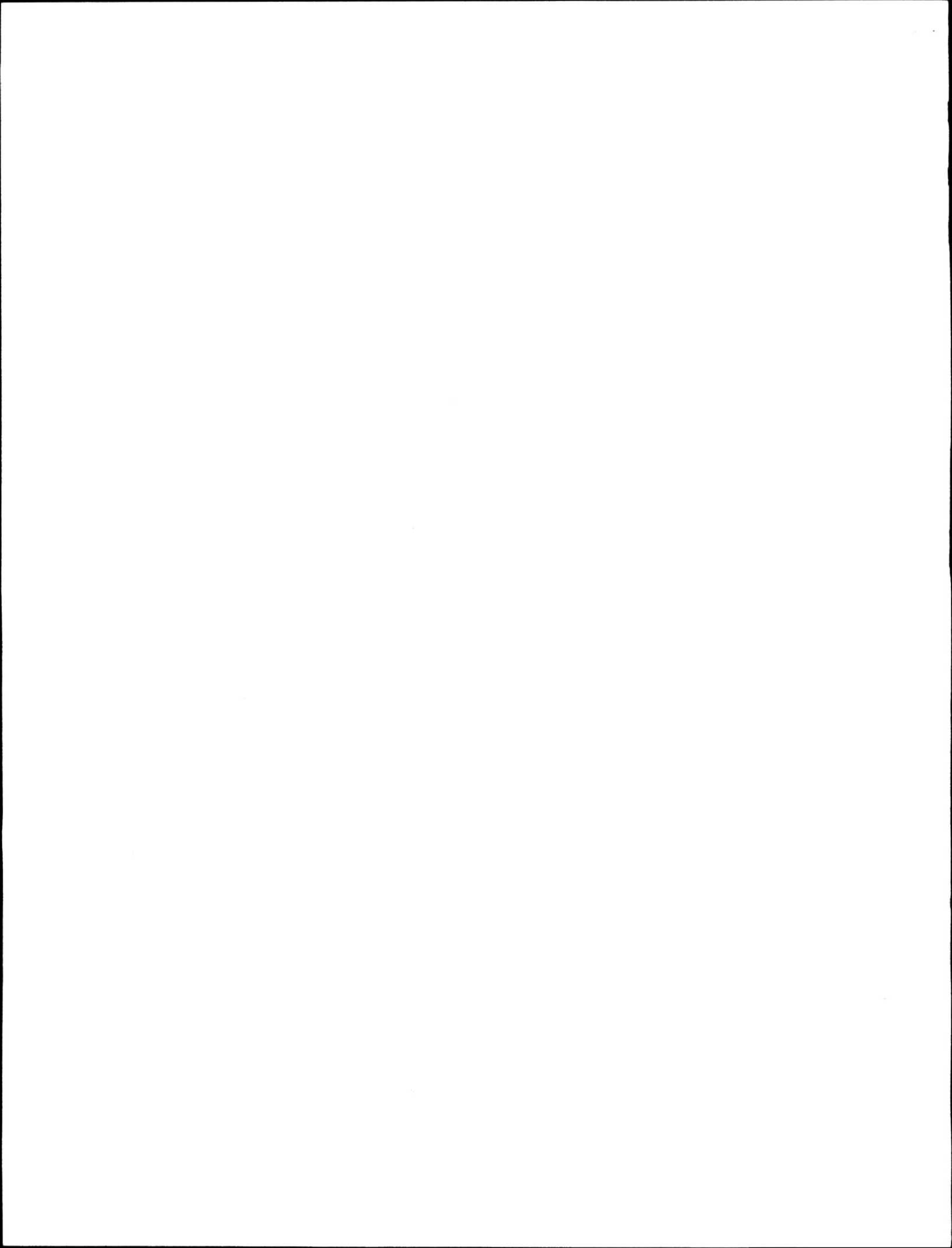


CANADA - ALBERTA
MEMORANDUM OF AGREEMENT
FOR
WATER QUANTITY SURVEYS
ANNUAL REPORT 1980-81.

WATER SURVEY OF CANADA
CALGARY DISTRICT OFFICE

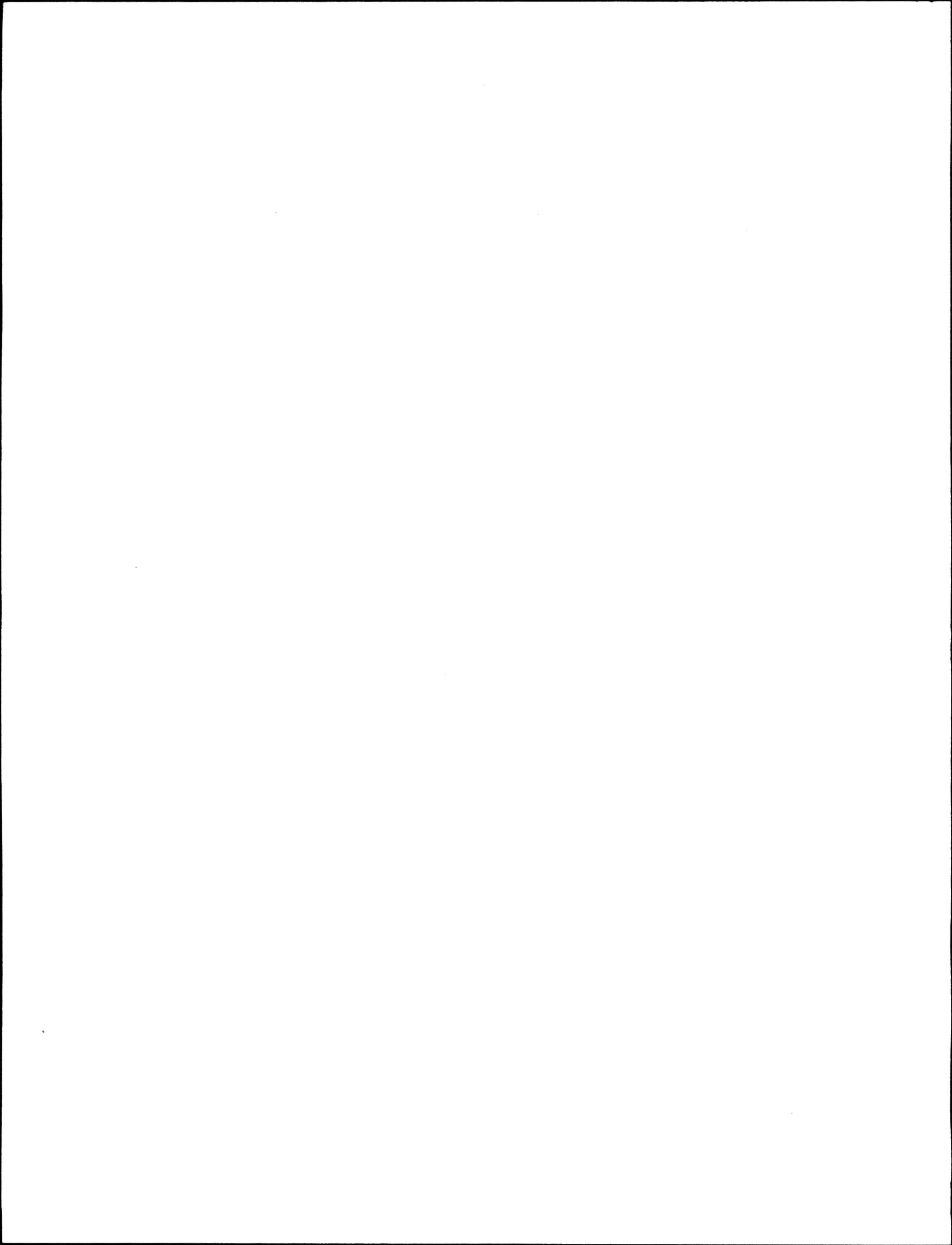
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CANADA - ALBERTA
MEMORANDUM OF AGREEMENT
FOR
WATER QUANTITY SURVEYS

