to the ultimate development of the original proposal, which would include an additional 500,000 acres of irrigable land in Saskatchewan, but our first thought is to make the most beneficial use of the water available on the most suitable lands for irrigation.

The South Saskatchewan River Storage places the water supply right in the midst of lands which it has been reported are of better quality and more suited topographically than any other lands in the Pearce Project. Also greater reserve supply and water control is provided by the South Saskatchewan River Storage.

With the lengthy canals to transport the water under the alternative project and approximately twice the surface reservoir areas, with only about one quarter the storage capacity, about 645,000 acre feet of water would be saved annually by construction of the South Saskatchewan River Project.

I therefore cannot agree that alternative proposals have not been thoroughly investigated. Several very competent engineers have gone into the whole question of the development of both the North and South Saskatchewan River waters, and all, including Mr. Russell, have arrived at the conclusion that it is more economical to utilize the South Saskatchewan River as a source of supply for the irrigation of the lands in Saskatchewan.

Mr. Russell presented nothing in his proposal that was not already available to the Board and which was sufficient to enable it to assess the comparative values of alternative uses of the water.

I wish to again state our position in this matter by pointing out the following:

1. That in my opinion there was sufficient material available for the Board to carry out its functions in accordance with Article 2 of the Agreement and to recommend allocation of water for the South Saskatchewan River Project;

2. That, in accordance with the procedures established by the Board at its meeting in Regina on May 6, 1949, the Board should not permit the introduction of any new proposals until it has disposed of the one it already has before it. My opinion on this point has been supported by the Chairman of the Board, by Mr. Gardiner of Ottawa, and by Mr. McDiarmid of Manitoba;
3. That the Board should not accept any proposals for new or alternative projects unless properly requested by one of the Governments of the Agreement. Mr. Russell's alternative, according to his own statement, was submitted to the Board Meeting without the knowledge or endorsement of his Government;
4. That we have no objection to the ultimate development of the North Saskatchewan-Red Deer Project, but not as an alternative to the South Saskatchewan River Project, and further, that the development of the South Saskatchewan Project is not inconsistent with the development of the Basin as a whole, as indicated in Report No. 3 of the Prairie Provinces Water Board;
5. That, after a thorough and complete investigation has been made of the water resources of a stream, as reports show was done in connection with the South Saskatchewan River, the Board, to be of any value, should be capable of making its own decision without depending on the findings of other agencies, such as the Commission, that has recently been appointed to investigate the South Saskatchewan River Project purely from the viewpoint of investment therein by the Federal Government. In Mr. Gardiner's letter to myself, dated January 14, 1952, he concurs in this viewpoint. Furthermore, Mr. Gardiner mentions in his letter that the Commission may experience some difficulty as a result of an allocation to the South Saskatchewan River Project not being made;
6. That the Board has already agreed that there is sufficient water for the South Saskatchewan Project without in any way affecting similar projects in other provinces.

This shelving of responsibility could create a precedent for all future actions by the Board. In such an event the prestige of the Board would be greatly weakened and it will defeat the object for which it was established.

I want to again express my Government's wishes that the Board reconvene at a convenient date and

reconsider its decision on the South Saskatchewan Project, and I suggest that when it meets the Board Members adhere more closely to the terms of the reference which are quite clear to my Government as outlined in the foregoing.

With reference to your expression of opinion, contained in the last paragraph of your letter of November 10th, that the Board should function in an advisory capacity only, this has not been borne out in actual practice. The Board, under the agreement signed by the four governments, is authorized to, and has made recommendations to the respective governments, all the recommendations for allocation, excepting for the South Saskatchewan Project, have now been concurred in by the governments concerned. I am now hopeful of similar favourable consideration by the Board for a recommended allocation to the South Saskatchewan Project.

I am also writing to Hon. J. S. McDiarmid in this same regard and am forwarding a copy of this correspondence to him as well as to Dr. L. D. Thomson for their information.

Trusting that I may hear from you as soon as conveniently possible, I remain,

Yours sincerely,

I. C. NOLLET.

Hon. D. A. Ure,  
Minister of Agriculture,  
Edmonton, Alberta.

MINISTER OF AGRICULTURE  
ALBERTA

Parliament Building,  
Edmonton Alberta,  
February 6th, 1952.

Hon. I. C. Nollet,  
Minister of Agriculture,  
Regina, Saskatchewan.

Dear Mr. Nollet:

I have noted the contents of your recent letter dealing with the matter of Prairie Provinces Water Board. I note that you have outlined your position under six headings; I would like to briefly comment on some of them.

You admit that No. 1 is only your opinion which would leave room to suggest that others might have an entirely different opinion on the same question. If all the Board had to do was allocate water, its function would not be too onerous.

*Royal Commission on South Saskatchewan River*

2. Certainly we could not agree with your idea that no new proposal could be introduced until the one before the Board was already disposed of. This is something that we would never agree with. It could be a means of stalling unnecessarily.

3. I can quite appreciate that Mr. Russell was not taking it upon himself to speak for the Government of this Province at the Board meeting referred to. However, as I think I have indicated to you before, the views expressed by Mr. Russell are those held by the Government here.

Further on in your letter you suggest that the Board, to be of any value, should be capable of making

its own decisions. As far as we are concerned, the Board does not make any decisions. It only makes recommendations. Any decisions that will be made, as far as we are concerned, will be done by the Executive Council.

I trust that this indicates quite clearly our thinking on these matters.

Yours very truly,

D. A. URE,  
Minister in Charge of  
Water Resources and Irrigation.

## PROVINCE OF ALBERTA

*Copy*

April 9, 1952.

Dr. T. H. Hogg,  
Chairman, Royal Commission,  
South Saskatchewan River Development,  
Ottawa, Ontario.

My Dear Dr. Hogg:

With regard to the matters contained in your letter of December 19, 1951, and particularly with regard to the last paragraph of that letter, my Government has now prepared a written submission which we trust will help the Commission's inquiry.

The submission expresses very briefly some of the views of my Government in advance of public hearings to be held later, and is not intended to preclude a formal submission by the Government of Alberta at a public hearing.

Yours very truly,

E. C. MANNING,  
Premier.

### INTRODUCTION

In order to properly present the views of the Alberta Government with respect to the proposed South Saskatchewan Development having regard to whether the said project represents the most profitable and desirable use which can be made of the physical resources involved it has been necessary to review the

proposals and plans which have been investigated over the past thirty years in connection with such a project. The following are briefly discussed:

*First:* Characteristics of the Saskatchewan River drainage basin and of the main tributaries of the North and South Saskatchewan Rivers.

*Second:* Jurisdiction over the administration of interprovincial streams.

*Third:* Interprovincial Board.

*Fourth:* Dominion Provincial Board.

*Fifth:* Activities of the Water Board.

*Sixth:* Analysis of alternative plans for use of the physical resources involved.

*Seventh:* Further investigations suggested.

**NOTE:** For the convenience of the Commission the views of the Alberta Government are summarized at the beginning of the submission.

### *Summary*

Because the headwaters of the important interprovincial streams are in the mountains and foothills of Alberta where the bulk of the runoff is readily accessible and feasible to divert, this province has not been so concerned as to the jurisdiction over the waters of such streams as have the provinces of Saskatchewan and Manitoba. However, in the best interests of the best uses of these waters, the Government of Alberta has agreed to the establishment of a Dominion-Provincial Board for the purpose of advising the respective Governments, first, with respect to the extent and character of the water resources of the interprovincial streams and the affects of the existing and potential water develop-

ments in any one of the provinces upon the water development potentialities of the other two provinces and, second, to recommend to the respective governments concerned, the allocation of waters of streams in the drainage basin for projects and provinces having regard to the best use of water in the drainage basin as a whole.

Because the conservation and the best use of inter-provincial streams in the Saskatchewan River drainage basin, can only be attained through the regulation of the flow of the streams by storage, and because the natural and artificial storage sites are in the mountain and foothill regions of the drainage basin, it is not possible to administer the water resources of this basin in the best interests of the respective provinces except through single administrative authority. In other words, these interprovincial streams cannot be administered in the best interests of the most beneficial use of water by the respective provinces separately.

Because of topographic and other features of the Saskatchewan River drainage basin, the best or most economical and beneficial uses of the water supplies, so far as irrigation and water power development is concerned, naturally occur in the foothill reaches of the drainage basin. This foothill region happens to be in the province of Alberta.

Although there is a very extensive area of semi-arid lands, within the Saskatchewan River drainage basin, which will benefit by the application of water for irrigation, stock water and other domestic purposes, particularly if pumping is resorted to, there is a definite limit to the quantity of water which it is feasible or economical to divert for these lands. For some time to come and possibly forever, the construction of irrigation facilities should be confined to those areas which can be reached by gravity canals or by low lift pumps, where exceptional conditions warrant, the use of such pumps.

It is possible, by diversions in the foothill regions of the Saskatchewan River drainage basin, to divert and carry irrigation water from the Red Deer, Clearwater, North Saskatchewan River, and if need be, from the Athabaska River, to large areas of semi-arid lands in both Alberta and Saskatchewan. Such a project was first investigated in a preliminary way by the Dominion Reclamation Service in the years 1921-22, and found to be quite feasible. However, a number of alternative plans to divert water to the lands of Alberta and Saskatchewan have since been investigated in some detail, but no surveys in detail have yet been made of one overall development for lands in both provinces.

Some of the advantages of two separate projects for Alberta and Saskatchewan are as follows:

- (1) It enables the province of Saskatchewan to proceed with irrigation development independent of the province of Alberta.
- (2) It brings the point of diversion for lands in Saskatchewan closer to these lands thus saving some losses in water transportation and some maintenance costs.
- (3) A dam on the South Saskatchewan River could serve as a diversion for water for irrigation purposes and also as a water power development for the generation of power for industry in Saskatchewan.
- (4) The proposed location for a reservoir on the South Saskatchewan River is such that little property damage would result from flooding.
- (5) The Calgary Power Limited, for its operations on the Bow River, has constructed a number of reservoirs which have the effect of increasing the winter flow of the South Saskatchewan and Saskatchewan Rivers through the province of Saskatchewan and Manitoba, thereby increasing the firm water power capacities of these streams.

Factors in favour of one overall Alberta-Saskatchewan Development are as follows:

There is always an advantage in co-ordinated programs of water development for drainage basins. The programs for the development of any particular drainage basin, in order to be economical, should be comprehensive and co-ordinate all individual effort with the end in view that the most beneficial use is made of the available water supply for the ultimate development. The independent development of the water resources mainly because of an artificial boundary dividing the drainage area is not consistent with the principles above enunciated.

For the full development of irrigation and water power in the Saskatchewan River drainage basin, both the North and South Saskatchewan Rivers are necessary. Insofar as irrigation is concerned the North Saskatchewan River is of little value except for the possibility of diverting some of the water from it to the South Saskatchewan River. The only point where such a diversion can be made happens to be in Alberta. Unless such a diversion is made to supplement the flow of the South Saskatchewan River, there will not be sufficient water available from the South Saskatchewan River for a reasonable water power and irrigation development.



There is more likelihood of finding good foundation conditions for diversion structures in Alberta than in Saskatchewan and the magnitude and cost of such structures will be much less in Alberta than in Saskatchewan.

Fairly complete water supply estimates of the Saskatchewan River drainage basin indicate that after allowing for some 1,721,400 irrigable acres in Alberta, there is sufficient water left for Saskatchewan.

- (a) To satisfy all future requirements along the Qu'Appelle Valley.
- (b) To irrigate over 430,000 acres of land every year in Saskatchewan.
- (c) To produce all of the energy necessary to pump the necessary supply for the irrigable lands.
- (d) To produce 326,000,000 K.W. hrs. of firm commercial energy each year.
- (e) To produce average per year 100,000,000 K.W. hrs. of secondary energy.

The doubtful part of the calculations to arrive at the above conclusions are with respect to return flow, evaporation losses and estimated requirements for irrigable areas. However, the estimates are reasonably close. The point to be noted however, is that all irrigable lands provided for in Alberta are or can be, and should be, under gravity canals, but if it can be considered economically feasible to pump water to great heights for the irrigation of lands in Saskatchewan, then it must be even more feasible and economical to pump water to the same great heights for lands in Alberta. Since, however, there are far more lands in the drainage basin than there is water available to irrigate, then it would be very wise to confine irrigation development in the drainage basin to those areas which can be reached by gravity canals rather than the lands which require to be reached by pumps.

If, for instance, the irrigable lands in Alberta were re-estimated on the basis of even a fifty foot lift, the water supply estimates would show considerably less firm and secondary energy than now estimated available at the Coteau site in Saskatchewan. That is, since the province of Alberta can give no assurance that irrigation development in the Province will be confined to 1,721,400 acres, then the estimates made for the primary and secondary energy production for the Coteau site is questionable on the basis of water supply alone.

If, by the construction of a dam in Saskatchewan of some reasonable height and cost, the South Saskatchewan River could be diverted by gravity canals to the Saskatchewan lands requiring water at costs comparable with the cost of carrying a similar supply of water from Alberta to these same lands then, and only

then, should two separate developments be considered, not because of any artificial boundary such as the fourth meridian, but as a matter of economy. The following are the best estimates available at the present time from which to judge the comparative merits of the proposed combined and separate developments.

On the basis of capital cost for the irrigation facilities to irrigate, in Alberta, some 400,000 acres of land, and in Saskatchewan some 430,000 acres of land, the following are the comparative costs.

Separate developments ....	\$134,000,000.00
Combined developments ...	96,367,000.00
Difference .....	\$ 37,633,000.00

Assuming a difference of some \$38,000,000.00 in favour of the combined irrigation project then for comparable cost, it is necessary to justify the expenditure of some \$38,000,000.00 by revenues to the irrigation development from the operation of the power development.

The following is from the report of David Cass-Beggs, the consulting engineer employed by the Government of Saskatchewan to investigate the water power possibilities on the proposed South Saskatchewan project.

"The primary disadvantage of the Coteau Creek plant is the limited energy available, particularly at the end of the irrigation development.

"The available energy has been estimated to be 326,000,000 Kw. hrs. initially falling to 210,000,000 Kw. hrs. finally. These figures are nearly 100,000,000 Kw. hrs. less than those estimated by the P.F.R.A.

"If the P.F.R.A. figures were realized at the start of the project it would probably be difficult to use the energy but at any time after 1970 an additional 100,000,000 Kw. hrs. could be absorbed and could be valued at 3.5 mills since it would save the incremental energy cost to this extent and the capital costs of transmission would already have been covered by the first block of energy.

"It would appear possible to contribute to the Central Saskatchewan project in one way or another a sum equal to the value of any additional power available, say 3.5 mills per Kw. hr., up to 100,000,000 Kw. hrs. per year. If the P.F.R.A. estimates were to be realized this would provide an income of \$350,000 per year after 1970. The assumptions on which this report is based indicate that it would be available only in occasional years or periods of high flow."

It would appear that there would not be much hope of justifying an expenditure of \$38,000,000.00 by power revenues particularly if such revenues would not be made available until after the year 1970.

The power and irrigation facilities are so tied together and involved, in this particular proposal, that it is very difficult to separate them in order to get a true picture of the values of the two separate developments. However, because of the uncertainty as to the future power loads for the Province and also of the water supply which will be available ultimately for power production, for these reasons alone one overall Alberta-Saskatchewan development would appear to be in the best interests of the drainage basin as a whole.

It is the view of the Alberta Government that the terms of reference to the Prairie Provinces Water Board must of necessity include a study of the most beneficial use of water and that a reservation of water for a two year period, which has been made by the Board, is all that is warranted under present circumstances for the South Saskatchewan River Project.

The Alberta Government believes that until a thorough investigation of one overall Alberta-Saskatchewan Project has been completed, the best uses of the water reservoirs of the Saskatchewan River drainage basin cannot be determined, and they would suggest that such an investigation be initiated by the Prairie Provinces Water Board.

A plan of the overall Alberta-Saskatchewan project which the Alberta Government suggests for further investigation is included in the submission. It has been compiled from information available in the Water Resources Office and represents, in their opinion, the gravity irrigation project that, with further investigation may prove to be the best use of the water resources available in the Saskatchewan River basin.

To carry out such an investigation as above suggested, the Alberta Government considers that before topographic surveys are undertaken a soil survey should be undertaken in sufficient detail to eliminate all of those areas where the soil is unsuitable thus saving the cost and time of making the topographic surveys.

#### *Characteristics of the Saskatchewan River Drainage Basin*

The Saskatchewan River Drainage Basin consists of the area drained by the North and South Saskatchewan Rivers and tributaries.

The characteristics of the North and South Saskatchewan River basins are very similar. They are made up of many tributaries which rise in the icefields to the east of the Great Divide. The upper sections consist

almost entirely of the higher peaks, generally above the tree line. The foothill sections are well covered with forests which serve to hold the snow, thereby regulating the runoff. As the streams reach the prairies they flatten out and the rate of flow becomes much less than from the upper reaches.

The South Saskatchewan River is made up of the following main streams together with many tributaries: The Waterton, Belly, St. Mary, Oldman, Little Bow, Highwood, Bow, and Red Deer Rivers.

These streams, with their tributaries, all join in Alberta to form the South Saskatchewan River, which, in Saskatchewan, is joined by a number of streams from the Cypress Hills. The stream is again joined by the North Saskatchewan River at a point below Saskatoon, to form the Saskatchewan River. The River then flows to Lake Winnipeg in Manitoba, and by the Nelson River, to the Hudson's Bay.

The North Saskatchewan River Drainage Basin is made up of the following main streams together with their tributaries:

The Clearwater, Brazeau, Sturgeon, Battle, Vermilion, and North Saskatchewan Rivers.

These streams all join in Alberta to form the North Saskatchewan River proper. The stream then flows into Saskatchewan where it is joined by the Battle and South Saskatchewan Rivers.

The following from the official hydrometric stream flow record will give some indication of the water supply of the Saskatchewan River Drainage Basin.

#### *Saskatchewan River at The Pas—*

Records from February 1913 to September 1937.

Drainage area .....	149,500 sq. mi.
Average annual run-off .....	18,000,000 ac.-ft.
Maximum rate of discharge recorded	103,000 c. f. s.
Minimum rate of discharge recorded	500 c. f. s.
Run-off per sq. mile of drainage area	120 ac.-ft.

#### *North Saskatchewan River at Prince Albert—*

Records from

Drainage area .....	46,100 sq. mi.
Average annual run-off .....	6,234,000 ac.-ft.
Maximum rate of discharge recorded	200,000 c. f. s.
Minimum rate of discharge recorded	400 c. f. s.
Run-off per sq. mile of drainage area	135 ac.-ft.

#### *South Saskatchewan River at Medicine Hat—*

Estimated

Drainage area .....	20,600 sq. mi.
Average annual run-off .....	5,481,115 ac.-ft.
Maximum rate of discharge recorded	145,000 c. f. s.
Minimum rate of discharge recorded	360 c. f. s.
Run-off per sq. mile of drainage area	266 ac.-ft.

*North Saskatchewan River at Edmonton—*

Drainage area .....	10,495 sq. mi.
Average annual run-off .....	5,621,000 ac.-ft.
Maximum rate of discharge recorded	204,500 c. f. s.
Minimum rate of discharge recorded	380 c. f. s.
Run-off per sq. mile of drainage area	535 ac.-ft.