ANNUAL REPORT 1980-81

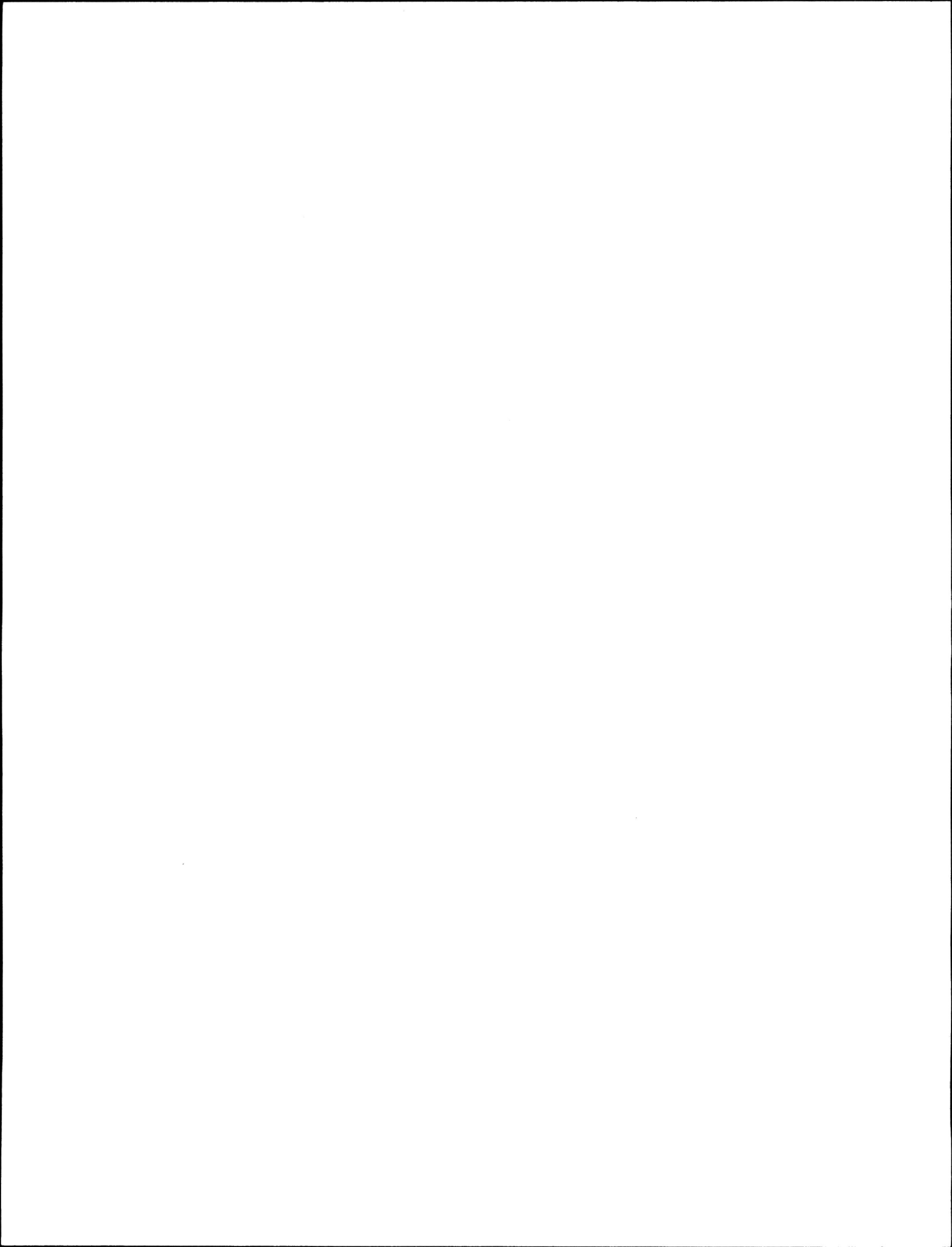


EXECUTIVE SUMMARY

The Coordinating Committee met twice during the period and frequent contact was maintained between the members of the committee and senior staff of both agencies. Major items arising from the Coordinating Committee meetings were an investigations of sediment station costs; planned construction of eighteen hydrometric stations during 1981-82; reclassification of a number of sediment stations during 1981-82; and the Oldman River Basin network planning study.

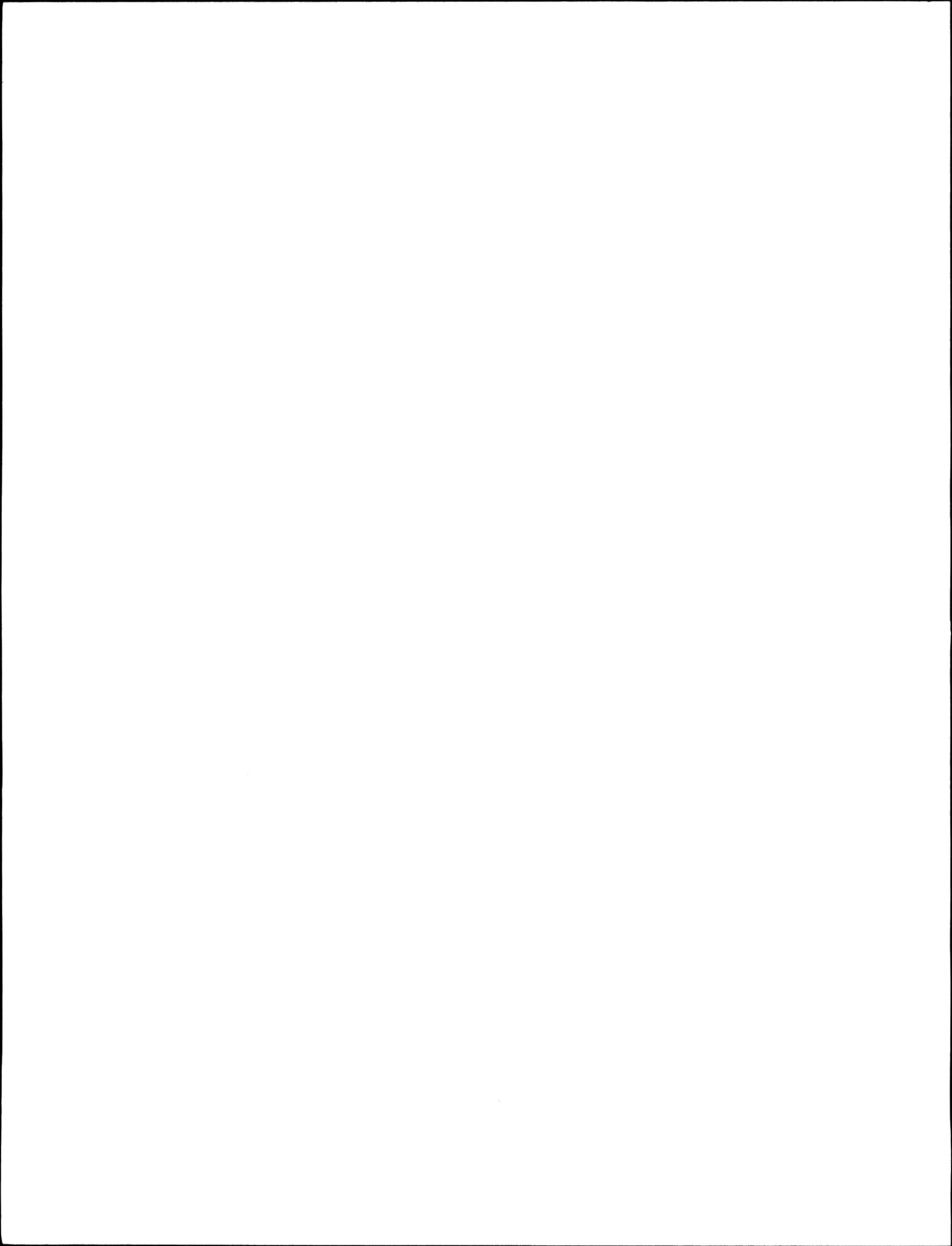
The 1980-81 program was satisfactory in most aspects as a normal runoff occurred throughout most of the province which permitted adequate field coverage of all hydrometric stations. Data computations for 1980 were completed on schedule for publication. The main achievement during the year was the satisfactory completion of all aspects of the construction and maintenance program.