The tributaries which flow from the mountains are permanent streams. Through the foothills in Alberta these streams flow in shallow valleys and have considerable fall. It is possible, therefore, to divert them by gravity canals to lands requiring irrigation on the higher benches. Throughout the eastern portion of Alberta and through the provinces of Saskatchewan and Manitoba, these streams flow in deep wide valleys from two to five hundred feet below the prairie level and cannot, therefore, be diverted by gravity to the general prairie levels.

There is a tremendous fluctuation between the maximum and minimum flows of the streams in the drainage basin. It is, therefore, important to all of the semi-arid and arid areas within the basin that the stream flow should be regulated and that water which now flows uselessly to the Hudson's Bay during high and flood stages, be stored and conserved in order to provide a satisfactory flow during the months of the year when the natural flow is low. Storage reservoirs can only be established where conditions are favourable, i.e. in the Saskatchewan drainage basin, mainly in the foothills of Alberta.

The past forty years have seen the depletion of what may be called a natural covering consisting firstly of prairie grass and secondly of forests, the latter having been depleted by logging operations and forest fires, and the former by grazing, cultivation and erosion. The result is that the run-off which formerly took place at seasons of the year which permitted direct irrigation from the rivers now occurs earlier in the year and in greater volume, not only making it more and more difficult to irrigate lands from the natural flow of the streams, but creating the conditions for disastrous floods and erosion.

Remedial measures which are now underway by the recently appointed East Slope Rocky Mountain Board, will have some beneficial effect over a long term of years, but large reservoirs will eventually be required in the headwaters to regulate the streams for both power and irrigation development and for flood control.

The area of the entire Saskatchewan River basin is 149,500 square miles or more than double the combined area of the Maritime Provinces. It contains most of the large centres of population, and a large percentage of the agricultural lands in Alberta and

Saskatchewan. Water development projects must, therefore, play a very important part in the agricultural and industrial development of the two provinces and of the country generally. The average annual discharge of the North and South Saskatchewan Rivers combined as they pass into Saskatchewan, is estimated at 13 million acre feet. The average annual flow of the Saskatchewan as it passes into Manitoba is estimated at about 18 million acre feet.

An estimate of 1,923,305 acres has been made for the ultimate development of irrigation in Alberta. The best estimate available for Saskatchewan is 925,000 acres. Together these give a total of 2,848,305 acres. Although the development of water power does not deplete the streams, it does decrease the summer flow and increase the winter flow.

In order to equitably allocate the interprovincial waters it will be necessary to make a comprehensive study of the available supplies and possible uses.

*Jurisdiction Over the Administration of Interprovincial Streams*

Prior to the transfer of the natural resources in 1930 from Canada to the respective provinces, there was a single administration of the water resources of the Prairie Provinces and the North West Territories. No conflict during that period of any description arose in any quarter as to the distribution or sharing of these resources. With the replacement of the united administration by divided ownership and control, after the transfer, it was realized that unless foresight was exercised, interprovincial difficulties might develop in respect to the use of the limited water resources available, thus giving rise to controversies and possible legal disputes similar in character to those which have been experienced with such obstructive consequences between state and state south of the International Boundary.

All of the important streams in Southern Alberta, with the exception of the Milk River, contribute to the drainage basins of streams which cover two or all three of the provinces of Manitoba, Saskatchewan and Alberta; they consist of the North and South Saskatchewan River drainage basins and tributaries, and the Battle River, which joins the North Saskatchewan River near Battleford. Other smaller streams which cross the Provincial boundary are Lodge, Middle and Battle Creeks, or tributaries of the Milk River, and Boxelder, Eyehill, Blackfoot, Bug Gully Creeks, as well as several other smaller streams.

As a measure designed to prevent the development of such controversy, a proposal for the formation of a Western Water Board was brought forward at the time

of the water resources transfer, in order to provide for the solution of interprovincial water problems.

Negotiations looking to the formation of the Board reached an advanced stage immediately after the transfer and an agreement embodying the proposal was signed by the Premiers of the three Prairie Provinces. The delay in the final consummation of the agreement was due to the impact of more pressing problems brought about by the depression. Further attempts to negotiate a satisfactory agreement at this time failed and the matter lay dormant until 1940.

#### *Interprovincial Board*

For the reason that the Manitoba Government became concerned with the effect of large water diversions in Alberta upon lake levels and water power possibilities in the lower reaches of the Saskatchewan River drainage basin, a Board composed of provincial members was initiated by that Province. A draft for an agreement between the provinces of Manitoba, Saskatchewan and Alberta was eventually prepared and finally completed in December, 1945.

The appointment of an Interprovincial Board, which followed, was not popular with the Dominion Government. The Minister of Resources for Canada in April, 1946, stated in Parliament that because the Prairie Provinces had set up an advisory water board, without inviting the Dominion to participate, the Federal Government was stepping out of the picture. This was taken by the opposition as an excuse by the Dominion Government for the Government to back down on its promises to provide irrigation works for the West. This caused a bitter debate in Parliament.

The main purposes of the Board established by the Provinces was to make, in co-operation with the Dominion Government Departments, a comprehensive overall study of the Saskatchewan River drainage basin, which the Board considered, should have been made years before, in order to determine the interrelationships between various developments which had been proposed from time to time with respect to various reaches of the Saskatchewan-Nelson River system, and the effects of the various proposed developments one upon another in the entire system. The Board, while it considered that although there was available a considerable amount of relevant information, such information was inadequate for such a study looking to economic development of the drainage basin as a whole and in the best public interests of the respective provinces and of Canada.

#### *Dominion-Provincial Board*

However, it was considered by the Provinces that if the statement of the Minister of Resources to the effect that the Dominion Government would step out of the irrigation picture unless represented on a Water Board, that a new Board would be formed which would include Dominion and Provincial representatives. Attached hereto is a copy of P.C. 2297 which provides for a Dominion-Provincial Board and to which is attached a copy of the agreement completed between Canada and the respective Provinces. It will be noted that Clause 2 is the important clause of the agreement. This provides as follows:

"The functions of the Board shall be to recommend the best use to be made of interprovincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta, and to recommend the allocation of water as between each such Province of streams flowing from one Province into another Province."

The result of it all was to place the Board in the position of allocating water to projects or Provinces before a comprehensive overall survey of the entire drainage basin was possible, in order to determine the best use of the available water supplies.

The following from a paper by D. M. Stephens, Deputy Minister of Mines and Resources for the Province of Manitoba, presented at the annual general meeting of the Engineering Institute of Canada, June 3rd, 1948, indicates the complexity of problems in the Saskatchewan Drainage Basin.

"I think it would be safe to say that the co-ordinated development of the water and related resources of the Saskatchewan River watershed represents one of the most important and one of the most complex problems in the field of resources management with which Canada is faced today. There are two national governments, three provincial governments, one state government and literally hundreds of municipal governments, each having its own general or special interest in the Saskatchewan River.

"There are as well, at least six separate and distinct geographic regions, each with its separate and distinct problems and possibilities relating to the control and use of water, not all of which are by any means compatible with others. First there is the mountain and foothills area where forest protection, power and storage will probably remain the dominant problems respecting the Saskatchewan River.

"Next there are the south-western prairie regions characterized by relatively steep river gradients, semi-arid climate, high summer temperatures, long growing seasons and, not the least important, populated by experienced irrigation farmers. These characteristics have been particularly favourable to irrigation. The steep slopes have made it possible, with a single dam and with a minimum of flooding damage, to command the maximum acreage solely by gravity. The climate has been favourable to irrigation not only because of the high summer temperatures and long growing seasons, but also because of the low precipitation which makes irrigation an annual necessity for the wide variety of cultivated crops grown in these localities. The steep river gradients which make it possible to command large land areas at relatively little cost also provide favourable conditions for the generation of hydro electric energy.

"Then comes the central prairie portion of the Saskatchewan River watershed. Through this region the Saskatchewan and its tributaries flow through relatively deep valleys, usually several hundred feet below the general prairie level and the river gradients are relatively flat. As the river flows easterly it passes through areas that have somewhat lower summer temperatures, higher annual precipitation and where dry-land farming is relatively less hazardous and where great difficulties would be encountered in using water either for irrigation or for power purposes.

"Between the prairie regions and Cedar Lake just above Lake Winnipeg, the river flows through a broad flat valley which is generally lightly wooded, but which is dotted with numerous shallow lakes and large open marshes. Throughout the eastern portion of the broad flat valley for many years the main economic return has been from aquatic fur bearing animals. These thrive in this immense marsh area wherein the water is periodically replenished as the Saskatchewan River overflows its low banks. Much of the eastern portion of this area is a flood plain or delta formation built up through the deposition of silt. During recent years two very interesting experiments have been going forward simultaneously in these portions of the Saskatchewan River delta or flood plain which lie between the Saskatchewan-Manitoba boundary and Cedar Lake."

Mr. Stephens in his presentation also stresses the importance of power development in the lower reaches of the Saskatchewan River and along the Nelson River.

The Alberta Government through its representative on the Board, prepared a list of projects authorized in Alberta under the provisions of the Irrigation and Water Resources Acts for recommendation of the Board. Attached herewith is a copy of O.C. 857/49 dated July 13, 1949, adopting the recommendation of the Board with respect to the Alberta projects. Similar action was taken by the Government of Manitoba at this time, but withheld by the Government of Saskatchewan until July 1951, when a list of Saskatchewan projects, authorized prior to the appointment of the Board, was submitted for consideration. Such a list of projects was adopted by the Government of Alberta by O.C. 1091/51 dated July 24, 1951.