Cooperative network planning activities were confined to the pilot project in the Oldman River Basin and these activities were essentially carried out by the province. The procedure developed appears to be very practical and worthwhile and it is currently planned that Water Survey will complete the study during 1981-82 and both agencies can then work together in applying the procedure to other basins in the province. An analysis of long term sediment stations was commenced by Water Survey of Canada to determine if some of these stations can be discontinued to provide funding to develop additional stations required, as defined by a cooperative sediment network planning study a few years ago. The other network planning activity was in the form of studies conducted in the Mackenzie River Basin to design a coordinated baseline network.



The material presented in this report has been improved over earlier reports by presenting a set of figures which describe the financial responsibility of the hydrometric network since the inception of the cost-sharing agreement, a history of the size of the hydrometric network, and histograms of hydrometric gauging station maturity. The figures describing the financial responsibility of both parties indicate that since 1975 there has been a significant decrease in the federal financial involvement and a significant per cent increase in the provincial involvement. The history of the size of the network indicates a small network prior to the mid-50's at which time the size of the network increased rapidly until the signing of the cost-sharing agreement in 1975. Since the signing of the agreement, the network has remained relatively stable in size, with only a small increase occurring. Histograms clearly depict the lack of maturity of the Alberta network as 35% of the network has 10 years or less of record and the modal value for years of data for the active network is only 15 years.

During 1980-81 Alberta paid \$390 000 to the hydrometric agreement as listed in Schedule "D" and in addition, paid \$26 000 for helicopter expenses in the Ft. McMurray Area for a total contribution of \$416 000. The computed cost for the Alberta share of the program was \$449 906, which resulted in an underpayment of \$33 906 by the province. The main reason for this shortage in payment was the initial erroneous calculation of Schedule "D" and care must be taken to ensure this doesn't recur.



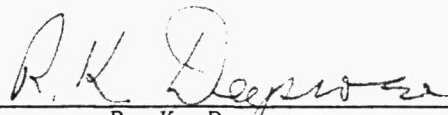
TO: Mr. P. G. Melnychuk
Administrator for Alberta

Mr. D. A. Davis
Administrator for Canada

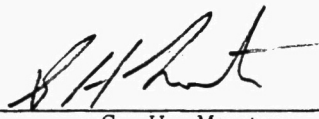
We hereby submit an annual report for fiscal year 1980-81 covering activities under the Memorandum of Agreement for Water Quantity Surveys for the Province of Alberta.

Province of Alberta

Government of Canada



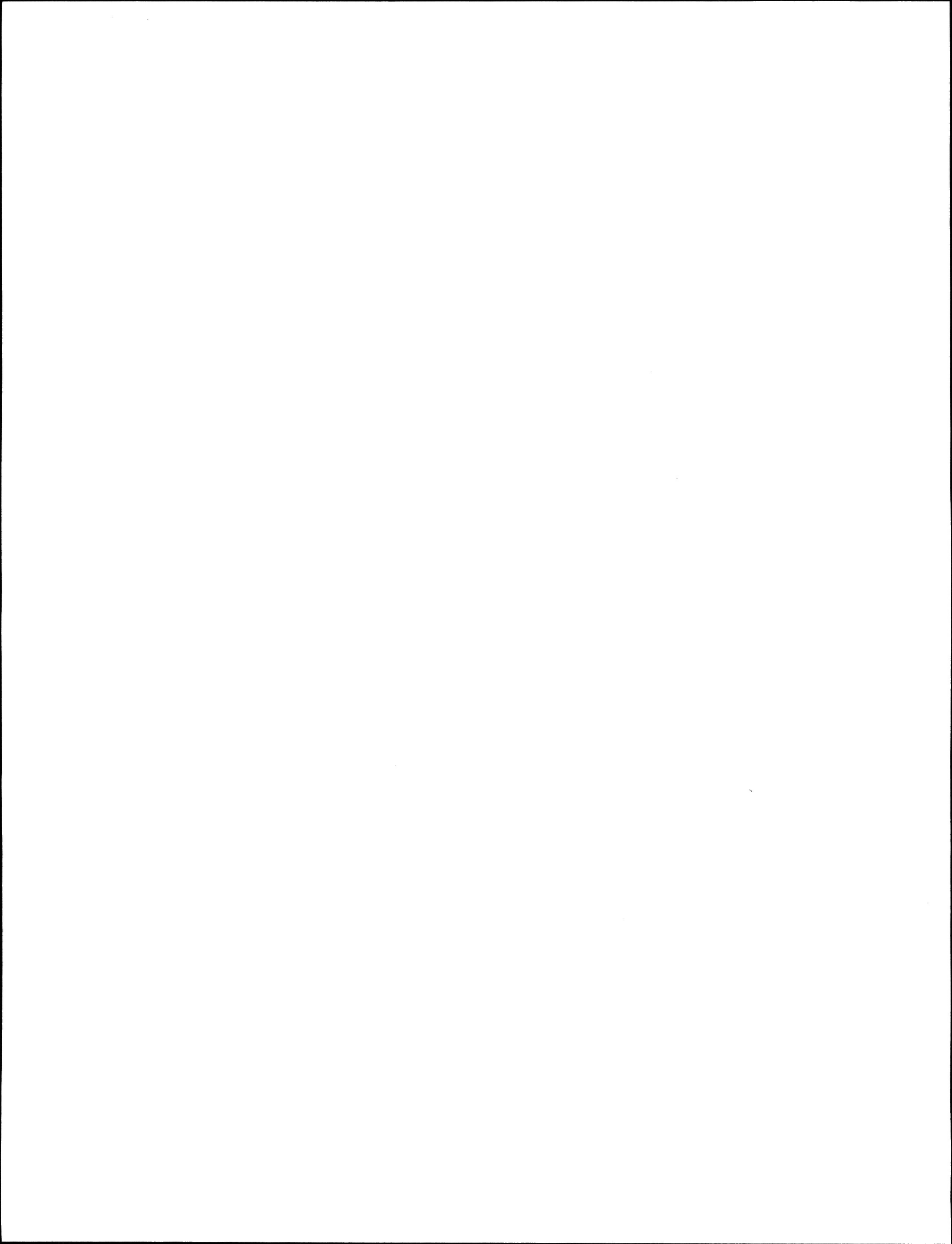
R. K. Deeproze
Alberta Department of Environment



G. H. Morton
Environment Canada

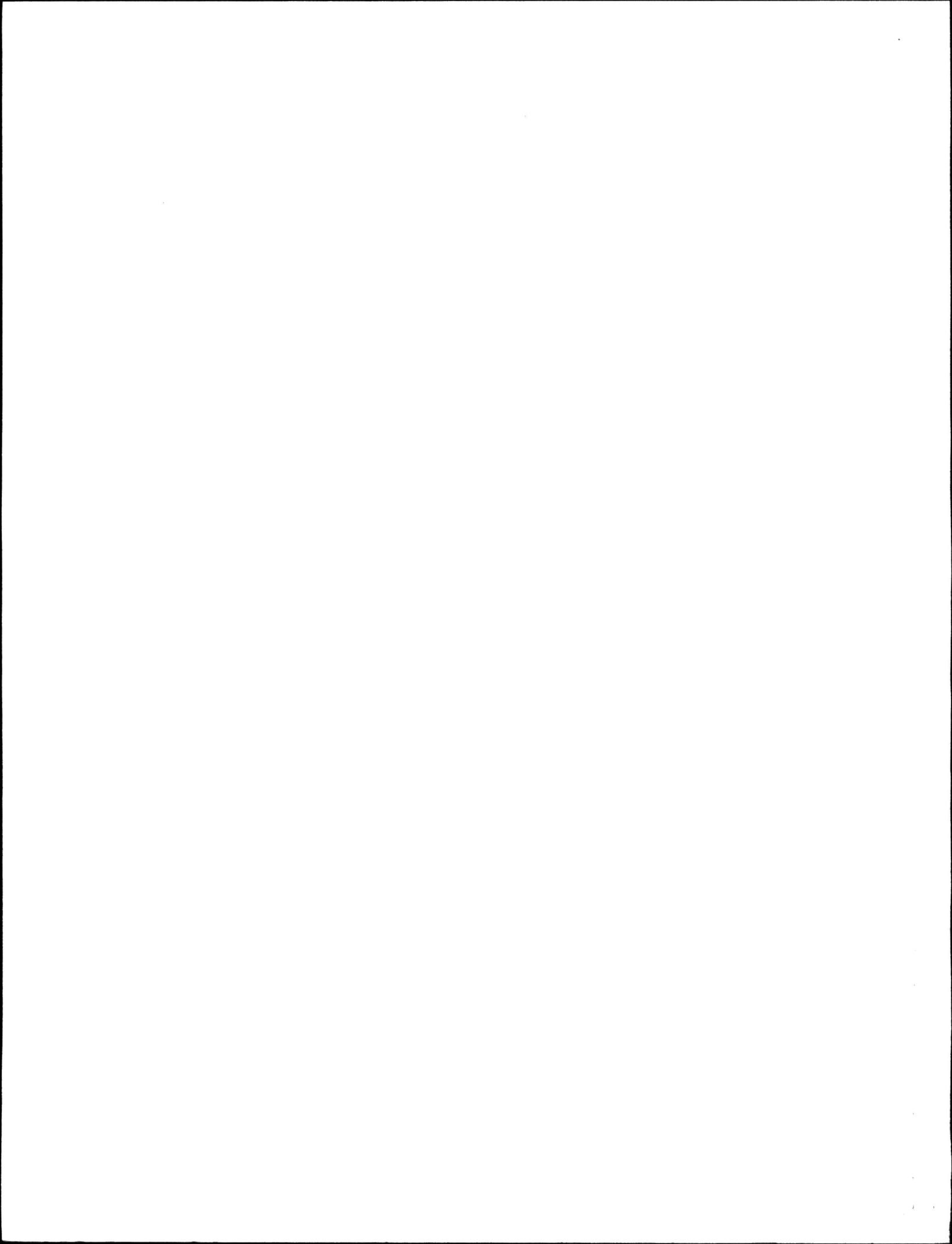
Members
Alberta Coordinating Committee.