A number of meetings of the Board were held during the above interval. The engineers employed by the Board in co-operation with Dominion and Provincial Departments prepared a very elaborate study of the available water supplies of the Saskatchewan drainage basin and the P.F.R.A. engineering organization proceeded with surveys and plans of the South Saskatchewan and William Pearce projects.

Through the Alberta representative of the Board the attitude of the Alberta Government with respect to allocating water for the William Pearce project in Alberta and the South Saskatchewan project in Saskatchewan was indicated to the Board from time to time.

Attached to this report is a copy of a letter dated February 14, 1950, by the Alberta representative on the Board to the Chairman of the Board anticipating the application by the Province of Saskatchewan to the Board for an allocation of water for the South Saskatchewan project. Engineers for the Water Resources Department of Alberta reviewed the plans, estimates and costs or proposal for separate Alberta and Saskatchewan projects, as against one overall Alberta-Saskatchewan project, and came to the conclusion that the one overall Alberta-Saskatchewan project should be recommended, in order to make the best use of inter-provincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta, or at least it was concluded that the allocation should be made to the South Saskatchewan River project until it was determined by further surveys, if necessary, what is the best use of these interprovincial waters.

Attached is a copy of the minutes of the meeting of the Board held September 5th, 1951, called to consider the allocation of water for the South Saskatchewan River project.

"When the question of allocation was considered, the Alberta representative took the view

that the two projects, the William Pearce and the South Saskatchewan, should be considered together in their merits and not from any Provincial point of view and that before allocations for either were made by the Board, one overall Alberta-Saskatchewan development should be further investigated and studied from the point of view of making the best use of the waters in the drainage basin."

As a result of the discussion which followed, the question of function of the Board arose. The representatives from Alberta and Manitoba supported the view that not only the available water supply must be taken into account, in considering allocations, but also the economics of the developments. The Saskatchewan representative, however, took the view that cost need not be considered and that it was nobody's concern except the Province affected what expenditure was necessary to make use of the water and that allocations should be made on the basis only of available water supply.

It was decided at the meeting that each Provincial representative should refer to his Government the terms of reference with respect to the functions of the Board for an interpretation of such functions.

With respect to the Alberta Government's interpretation the following is from a memorandum dated October 1, 1951, by the Minister in charge of Water Resources, who brought the matter to the attention of Council.

"It is our unanimous opinion that the terms of reference must of necessity include a study of the most beneficial use that can be made of the water."

With respect to other interpretations, the following are from letters by the Ministers of Agriculture for Saskatchewan and Canada respectively:

"The question of the Board's terms of reference apparently centered around the relation to the Board to the recently constituted Royal Commission. As you know, the Board, with the exception of the Saskatchewan representative, voted to postpone a decision on allocation until the Commission completes its report to the Federal Government, thus binding itself to the findings of the Commission. In my opinion this constitutes a breach of the spirit and terms of reference . . . Furthermore, the Water Board has the specific task of allocating waters in a comprehensive consideration of the factors involved while the Commission was set up

to investigate factors employing eventual investment decisions on the part of the Federal Government."

The above are quotations from a letter by the Minister of Agriculture for Saskatchewan. The following are from the Minister of Agriculture for Canada:

"My own point of view is that the authority given to the Board to study alternative uses of Water Resources had no particular project in mind.

"I do not think, however, that it was very anticipated that it would be the responsibility of any Province desiring to use water, which had been assigned to it, to first submit their plans to the Water Board.

"All we would be concerned about in a matter of that kind is the question as to whether the amount of which the Board had agreed any one of the Provinces was entitled to would take care of the project that we ourselves intended to finance. In my opinion the question as to whether we are going to finance it or not is one to be decided by the Government of Canada, and the Government of Canada would be quite capable of determining from the facts given to it by the Prairie Provinces Water Board as to whether there is sufficient water available.

"In short I do not think that the procedure followed by the Water Board at their last meeting was in agreement with the terms of the Order-in-Council, which set up the Prairie Provinces Water Board."

The foregoing is given to indicate the difference of opinions of Board members and their respective Minister.

In support of Alberta's contention that one overall Alberta-Saskatchewan project should be recommended, rather than two separate projects, or at least no allocation should be made to the South Saskatchewan project until it was determined by further surveys, if necessary, what is the best use of water, the following preliminary construction cost estimates were prepared by the Water Resources Department for the purposes of a rough comparison.

Separate Developments .....	\$134,000,000
Combined Development .....	96,367,000
	\$ 37,633,000

The following is from a letter dated November 9, 1951, from the Alberta representative of the Water Board to the Chairman of that Board.

"It would seem to us that this difference, if justified at all, must be justified on by the development of water power incidental to the water power development.

"We have not had the construction details and other data to intelligently analyse the power features. However, from a study of the Cass-Begg Report, which is the only practical analysis of the power situation in Saskatchewan available to us here, we would conclude that a capital expenditure of not more than a quarter of \$37,633,000 could be justified from the net revenues available from the power development.

"However, the Royal Commission recently appointed to report on the South Saskatchewan project is composed partly of power experts who will probably be able to better assess the water power values."

Since the meeting of the Water Board, engineers of the Water Resources have given some further consideration to the type of project which would best serve the functions of providing irrigation for Alberta and Saskatchewan lands.

#### *Activities of the Prairie Provinces Water Board*

For purposes of dealing with applications to the Board the principal priority was adopted on the following basis:

*First:* Projects which are fully developed and for which water had been appropriated by the Federal Government prior to the Natural Resources Transfer Agreement.

*Second:* Projects which are fully developed and for which water had been appropriated by the Province concerned prior to July 28, 1948.

*Third:* The completion of projects which are partially developed and which can be fully and beneficially developed within the appropriations as "First" and "Second".

*Fourth:* The completion of projects with respect to which substantial works are now in existence and which works could, by the use of additional water and as shown by complete investigation, be made to serve larger areas in a beneficial manner involving allocations over and above those provided for by prior Dominion and Provincial allocations.

*Fifth:* Projects which are now under development by the Dominion and Provincial Governments and with respect to which an immediate beneficial use must be established in order to secure or protect our international allocation.

The first application dealt with by the Board was that of the Government of Alberta for the necessary

water for those projects for which water had been appropriated either by the Dominion or the Province.

Allocation for these projects was recommended by the Board and confirmed by Orders in Council by the Alberta and Manitoba Governments and by the Federal Government respectively. The date of the Alberta Order in Council was July 13, 1949. However, the Government of Saskatchewan delayed confirmation pending the completion of the investigation of the South Saskatchewan River Development, apparently with the intention of including this project along with those in Alberta and Saskatchewan for which water was allocated prior to the establishment of the Prairie Provinces Water Board.

The allocations requested for Alberta were made when the Board asked for them and these were before the Board prior to any other allocations. There was no new commitment in any of Alberta's requests as it was merely a summary of existing projects and water that had been appropriated over many years either by the Federal Government or by the Alberta Government.

The Board did approve a list of Saskatchewan projects similar to those requested for Alberta and for which water had been allocated by the Federal and Saskatchewan Governments prior to the existence of the Prairie Provinces Water Board. These were confirmed by Order in Council signed by the Lieutenant Governor of Alberta July 24, 1951, and the existing Alberta projects finally confirmed by Order in Council by the Government of Saskatchewan.

At a meeting of the Prairie Provinces Water Board at Regina, on the 5th and 6th of September, 1951, allocation for a supply of water from the South Saskatchewan Project was submitted to the Board. The Alberta representative on the Board presented a proposal for one overall Alberta-Saskatchewan project as an alternative to the two separate projects, one of which was the South Saskatchewan project under consideration.

The opinion was expressed by the Alberta representative of the Board as follows:

"When the matter of allocation of water for the South Saskatchewan Project was brought to the attention of the Board at a meeting held January 26th and 27th, I expressed the opinion that the two projects, the Red Deer Diversion project and the South Saskatchewan project should be considered together on their merits and not form any provincial point of view and that before allocations were considered for either of these projects, one overall Alberta-Saskatchewan development should be studied."

In the discussions which followed the functions of the Board were discussed. The Alberta representative argued that it was the responsibility of the members in considering allocation for projects, to take into consideration, not only available water supply, but also the economics of the projects which involves the cost of such projects and for that reason alternatives should be investigated before allocations were finalized. Members were requested by the Chairman to refer to their respective Governments the terms of reference for an interpretation of the "Functions of the Board".

The chairman stated that alternatives to the South Saskatchewan Project had already been investigated by P.F.R.A. and it was his understanding that the South Saskatchewan Project was the most economical proposal. However, in view of Mr. Russell's motion he was prepared to have the available data reviewed again.

A motion that whereas the Board has unanimously agreed there is sufficient water for this project the Board agree to reserve to the South Saskatchewan River Project 960,000 acre feet of water annually from the South Saskatchewan River, this reservation to be effective for a two year period was carried.

It is the opinion of the Alberta Government that the terms of reference to the Board must of necessity include a study of the most beneficial use that can be made of the water and that a reservation of the water for a two year period for the South Saskatchewan projects is all that is warranted under the present circumstances.

#### Analysis

Engineers of the P.F.R.A. and the Water Board made a review of the alternatives and came to the following conclusions:

First, cost is no criterion of economy. This has been borne out in the comparison of the combined and separate proposals. It has been shown that although the initial cost of the combined proposal is less, the separate proposal is much more desirable.

Engineers of the Water Resources do not agree with the review which was made and have prepared estimates from the best information available for comparative cost and find:

On the basis of capital cost for irrigation facilities only, the following is probably the best comparison which can be made at present:

Capital Cost—Separate developments ....	\$134,000,000
Capital Cost—Combined developments ....	96,367,000
Difference .....	37,633,000

Engineers of the Water Resources Department have done further investigation and in this submission they present a plan for one overall project which, in their opinion, should be investigated as an alternative to the two separate Alberta-Saskatchewan developments.