June, 1981



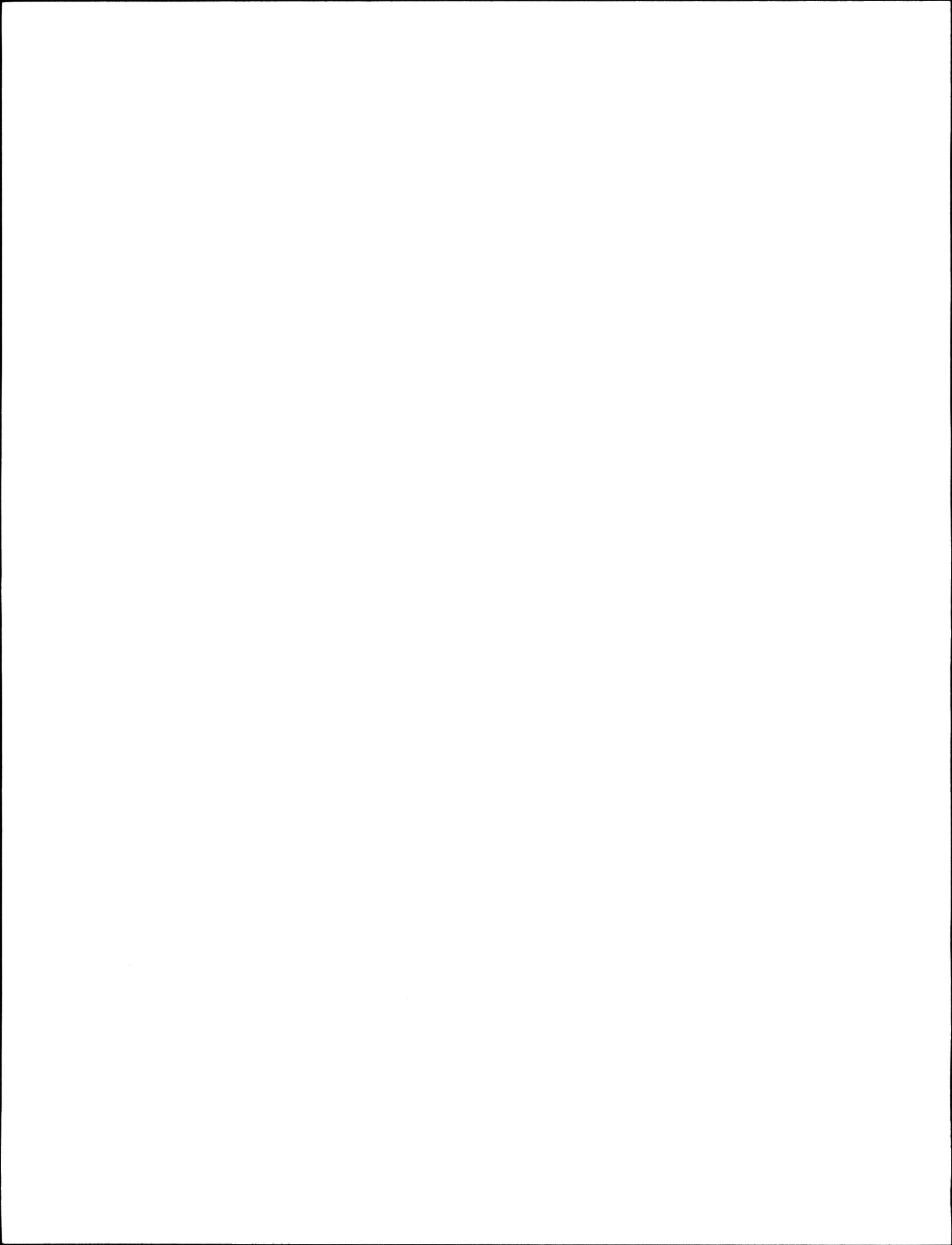
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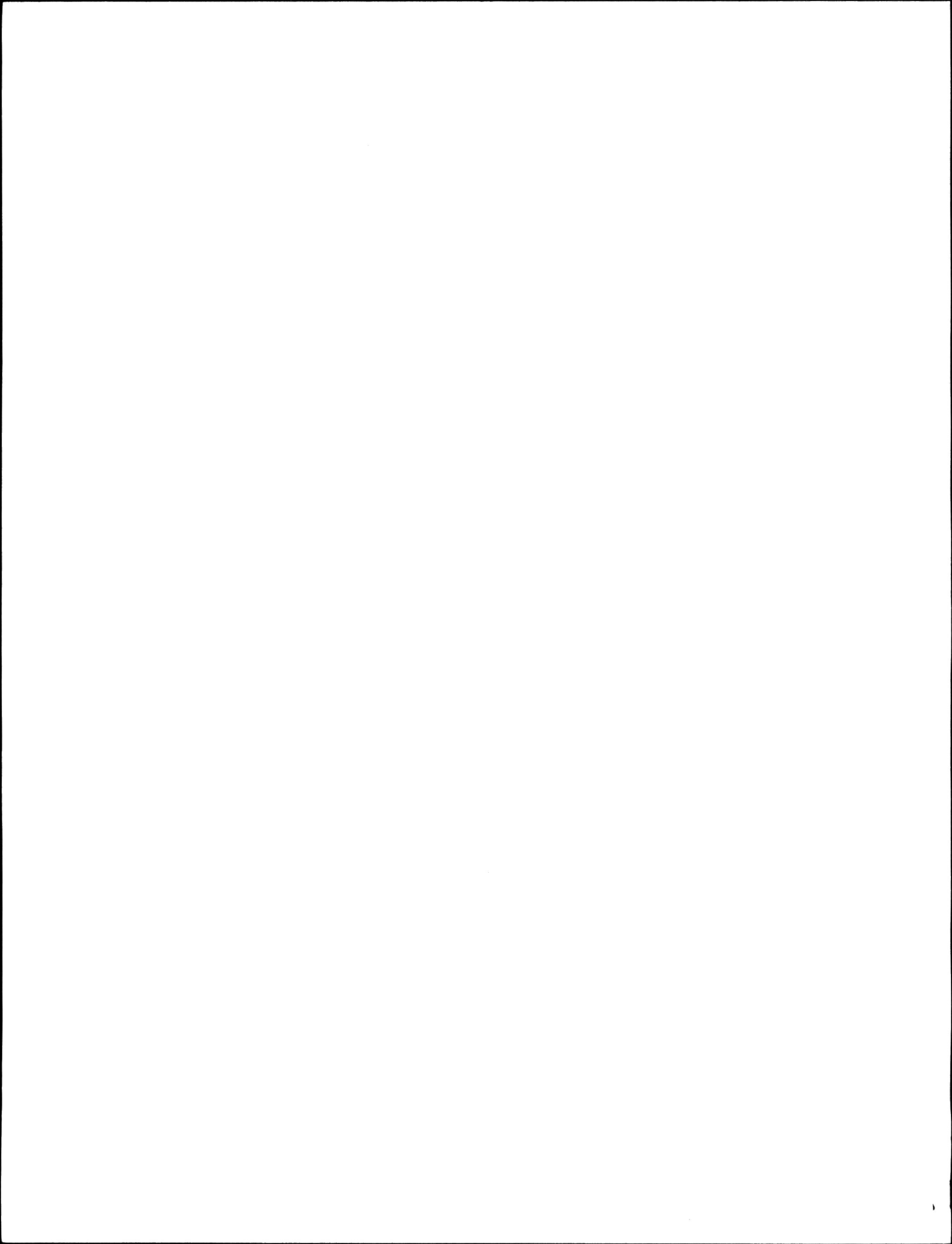


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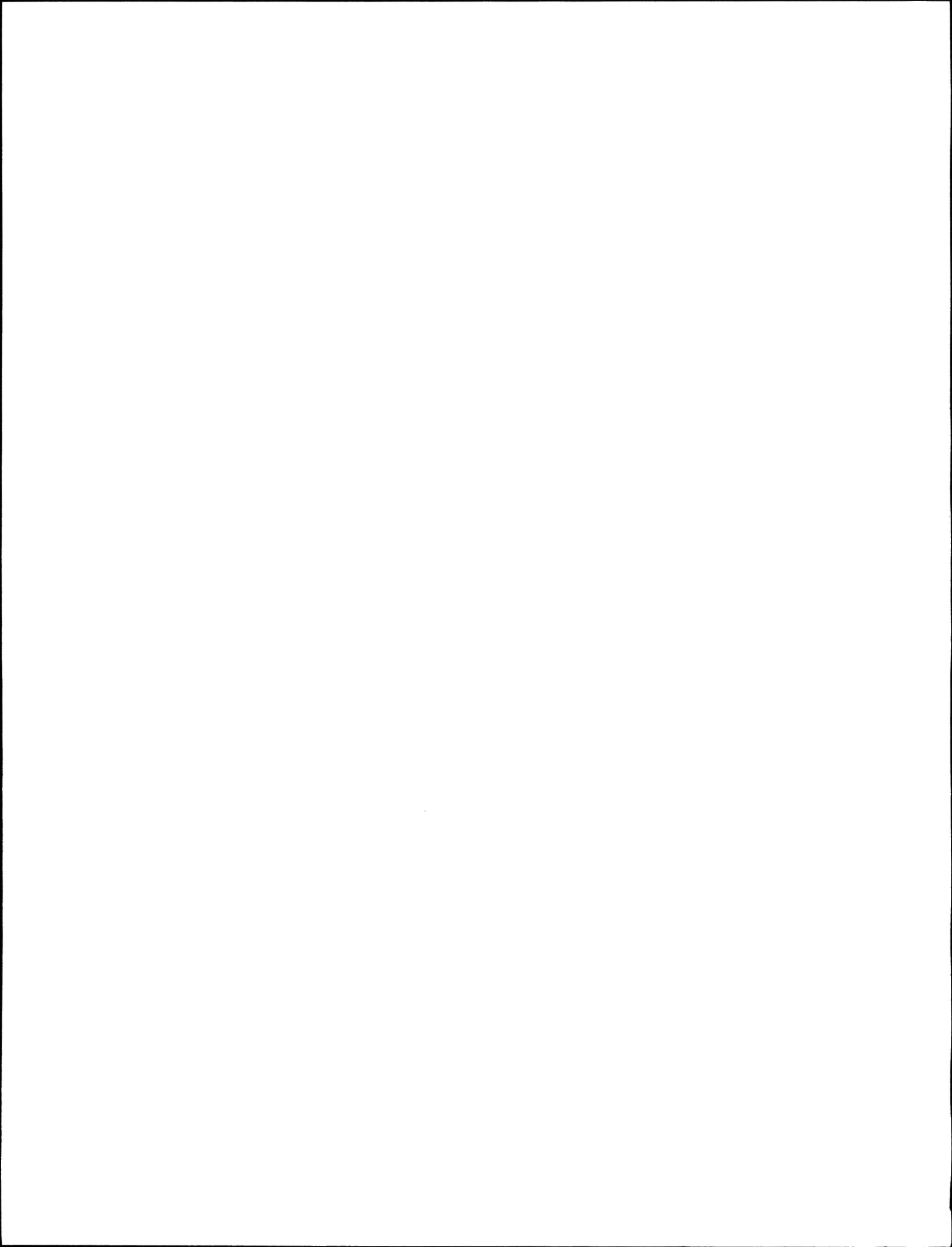