#### Further Investigations Suggested.

The plan proposed by the Water Resources engineers is a combination of various plans investigated by the various irrigation agencies, (see attached plan).

It is mainly the project proposed by William Pearce and investigated in 1921-22 by the Reclamation Service supplemented by later investigations and plans.

A. B. Cook, P.F.R.A. engineer, proposed the central section which reaches the land in Western Saskatchewan which can only be reached under a gravity canal by this means.

The P.F.R.A. investigations east of the South Saskatchewan River in Saskatchewan have supplied the information for those lands.

Other information has been taken from various topographic maps and plans available in the Water Resources Office.

Before any further topographical survey is considered, there should be a complete comprehensive soil survey of all areas considered satisfactory for irrigation from the preliminary survey work.

The preliminary soil survey as now issued differs very widely from the final soil surveys. This means considerable waste of time and money on topographic surveys on lands which are later rejected by the final soil survey. The Carmangay district of Alberta is a good example. Preliminary soil survey showed the lands satisfactory for irrigation, but later, after the plane topographic survey was completed the final soil survey showed the lands unsatisfactory.

If a sufficiently comprehensive soil survey were completed, immediately after the preliminary topographic work, so that any lands found to be suitable from a soil standpoint would, if found satisfactory from a topographic standpoint, only be reduced by the small amount due to irregularities in soil and topography by the final soil survey, then the topographic surveyors could complete their work knowing that the land surveyed would not be rejected at a later date. The time and money now used for topography could be well spent in a more comprehensive soil survey.

If this cannot be done prior to completion of the plane table work then a man skilled in soil survey should be added to the topographic survey party so that any land plane tabled would be suitable for soils. That is, there would be a minimum wastage of effort.



At present canals are designed on a purely topographic basis. If the area to be irrigated had the soil survey and topographic survey completed together than the canal location and design would be proper for the area.

The project proposed for further investigation includes a diversion from the North Saskatchewan to the Clearwater and another diversion of the North Saskatchewan River water and that of the Clearwater River into the Red Deer River.

In order to minimize the size of the main canal it is proposed that a storage site be investigated on the Red Deer River at the mouth of the Raven River. This site would provide additional storage on the Red Deer River upstream of the main diversion dam.

The main diversion dam requiring further investigation is the one proposed by the Reclamation Service, located in 38-25-w1. Its estimated length is 4,500 feet and its height 174 feet.

The headgates for the main canal are on the south side of the river and the main canal follows the river crossing it in a large syphon in 10-38-22-w4. This structure was estimated by the Reclamation Service to be 4,400 feet long and have a head of 300 feet. From here it goes southeastward into Sullivan Lake. This is the largest and cheapest storage available on the whole project. It commands nearly all the land which is considered to be suitable for irrigation in the Alberta section of the project.

The present main canal is proposed, instead of that located by the P.F.R.A., because it commands a greater area and hence no pumping is required. The P.F.R.A. canal follows low land and to reach over 50 per cent of the suitable land requires pumping. We believe that only in exceptional cases can irrigation be financially sound when pumping is required to reach the irrigable lands.

The reservoirs are large and have a small storage capacity in the P.F.R.A. plan. Sullivan Lake is a natural reservoir with a very large storage capacity.

The water for the Saskatchewan lands continues down Sounding Creek through various storage dams. These dams while providing drops for the water also provide storage for peak requirements. They also could be used as a source of power for pumping when and if it is found feasible to pump.

North of Macklin, Saskatchewan, the water is diverted from Eaglehill Creek into a canal which carries it 55 miles into Eaglehill Creek. This canal requires three syphons and for part of the area it is through sandy soil.

On Eaglehill Creek are located Lake Reservoir, Tramping Lake Reservoir and Opuntia Lake Reservoir,

which provide storage to carry the peak irrigation requirements. All of these reservoirs are high enough to command the proposed irrigable area in the eastern part of Saskatchewan. A canal from Opuntia Lake skirting along the south side of Eaglehill Creek to near Rosetown, then turning down toward the White Bear Lake depression and thence around the north side of the Coteau bluffs would carry the irrigation water to the river crossing in the area near the Coteau damsite. A large and expensive syphon has been suggested as the means of crossing in this area.

The water crosses the river at an elevation such that the area suggested by the P.F.R.A. in the South Saskatchewan report is all covered by gravity. This eliminates the annual cost to the irrigators for lifting the water high enough to reach their lands.

Here again if it is deemed financially sound to pump to other lands in the area considerable pumping power might be found in the drops located near the east end of the syphon which drop the water for irrigation of the lower areas east of the river.

Water for irrigation in the Qu'Appelle valley would be supplied from the main canal going south from the east end of the syphon.

A larger area may be commanded from the high line canal east of the river, however we have confined the proposed investigation to those lands suggested by the P.F.R.A. The investigation would show whether sufficient water was available or whether these additional lands require irrigation.

There are certain lands in the area around Rosetown, which may not require irrigation, which are shown as commanded on the plan.

Mr. A. B. Cook, of the P.F.R.A. engineering staff, has made a proposal from reclamation surveys that seems worthy of further investigation. He suggests the canal in the vicinity of Youngstown be continued easterly to a natural reservoir site in Township 30, Range 1, West 4th Meridian. This site is 160 feet above the creek and has an estimated storage of some 300,000 acre feet. This reservoir would provide adequate storage close to the proposed area with a minimum of expense. From this reservoir A. B. Cook's main canal crosses the Cabrai valley on either one long syphon or possibly a couple of small ones. Once across this valley the canal passes through a series of small lakes to reach part of the commanded area. The land commanded in this area is not commanded by other proposals and can only be reached by gravity by a canal crossing the Cabrai valley in this area.

Adding this area to the project would tend to balance the area. This would give a large additional acreage of land in Saskatchewan that would be irrigable.

It would provide a band of irrigation in Saskatchewan from the 4th Meridian to east of Saskatoon. This additional area suggested by Mr. A. B. Cook has considerable merit and warrants further investigation.

It is obvious from the number of different proposals that have been made of the best use of this water that sufficient investigation has not been completed to determine which is the best plan. We, therefore, submit this proposal as the one that we consider shows the most promise and warrants further investigation prior to the construction of either two separate provincial projects or one overall combined Alberta-Saskatchewan project.

[DOCUMENTS ATTACHED]

Copy

O.C. 857/49.

Approved and Ordered,  
(Signed) J. C. BOWEN,  
Lieutenant Governor.

Edmonton, Wednesday, July 13th, 1949.

The Executive Council has had under consideration the report of the Honourable the Acting Minister of Agriculture, dated July 7th, 1949, stating that:

WHEREAS one of the functions of the Prairie Provinces Water Board is to recommend the allocation of the waters of Interprovincial streams; and

WHEREAS the said Board has accordingly recommended the allocations in the annual amounts indicated hereunder be granted to the Province of Alberta for diversion from the tributaries of the South Saskatchewan River for the following developed and partially developed irrigation projects:

Project	Classification	Irrigable Acres	Allocation in Ac. Ft.
St. Mary and Milk River Development.....	4 and 5	465,000	790,000
Western Irrigation District....	3	50,000	85,700
Eastern Irrigation District....	3	281,000	562,000
Bow River Irrigation Development.....	4	240,000	478,534
United Irrigation District....	3 and 5	34,000	51,000
Lethbridge Northern District	1	96,135	150,000
Mountain View Irrigation District.....	1 and 5	3,600	6,000
Leavitt Irrigation District....	3 and 5	4,400	7,000
Aetna Irrigation District....	3 and 5	7,300	13,000
Macleod Irrigation District....	3	5,000	8,000
Private Projects.....		70,000	80,000
<b>Total.....</b>		<b>1,256,435</b>	<b>2,237,234</b>

THEREFORE, upon the recommendation of the Honourable the Acting Minister of Agriculture, the Executive Council advises that the recommendations of the Prairie Provinces Water Board be and are hereby adopted by the Government of the Province of Alberta.

(Signed) ERNEST C. MANNING,

Chairman.

Copy

O.C. 1091/51.

Approved and Ordered,  
(Signed) JOHN J. BOWLEN,  
Lieutenant Governor.

Edmonton, Tuesday, July 24th, 1951.

The Executive Council has had under consideration the report of the Honourable the Minister of Agriculture, dated March 10th, 1951, stating that:

WHEREAS one of the functions of the Prairie Provinces Water Board is to recommend the allocation of the waters of Interprovincial streams; and

WHEREAS the said Board has accordingly recommended the allocations in the annual amounts indicated hereunder be granted to the Province of Saskatchewan from the indicated interprovincial drainage basins for the following developed and partially developed domestic, industrial, irrigation and municipal projects:

FINAL ALLOCATION

Project	Classification	Acre Feet Annually
<i>South Sask. Drainage Basin—</i>		
Small projects—		
Main stem.....	1 and 2	1,500
Tributaries.....	1 and 2	
City of Saskatoon—		
Municipal.....	1	11,426
Stem plant.....	1	31,260
Caron-Moose Jaw Diversion.....	2	12,600
Swift Current Irrigation Project.....	3	55,000
Swift Current Small Projects.....	1 and 2	5,600
<i>Qu'Appelle Drainage Basin—</i>		
Small projects.....	1 and 2	20,000
<i>Battle Creek Drainage Basin—</i>		
Small projects—		
Main stem.....	1 and 2	7,536
Tributaries.....	1 and 2	3,410
Richardson-McKinnon Project.....	1	3,054

FINAL ALLOCATION—*Conc.*

Project	Classification	Acres Feet Annually
<i>Middle Creek Drainage Basin—</i>		
Small projects.....	1 and 2	1,027
Middle Creek Reservoir losses.....	2	2,335
<i>Lodge Creek Drainage Basin—</i>		
Small projects.....	1 and 2	600
Spangler project.....	1 and 2	2,970
TENTATIVE ALLOCATION		
<i>South Saskatchewan Drainage Basin—</i>		
Regina-Moose Jaw Diversion.....		20,000
French Flata-Valley Park Projects.....		11,110
<i>Battle Creek Drainage Basin—</i>		
Small irrigation development—		
Main stem.....		1,000
Tributaries.....		1,000
Vidora Irrigation Project.....		3,360
Consul Irrigation Project extension.....		2,400

THEREFORE, upon the recommendation of the Honourable the Minister of Agriculture, the Executive Council advises that the recommendations of the Prairie Provinces Water Board, be and are hereby adopted by the Province of Alberta.