This is the sixth Annual Report summarizing the activities of the Canada-Alberta Co-ordinating Committee established by the Memorandum of Agreement in 1975. A sample copy of the agreement, which is relatively similar for all provinces and the territories, is contained in the Annual National Cost-Sharing Report.¹

The agreement establishes the basis on which cooperative water quantity surveys are carried out in Alberta and describes the costs which are shareable and the costs borne solely by the party operating the network. It requires that the Administrators of the agreement establish a Coordinating Committee to plan and review network operations and to prepare annually, Schedules "A" and "D" for approval by the Administrators. Schedule "A" (Appendix A) lists the gauging stations covered by the agreement, designation for cost-sharing purpose, and operational responsibility. Schedule "D" (Appendix C) gives the annual cost-sharing payment to be paid by Alberta to Canada.

The water quantity survey network in operation at March 31, 1975 was reviewed to determine the division of responsibility between the federal and provincial governments. Each station was designated either 'Federal', 'Federal-Provincial' or 'Provincial', the designation not only indicating the prime need, but also the financial responsibility. Schedule "B" (contained in the National Report) of the agreement, lists the items to be included in computing the annual payments. The federal government pays 100% of the cost of operation and construction of stations designated

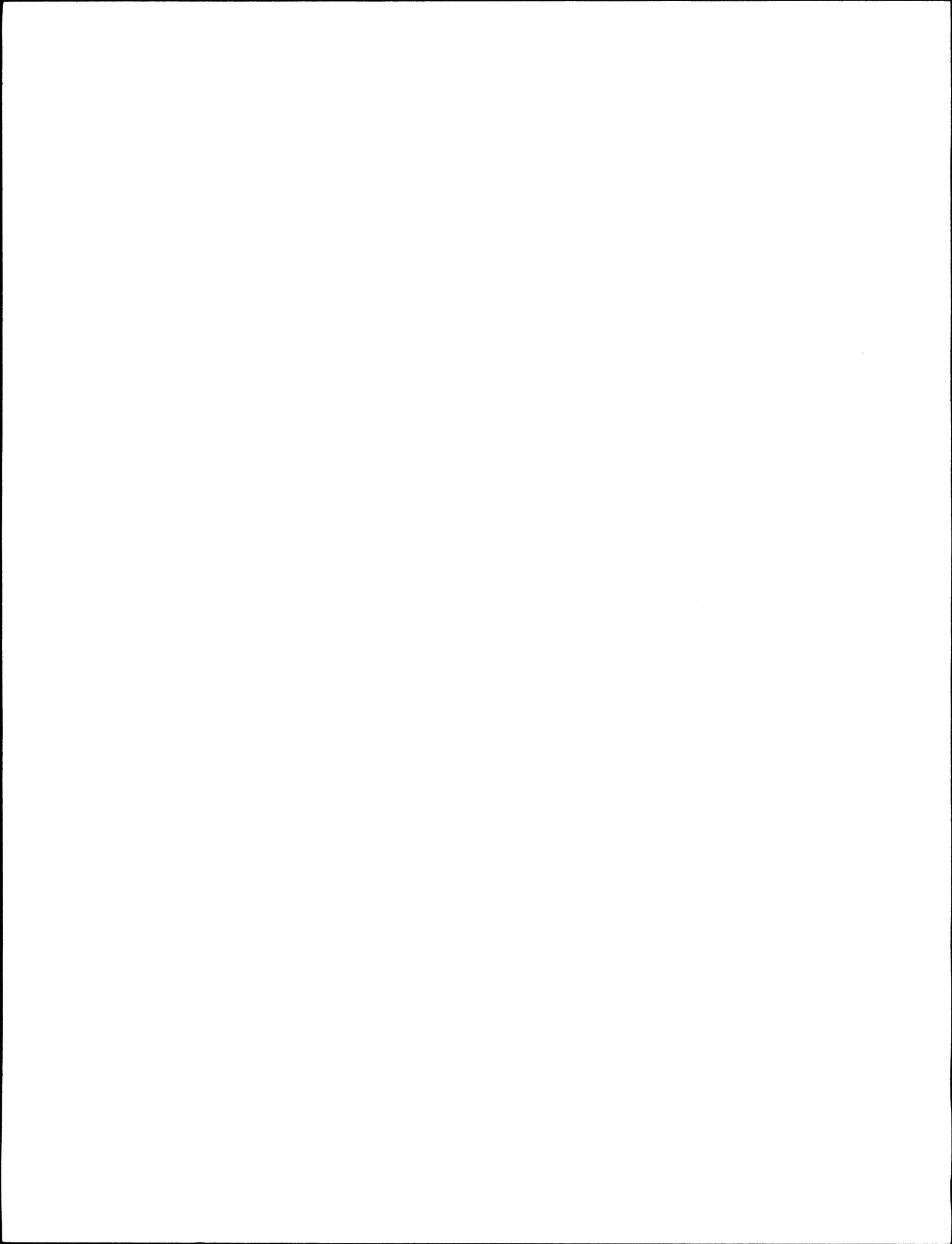
¹ Environment Canada, Water Quantity Surveys, Federal-Provincial Cost-Sharing Agreements, Annual Report.



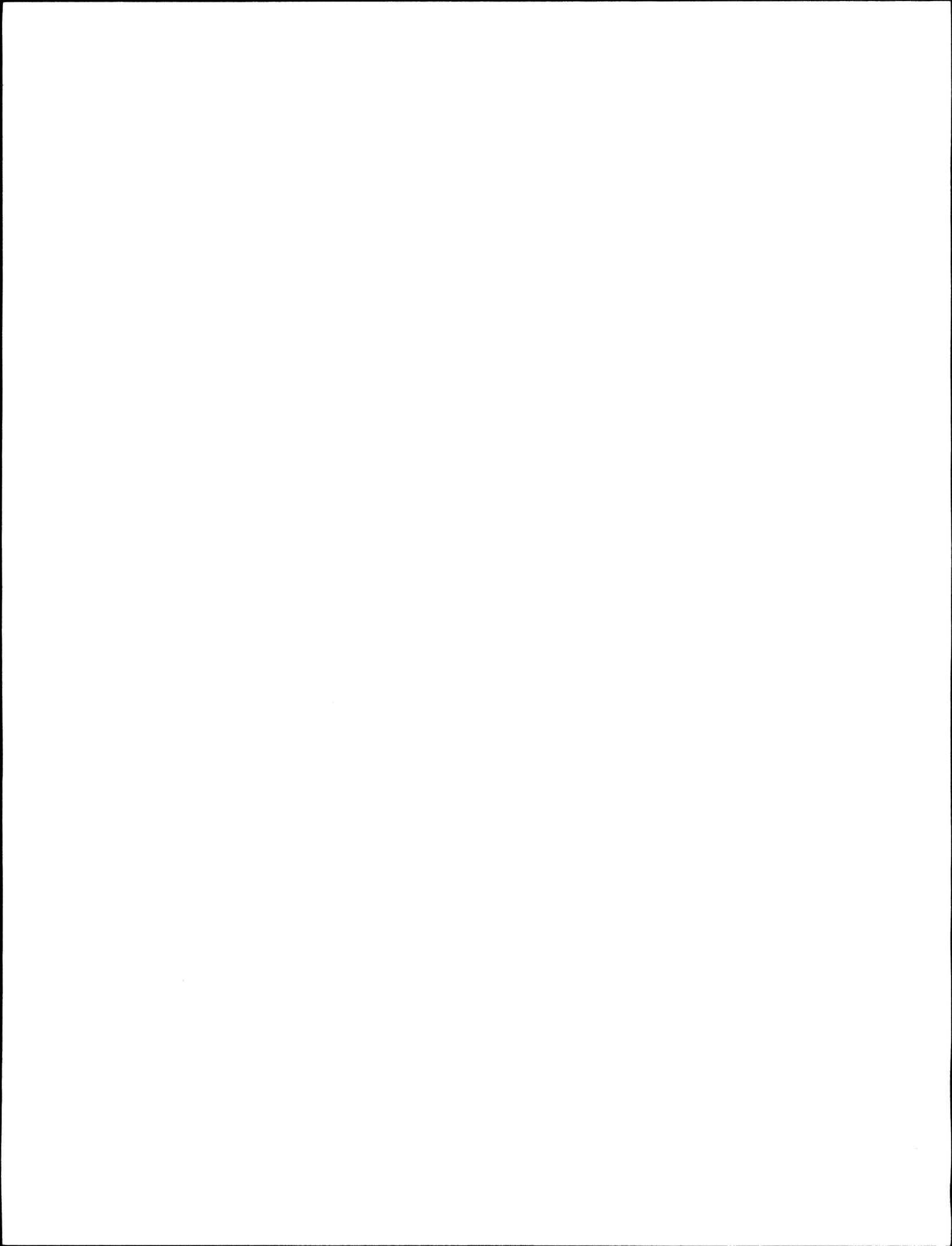
designated 'Federal' and 50% of the cost of stations designated 'Federal-Provincial'. The provincial government pays 100% of the cost of operation and construction of stations designated 'Provincial' and 50% of the cost of operation and construction of stations designated 'Federal-Provincial'. Initially, guidelines were developed for 'Federal' gauging stations with 'Federal-Provincial' and 'Provincial' gauging stations being designated by a review of user requests. In 1977 a set of guidelines was developed for the three categories and reviewed at the National Coordinating Committee meeting in October 1977. A copy of the approved guidelines dated August 3, 1977 is contained in the National Report.

Section 2.0 of this report summarizes the operational considerations of the 1980-81 water quantity program. Significant issues discussed at the Coordinating Committee meetings of June 27, 1980 and February 25, 1981 are identified in subsection 2.1. Operational problems and achievements are then outlined in subsection 2.2. Changes to the network, which were previously agreed upon but which affect Schedule "A" for April 1981, are listed in the subsection 2.3 "Water Quantity and Sediment Networks" and Tables 1 to 3 summarize the classification of hydrometric stations. Subsection 2.4 includes a brief summary of network planning activities and figures we provided to indicate the financial responsibility and network changes from 1975 to 1980, the history of the size of the hydrometric network, and histograms of gauging station maturity. The final subsection provides a description of program plans for 1981-82.

Section 3.0 summarizes the cost of operation for the 1980-81 program. This section contains a summary of the federal and provincial costs associated with the water quantity network operations and construction activities. Detailed cost calculations for the 1980-81 fiscal year are



presented in Appendix B. Tables 4 to 6 summarize the Total Program and Shareable Costs, Schedule "D", and a Comparison of Schedule "D" Costs with Actual Costs.



2.0 SUMMARY OF OPERATIONAL CONSIDERATIONS

2.1 Coordinating Committee Meetings

The Federal-Provincial Coordinating Committee held meetings on June 27, 1980 and February 25, 1981. Significant agenda items discussed at these meetings follow:

i) Sediment Weighting Factor

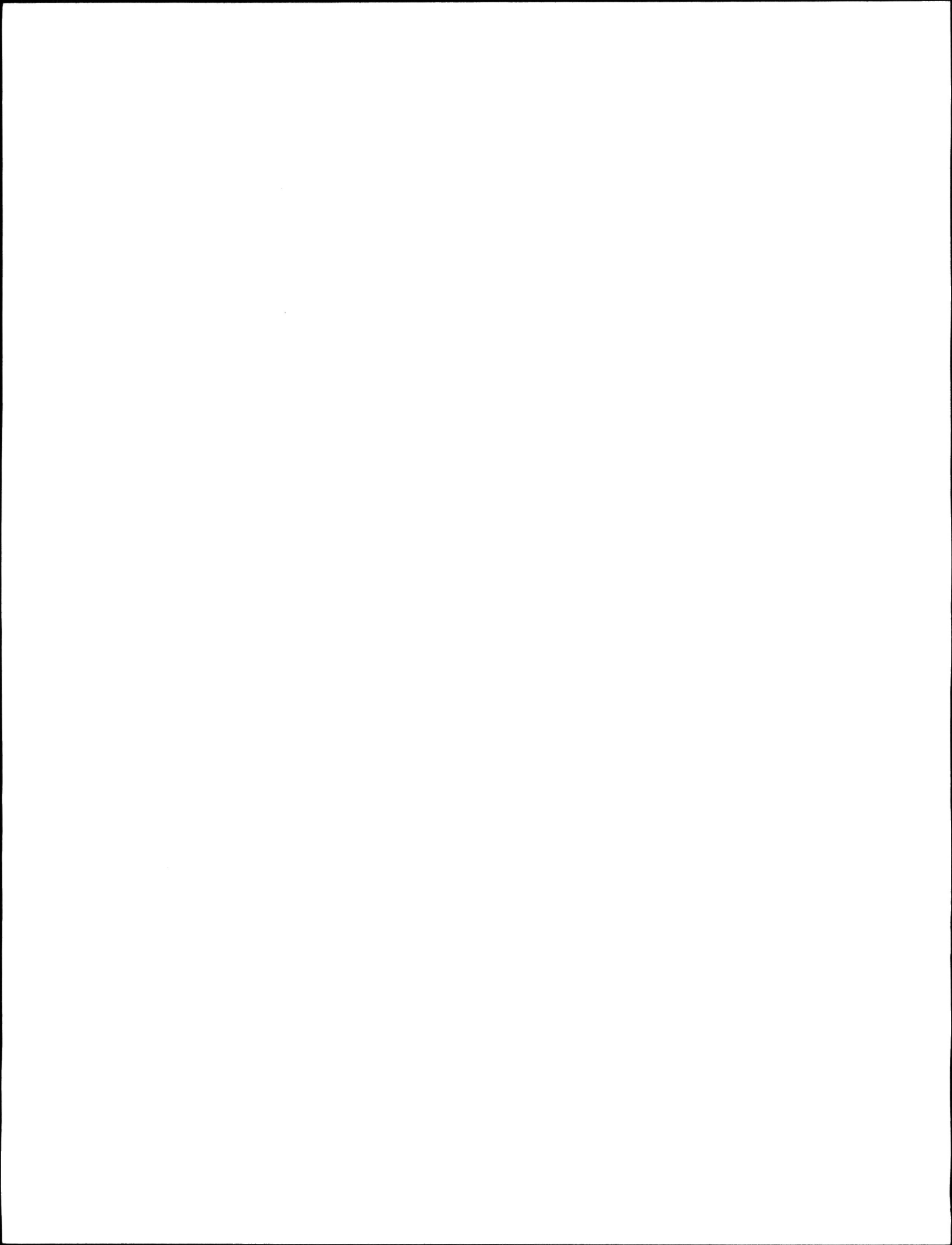
At the June meeting, Alberta Environment expressed their concern with the use of the factor of 2.4 for a twelve-month sediment station. They expressed the concern that since there are so few sediment stations as compared to hydrometric stations, the use of the constant fixed factor would not be as representative of actual costs as is the case with hydrometric stations.