(Signed) ERNEST C. MANNING,  
Chairman.

Copy

February 14th, 1950.

Mr. L. B. Thomson,  
Director of Rehabilitation,  
P.F.R.A.,  
910 McCallum Hill Building,  
Regina, Saskatchewan.

Dear Mr. Thomson:

Certain discussions at the recent meeting of the Prairie Provinces Water Board have given the writer cause for some alarm and considerable thought. The discussions referred to are—

*First*:—that discussion which followed as a result of Mr. Munroe's reference to the possibility of the Board allocating water for power purposes in Saskatchewan, and

*Second*:—from his reference to the possibility of making allocations to Provinces rather than to projects.

With regard to the first, the writer is able to appreciate the desire of Saskatchewan to have water allocated for power purposes in that Province and he can understand that unless water for power purposes as well as irrigation purposes is given, some definite standing, which standing can be protected by the Board, it might be very difficult if not impossible to attract capital for water development.

On the other hand, however, unless further development of irrigation in Alberta is greatly curtailed or an additional supply of water made available from the North Saskatchewan, the Athabaska, or both drainage basins, sufficient for such further development, it would be impossible for the Board to make or maintain definite allocations for power development until all the requirements for irrigation and other purposes are met.

The above discussions have prompted the writer to review briefly the history of the following two projects which might soon require the serious consideration of the Board. First, the North Saskatchewan or Red Deer Diversion project, and second, the South Saskatchewan River Development.

Most of the lands contained in these projects were originally in one combined development known as the North Saskatchewan Project. This project extended from a point on the North Saskatchewan River above Rocky Mountain House to Saskatoon in Saskatchewan. The project originally contained some 1,411,000 acres of irrigable lands and was estimated to cost approximately \$105,600,000 including the diversion of the North Saskatchewan and Clearwater Rivers. While a revision of unit prices would undoubtedly increase the costs of the project, the writer knows the unit prices adopted in 1921, when the estimates were made, were purposely made fairly high.

Assuming, however, that the estimated cost of \$105,600,000 is even only very approximately correct, then the Board when the time comes to seriously consider appropriations for the two above projects as now contemplated, should in the best interests of the best uses of water in the drainage basin as a whole, give serious consideration to one general overall Alberta-Saskatchewan project rather than two separate projects.

Regarding the matter of two separate projects as an alternative to one overall development, the writer is quite familiar with the early considerations given to the alternatives and was probably more instrumental than any other person for making the investigations which have led to the present status of the development. The following are some of the considerations referred to.

Although it is quite feasible to carry water by means of canals, natural channels and reservoirs, from the Red Deer River in Alberta as far as Saskatoon in

Saskatchewan, and it is the writer's opinion that it is quite feasible also to carry such water across to the east side of the South Saskatchewan River to the additional lands now included in the Saskatchewan Development, it was considered advisable for a number of reasons to divert water for the Saskatchewan lands directly from the South Saskatchewan River, if such diversion was found to be feasible and economical. There was, however, no thought in the writer's mind of constructing a huge and expensive dam as now contemplated and the only reason the writer had in mind for suggesting an alternative to the one Alberta-Saskatchewan development was the existence of the summit at the south end of Whitebear Lake between the North and South Saskatchewan Rivers drainage basin. It was considered that if by the construction of a dam some fifty to seventy feet in height across the South Saskatchewan River at a point about due north of Swift Current, South Saskatchewan River water could be diverted from the Whitebear Valley depression to the Eaglehill Creek drainage basin, the cost of such necessary diversion works might compare favourably with the saving which might be effected in the cost of main canal construction necessary to carry water to the Eaglehill Creek drainage basin from Alberta. That is, it was considered that if water for Saskatchewan lands could be carried into Saskatchewan by river channels rather than by canals, natural channels and reservoirs by the Sounding Creek, Eyehill Creek, Tramping Lake and Eaglehill Creek route at comparable costs than it would be desirable to have two separate developments rather than one.

Unless some economical diversion of the South Saskatchewan River in Saskatchewan can be made, then it is possible and the writer believes very probable, that the one combined Alberta-Saskatchewan Development will be much more economical than two separate developments.

However, whether or not the project is treated as one overall Alberta-Saskatchewan Development or two entirely separate developments, the writer is of the opinion that the Board in considering alternatives, should treat these developments more or less as one. The writer is convinced that if any priority is in the mind of any member of the Board, then the Alberta Development should be given such priority for a number of reasons, some of which are as follows:

*First:* Investigations were initiated in Alberta with respect to the irrigation of Alberta lands in what was called the North Saskatchewan project, long before the Saskatchewan Development was thought of, and at the request of the

P.F.R.A., a reservation was made by the Water Resources Office, for a water supply for the Alberta Development before the Saskatchewan Development was investigated or planned.

*Second:* The construction cost of the Alberta Development will be much less than the construction cost of the Saskatchewan Development.

*Third:* Very large areas within the Alberta Development have been abandoned as far as farming is concerned and other large areas are owned by the Government, all of which are excellent grazing lands. Irrigable tracts conveniently distributed throughout these large areas will be greatly benefited by irrigation and stock water supplies.

Alberta is somewhat handicapped with respect to the above project due to the fact that investigations and reports which have been undertaken by the P.F.R.A. are somewhat behind hand in comparison with similar investigations and reports of the Saskatchewan Development. However, it will be found when it is possible to make more intelligent comparisons of the two projects, that there are very good reasons why the Alberta project should take priority if any priority is considered.

However, as stated above, it is the writer's opinion that the two projects should be considered together on their merits and not from any provincial point of view. In that event it is the writer's opinion that one overall Alberta-Saskatchewan Development will likely be found to be desirable both from the point of view of cost and also from the best use of the available water supply.

With regard to an allocation of water for power purposes in Saskatchewan, it is the writer's opinion that this could not be considered until allocations for irrigation in Alberta were finally dealt with.

With regard to the matter of allocating water by provinces rather than by projects, the writer would like first to refer to certain quotations from the Engineering Journal of December, 1948, in which the papers presented at the annual General Meeting of the Institute are discussed. The following from a discussion by Mr. F. R. Burfield on page 647 is of interest.

"Actually what is being apportioned is not water, but Dominion Government aid. At the present time the costs of construction of irrigation undertakings is borne in very large part by the Dominion Government. There may be good political even statesmanlike reasons why the Federal aid should not be given entirely to one province,

even though the best or cheapest irrigation may be concentrated there. The practical result is that diversion of water is necessarily subservient to division of federal aid. This will be decided by politicians not by the Water Board."

The following is from a discussion by the writer on page 648.

"I do not think the function of the Board should or will be to apportion water by some rule as suspected by Mr. Burfield, but rather in the best interests of the drainage basin as a whole. I would hope that the Board in its recommendations would give consideration mainly to the most economical and beneficial uses of the waters to be apportioned. If however, there should be a tendency in the allocation of funds by provinces rather than by projects, then I think the Water Board would at least have the effect of curbing any such tendencies. A Board composed mostly of those who have to do with the actual administration of streams would be most competent to judge the merits or demerits of the respective projects and I believe that the recommendations of such a Board will be respected by Governments."

The writer would here like to review briefly the negotiations which led up to the appointment of the Prairie Provinces Water Board.

The province of Alberta, because of its more favourable location with respect to the drainage basin, is naturally not so concerned with waters which flow across the provincial boundaries as are the provinces of Saskatchewan and Manitoba. On the other hand, however, Alberta cannot consistently decline to participate in the formation of a Board such as the one recently set up, where such a Board is in the best interests of the provinces of Saskatchewan and Manitoba. However, the following thoughts were in the writer's mind throughout all negotiations which preceded the setting up of the present Board.

*First:*—Streams do not respect artificial boundaries.

It is not practical, therefore, to endeavour to administer them provincially. The natural boundaries are the limits of the drainage basin and these are the only boundaries which should be considered in any overall and comprehensive plan of water development.

*Second:*—The Saskatchewan River Drainage Basin should be treated as a whole and not piece-meal. The best use should be made of the available water supplies in so far as possible by regions in the drainage basin rather than by provinces.

*Third:*—All commitments made by the respective provinces by virtue of authorizations, appropriations or reservations, should be treated as priorities and given some definite standing by the Board before allocating water for new projects.

It was with these thoughts in mind that the writer discussed with the Alberta authorities the advisability of co-operating with the other provinces of the Dominion in setting up a Water Board, and he is now somewhat alarmed by the trend of some of the thinking by some of the members of the Board. If as the writer believed, the purpose of the Board is to treat the drainage basins by regions rather than by provinces, and to recommend the allocation of water by projects where it can be best used within the drainage basins, that is one thing. However, if it is likely to be found impractical to do this and the Board is forced in its decision to consider the claims of the respective provinces ahead of other considerations, then that is another thing.

Possibly, the Board should give early consideration to the above alternatives before matters become further involved.

The writer here would like to make the position clear with respect to the use of water for the two projects—First, the North Saskatchewan-Red Deer Diversion Project, and second, the South Saskatchewan River Development.

As pointed out above, the Water Resources Office at the request of the P.F.R.A. has already made a reservation of water for the first project so that any water allocated for the second project must be over and above that amount of water as far as this office is concerned. Therefore, the Board before it considers the matter of allocating water for power purposes in Saskatchewan, should be quite sure of the amount of water then left in the stream for that purpose.

Yours very truly,

BEN RUSSELL,  
Director of Water Resources.

PRAIRIE PROVINCES WATER BOARD

*Minutes of Meeting at Regina, September 5 and 6, 1951*

7-01 The meeting convened at 1.30 p.m. in Room 111A of the Hotel Saskatchewan in Regina. Present were:

*Members of the Board*

L. B. Thomson (Chairman) E. J. Scammell  
N. Marr B. B. Hogarth  
B. Russell

## Others

W. M. Berry (Engineering Secretary)	B. Boyson W. Stichling
A. G. Underhill	W. B. Clipsham
O. R. Hoover	N. E. Hartnett
H. L. Johnston	J. A. Arnot
E. E. Eisenhauer	

7-02 It was moved by Mr. Hogarth and seconded by Mr. Scammell that the minutes of the last meeting be approved—carried.

7-03 The Chairman announced that Mr. D. M. Stephens, former member of the Board for Manitoba, had been appointed by his Government to direct the work of the Manitoba Hydro-Electric Board and therefore that Government had appointed Mr. Hogarth to replace Mr. Stephens on the Board (Manitoba Order-in-Council 1100/51). Mr. Hogarth was then welcomed by the Chairman and the other Board members.

Mr. Marr suggested the Secretary should write Mr. Stephens expressing the Board's regret at having lost his support and counsel, but also expressing its congratulations on his new and important appointment. This suggestion was endorsed by all members.

7-04 The proposed agenda for the present meeting, as submitted by the Chairman, was approved.

7-05 The Chairman announced that the two recommendations made by the Board had been ratified by all Governments and were now final. These recommendations were:

Allocation to Alberta—recommended May 31, 1949—ratified by Canada Order-in-Council 4030/49; by Alberta Order-in-Council 857/49; by Manitoba Order-in-Council 1121/49; by Saskatchewan Order-in-Council 1307/51

Allocation to Saskatchewan—recommended February 15, 1951—ratified by Canada Order-in-Council 1874/51; by Alberta Order-in-Council 1091/51; by Manitoba Order-in-Council 1264/51; by Saskatchewan Order-in-Council 1310/51

7-06 The Secretary then reported on the organization and work of the Board's staff, stating—

1. The separate staff for the Board became an actuality when office space became available in Room 413, Post Office Building, Regina, about July 1, 1950.
2. Since that time the staff has consisted of the Secretary, one engineer, one stenographer and two draftsmen. One more engineer is vitally needed to supplement this organization.
3. Since its formation, three major reports on flow conditions in the Saskatchewan River basin have been issued. In addition, two memoranda were

prepared: one for the Saskatchewan Power Corporation on the effect of the proposed South Saskatchewan River Project on the hydro-electric power potential of its rivers, and the other for the Government of Saskatchewan on the effect of Alberta's request for an allocation on the proposed South Saskatchewan River Project. At present the staff is engaged in further studies of developments in the Saskatchewan River basin, in making a complete water supply and use study of the Qu'Appelle River basin, and investigating the water supply and use problems of the Cypress Hill's streams.

4. For the fiscal year ending March 31, 1952, the staff has been allocated \$20,000 from the P.F.R.A. appropriation. Estimated salaries for this period total nearly \$17,000 while travelling expenses and other charges will add to this figure.

The members then expressed their satisfaction with the work of the staff. The Chairman reminded the members that the Board's staff is completely separated from P.F.R.A. and is always ready for use by any of the provinces.

7-07 It was reported that Messrs. Thomson, Marr and Munroe were unable to contact the officials of the Department of Public Works as planned and set out in Minute 6-05. It was decided to leave this matter of navigation in abeyance.

7-08 The Secretary reported that, in accordance with Minutes 6-07, he had advised the printers to keep the mapping plates until further notice, had received delivery of the maps, had distributed the maps to the Board members in the numbers requested and had made recommendations for the public and private distribution of the maps, which recommendations were endorsed by correspondence by all Board members. These recommendations follow:

1. Only the 4- and 5-colour maps to be distributed outside the Board.
2. Reasonable requests from public agencies to be supplied without charge.
3. Requests from private sources to be referred to Secretary and, if reasonable, to be supplied at 75 cents per map.

7-09 Mr. Marr requested Messrs. Hoover and Johnston to report on the status of their new gauging stations.

Mr. Hoover read and presented a report dated August 28, 1951, which is attached to and made a part

of these minutes. Mr. Marr moved, seconded by Mr. Russell, that this report and its recommendations be adopted—carried.

Mr. Johnston read and presented a report dated August 21, 1951, which is attached to and made a part of these minutes. Mr. Marr moved, seconded by Mr. Hogarth, that this report be adopted—carried.

Mr. Marr pointed out the necessity of obtaining

- (a) additional information on northern Saskatchewan rivers and
- (b) assistance on the transportation problem by Saskatchewan Government aeroplanes similar to the assistance given by Manitoba. Mr. Scammell agreed to take this matter up with his Government and will make use of the Board's recommendations set out in Minute 4-06.

7-10 On procedural matters, Mr. Marr moved that in future all motions before the Board, do not necessarily require a seconder—carried.

7-11 The Secretary then suggested a revised method of allocating water for power; this suggestion is attached to and made a part of these minutes. The Board took exception to this sentence contained therein, "the Board would still, of course, have to approve proposed hydro-plants and might provide regulations controlling their manner of use." The Chairman appointed a subcommittee consisting of Messrs. Russell, Scammell, Hogarth, Marr and Berry to review and revise this proposal during the next recess.

After the recess, the subcommittee submitted their proposal which was:

That the Board made no recommendations for allocations of water for hydro-power developments but shall, pursuant to its functions under Section 2 of the Agreement, record all proposed hydro-power developments and may, if deemed necessary and advisable, make recommendations to the respective Governments governing the operations of any such developments.

This proposal was considered and adopted by the Board upon the motion of Mr. Russell.

7-12 The Secretary reviewed the progress being made by the staff on the Qu'Appelle River basin study: he mentioned the difficulties and distributed typical results. After discussion, the Secretary was instructed to proceed with the study.

7-13 The Secretary reviewed Water Board Report #3, "Preliminary Report on Effects of Certain Major Projects in the Saskatchewan River Drainage Basin", which had previously been distributed to the members in accordance with their instructions. The Board expressed their agreement with the conclusions set out

in this report. Mr. Hogarth pointed out, however, that this report assumed the Dauphin River Power Project as an individual project; with interconnection with steam and the Winnipeg River hydro plants, operation assumptions would change resulting in possible changes in the effect of upstream diversions.

7-14 The Chairman stated that the main purpose of this meeting was to consider the request for a recommended allocation for the South Saskatchewan River Project. He said the first application for this project had been considered on May 6, 1949; that due to insufficient data the requested water had been placed in the "reservation" class; that the P.F.R.A. had then prepared detailed reports on soils, climate, engineering, economics, etc. which had gone out to all Board members; that on December 18, 1950, the Board had considered a revised application from the Saskatchewan Government but, due to insufficient water supply information, had postponed action till this meeting; that since the last meeting the Secretary had distributed Water Board Report #3 containing the requested water supply information; that with the information now available he felt the Board was now in a position to act on this application. As he understood the Saskatchewan Government wished to again modify their request, he invited Mr. M. E. Hartnett, Deputy Minister of Agriculture, to address the Board.

Mr. Hartnett, speaking for the Minister of Agriculture, referred to Saskatchewan's previous applications, dated May 4, 1949 and November 8, 1950 for a recommended allocation. Due to recent information received, he presented a revised request as follows:

REVISION OF REQUIREMENTS FOR SOUTH SASKATCHEWAN RIVER PROJECT BASED ON THE REVISED SUMMARY REPORT OF INVESTIGATIONS

Net Irrigable Area .....	430,000 acres
18" duty, 80% Irrigation Factor 30% losses— $430,000 \times 1.5 \times 0.8$	
$\frac{\quad}{0.7} =$	737,000 ac.-ft.
Reservoir Losses—Evaporation 21" on 70,000 acres .....	122,000 "
Seepage 57 c.f.s. ....	41,000 "
Total Requirements .....	900,000 "
Possible additional area about .....	40,000 acres
18" duty, 80% factor 20% losses— $40,000 \times 1.5 \times 0.8$	
$\frac{\quad}{0.8} =$	60,000 ac.-ft.

Mr. Hartnett noted this revised application did not include a request for an allocation for power. He concluded by stating his Government feels that this

project has received more pre-construction study and investigation than any other known to it and that an immediate recommendation for allocation would be appreciated.

Then, upon invitation, Mr. E. E. Eisenhower, Sask. Deputy Minister of Public Works, stressed the urgency of getting this allocation recommended.

Mr. W. B. Clipsham, Chief Engineer of Sask. Power Corporation stated that he had nothing to add but then, in reply to a question by Mr. Russell, said he felt the Saskatchewan Government would never build the Coteau Dam for hydro-electric power production alone.

The Chairman thanked the visitors for their contribution and then ruled that the Board would immediately go into executive session. All visitors and assistants then retired.

7-15 In executive session the Board then gave full consideration to the allocation of water for the South Saskatchewan River Project. It was unanimously agreed that the water supply studies show there is sufficient water for the purposes of this project.

The Chairman asked members of the Board to consider the Saskatchewan Government application and a motion would be in order. Before the motion was received, however, Mr. Russell opened the discussion by suggesting that the alternate project of the North and South Saskatchewan project be considered and he filed a report for members to study. Mr. Russell believed that the combined project should be studied before an allocation was made by the Board. He also stated that he was not prepared to vote for a motion approving the application until such study was completed. He believed that as a Board member he was carrying out the function of the Board in determining the best use of water.

The question of procedure in receiving application was considered at some length by the Board. The Chairman agreed with Mr. Scammell that the proper procedure was to consider the Saskatchewan Government application, but in view of the nature of Mr. Russell's alternate proposal and his statement, it would be advisable to delay such procedure and have the economic aspects of this alternate proposal reviewed. The Chairman further stated that the matter of investigating this alternate project was one of Government Policy and the extent of further investigations had to be determined because there was no official request from the Alberta Government to have the combined project investigated to its ultimate conclusion. The Chairman also stated that alternatives to the South Saskatchewan River Project had already been investigated by the P.F.R.A. staff and it was his under-

standing that the South Saskatchewan River project was the most economical proposal. However, in view of Mr. Russell's position, he was prepared to have reviewed again the data available, and possibly this review could be presented at the Commission.

Mr. Russell stated that he was expressing his own views as a result of his experience and training. We had not discussed this combined proposal with the Alberta Government, but would do so on his return to Edmonton.

Mr. Scammell moved that, in view of the information received and of the fact that the necessary water is available, the Board now recommend an allocation for this project. Messrs. Hogarth and Marr felt that the Board should wait until it had received the report of the new Commission, appointed by the Government of Canada to investigate the economic and social aspects of the project, and to treat their report as additional evidence. Mr. Russell agreed with this view but added that he felt alternative methods of developing these resources, such as a combined South Saskatchewan-Red Deer Project, should be looked into, preferably by the new Commission. The motion was therefore defeated.

Mr. Hogarth then moved that, whereas the reservation previously made by the Board for this project has lapsed and whereas the Board has unanimously agreed there is sufficient water for this project, the Board agree to reserve to the South Saskatchewan River Project 960,000 acre-feet of water annually from the South Saskatchewan River--this reservation to be effective for a two-year period. In this discussion, Mr. Scammell stated he would vote for this motion only to preserve the position of the application--carried unanimously.

7-16 There was some discussion on the function of the Board, after which the Chairman ruled that in view of the present lack of unanimity and the difference in point of view by members of the Board as to its functions and duties, each member of the Board is requested to refer the terms of reference to his respective Government for clarification and to request the responsible minister of each Provincial Government to confer with the Federal Minister of Agriculture at an early date.

7-17 Some discussion took place as to whether the Agreement inferred that the Board should take cognizance of the Northwest Territories and its streams along, across, and in the vicinity of the prairie provinces. The Board agreed this was so.

7-18 Mr. Scammell then submitted a tabulation of existing and proposed hydro-electric power develop-



*Royal Commission on South Saskatchewan River*

ments in Saskatchewan for "recording" with the Board. This tabulation is attached to and made a part of these minutes.

7-19 The Secretary submitted, in accordance with Minute 6-13, his revised suggestions for amending the Agreement, these are attached to and made a part of these minutes. The Board concluded that the matter of amending the agreement should be held in abeyance.

7-20 The meeting adjourned on September 6th at 4:30 p.m.

*Copy*

P.C. 2297

*Certified to be a true copy of a Minute of a Meeting of the Committee of the Privy Council, approved by His Excellency the Governor General on the 19th day of JUNE, 1947.*

WHEREAS the construction of water development projects in the Provinces of Alberta, Saskatchewan and Manitoba involves the use of inter-provincial waters;

AND WHEREAS no provision has been made for determining the allocation of the said waters between the provinces;

AND WHEREAS it is desirable that the most beneficial use be made of the available water resources of the three Prairie Provinces;

AND WHEREAS it is considered desirable by agreement with the Governments of the Prairie Provinces to establish a Board for the purpose of allocating the said waters and making recommendations as to their beneficial use:

THEREFORE His Excellency the Governor General in Council, on the recommendation of the Minister of Agriculture and the Acting Minister of Mines and Resources, is pleased to authorize and doth hereby authorize the Minister of Agriculture and Minister of Mines and Resources to execute the attached agreement with the three Prairie Provinces providing for the establishing of a Board to be known as "The Prairie Provinces Water Board".

(Sgd) A. D. P. HEENEY,  
*Clerk of the Privy Council.*

The Honourable

The Minister of Agriculture

## AGREEMENT

THIS AGREEMENT made this twenty-eighth day of July, A.D. 1948

## BETWEEN:

THE GOVERNMENT OF CANADA, hereinafter called "Canada"

AND

THE GOVERNMENT OF MANITOBA, hereinafter called "Manitoba"

AND

THE GOVERNMENT OF SASKATCHEWAN, hereinafter called "Saskatchewan"

AND

THE GOVERNMENT OF ALBERTA, hereinafter called "Alberta"

1. Manitoba, Saskatchewan and Alberta and Canada agree to establish and there is hereby established a Board to be known as the Prairie Provinces Water Board to consist of five members to be appointed as follows:

- (a) two members to be appointed by the Governor General in Council, one on the recommendation of the Minister of Mines and Resources, and one, who shall be Chairman of the Board, on the recommendation of the Minister of Agriculture;
- (b) one member to be appointed by the Lieutenant Governor in Council of each of the Provinces of Manitoba, Saskatchewan and Alberta.

2. *Functions*

The functions of the Board shall be to recommend the best use to be made of interprovincial waters in relation to associated resources in Manitoba, Saskatchewan and Alberta and to recommend the allocation of water as between each such province of streams flowing from one province into another province.

3. *Composition of Board*

The members of the Board shall be chosen from those engaged in the administration of water resources or related duties for Manitoba, Saskatchewan, Alberta, or Canada, as the case may be, and shall serve as members of the Board in addition to their other duties.

4. *Duties of Board*

The duties of the Board shall be as follows:

- (a) to collate and analyse the data now available relating to the water and associated resources of interprovincial streams with respect to their utilization for irrigation, drainage, storage, power, industrial, municipal, navigation and other purposes;
- (b) to determine what other data are required from time to time in order to reach decisions on questions referred to it and to make recommendations

to the appropriate governmental organizations concerned for the carrying out of such field surveys, power investigations, soil surveys, establishment of gauging stations, economic studies relating to drainage and flood control and all similar work which the Board considers necessary to supply information required for the proper performance of its duties.

- (c) upon the request of anyone of the three provinces or the Dominion to recommend the allocation of the waters of any interprovincial stream among the respective Provinces;
- (d) to report on any questions relating to specific projects for the utilization or control of common river or lake systems at the request of one or more of the Ministers or authorities charged with the administration of such river or lake systems.

#### 5. Confirmation of Board's Recommendations

A recommendation of the Board with respect to any matters referred to it under Subsection (c) and (d) of Section 4 hereof shall become effective when adopted by Orders in Council passed by Canada and by each of the Provinces affected thereby.

#### 6. Authority of Board

The Board shall have authority to correspond with all governmental organizations and other sources of information in Canada or abroad concerned with the administration of water resources, and such other authority as may be conferred on the Board from time to time by agreement between the parties hereto; all agencies of the four governments having to do with the water and associated resources in the area covered by the Agreement shall be required to supply the Board with all data in their possession requested by the Board.

#### 7. Records

The records relating to the water resources of the three Provinces collected and compiled by the P.F.R.A. organization at Regina shall be made available to the Board.

#### 8. Meetings of the Board

The Board shall meet at the call of the Chairman and meetings shall be called at least twice annually, the expenses of the members shall be borne by their respective governments.

#### 9. Reports

The Board shall submit an annual progress report outlining work done and work contemplated in the

agreed program to each of the responsible Ministers of the parties hereto and such other reports as may be requested by any one of such Ministers.

#### 10. Staff and Location of Board Office

The Board shall employ a Secretary, who shall be a qualified engineer, with headquarters at Regina; if he is a Dominion Government employee he shall serve as Secretary as part of his regular duties; otherwise two-fifths of the salary of the Secretary shall be provided by Canada and one-fifth by each of the Provinces of Manitoba, Saskatchewan and Alberta; such technical and clerical staff, office accommodation and supplies as may be necessary shall be provided by the P.F.R.A. organization.

11. Each of the parties hereto agrees that it will not within the limits of its jurisdiction construct or permit the construction of any project that will interfere with the allocation of waters resulting from a recommendation of the Board duly adopted pursuant to Section 5 hereof.

12. Any water development project already constructed or to be constructed by any one of the parties hereto shall be so operated as to maintain as far as possible the allocation of water determined by the Board.

Signed on behalf of the Government of Canada by the Right Honourable James C. Gardiner, Minister of Agriculture and the Honourable James A. MacKinnon, Acting Minister of Mines and Resources, on behalf of the Government of Manitoba by on behalf of the Government of Saskatchewan by on behalf of the Government of Alberta by

Witnessed by:-

D. W. ALLAN

JAMES GARDINER  
Minister of Agriculture for  
Canada

A. CEDAR

JAS. A. MACKINNON  
Acting Minister of Mines  
and Resources for Canada

D. M. STEPHENS

J. McDIARMID  
Minister of Mines and Natural  
Resources for Manitoba

C. A. L. HOGG

J. L. PHELPS  
Minister of Natural Resources  
for Saskatchewan

JESSIE ROSS

D. B. MACMILLAN  
Minister in Charge of Water  
Resource and Irrigation for  
Alberta