Recommendation: Conduct a pilot time and cost comparison to operate various sediment stations, as compared to hydrometric operations and prepare a report for the Coordinating Committee.
Action by: Environment Canada.

At the February 1981 meeting Water Survey of Canada indicated the pilot study had not been completed and that the report should be available by the June 1981 meeting. Preliminary results showed a high degree of variability from station to station and year to year.

ii) New Station Construction

Alberta tabled a preliminary list of 9 new stations at the June



1980 meeting and a final request for 18 new stations was submitted by Alberta at the February 1981 meeting. The additional nine stations were at sites in the Cold Lake heavy oil areas. Alberta Environment stressed the importance of constructing all eighteen hydrometric stations during 1981-82 and emphasized the point by asking that Water Survey consider the possibility of contracting out construction work that Water Survey would not handle and that Alberta Environment would assume the financial responsibility for this increased cost.

Recommendation: The provincial proposal be reviewed by Water Survey of Canada with respect to cost estimates and suggested classification and that Water Survey include these final costs in Schedule "D" for 1981-82.

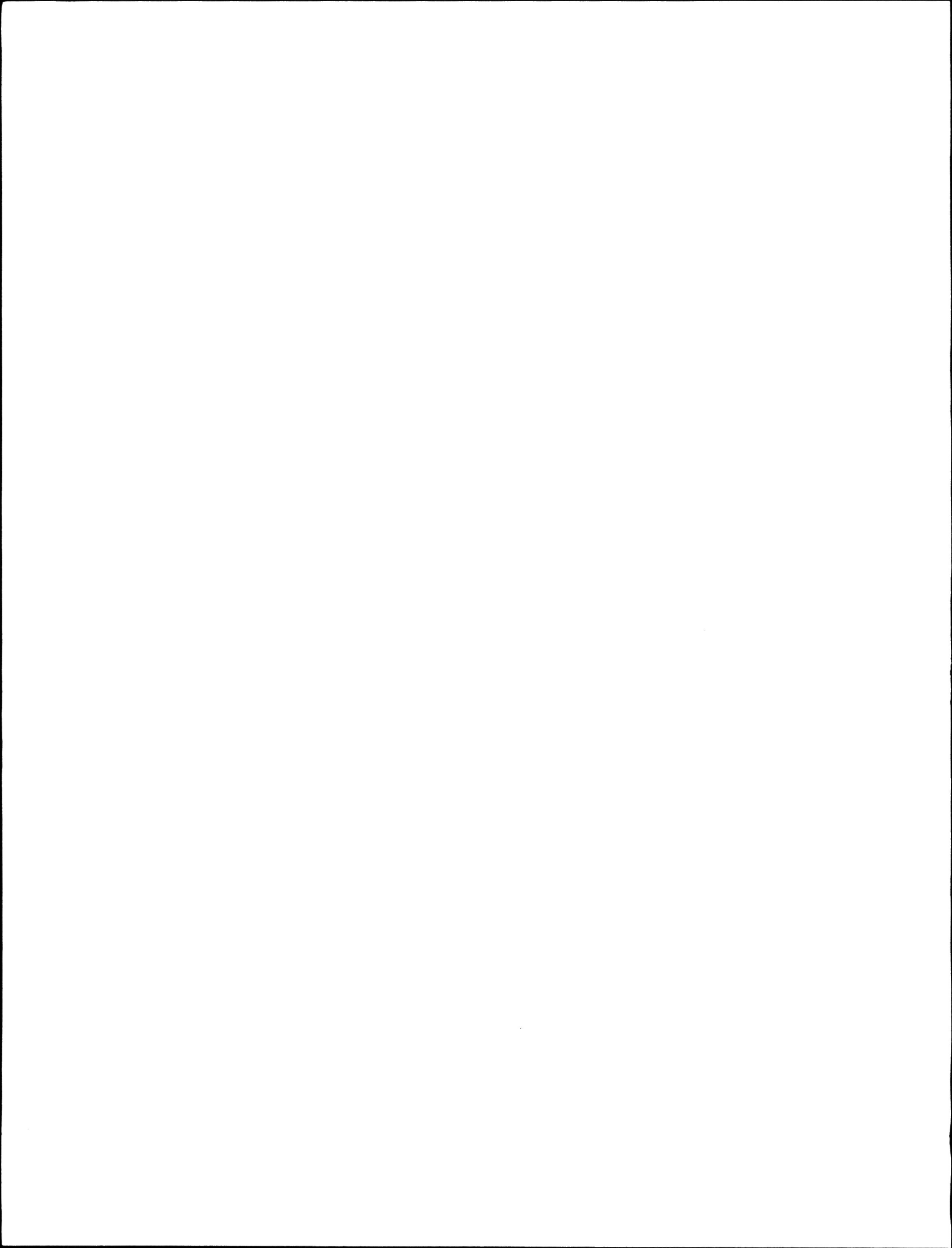
Action by: Environment Canada.

iii) Reclassification of Sediment Stations 1981-82

At the June 1980 meeting, Alberta Environment expressed their dissatisfaction with the proposed reclassification of a number of sediment stations. They expressed particular concern over the reclassification of Federal stations to a sediment classification of Federal-Provincial.

Recommendation: Water Survey of Canada re-investigate the reclassification of the sediment program at six Federal stations and one F-P station and report to the Coordinating Committee.

Action by: Environment Canada.



Water Survey of Canada reported at the February 1981 meeting that they had reviewed the proposed reclassification at the seven sites identified by Alberta and that there is only limited federal interest in these stations. Therefore, it was agreed that effective April 1, 1981 a total of ten stations would be reclassified for purposes of sediment costing.

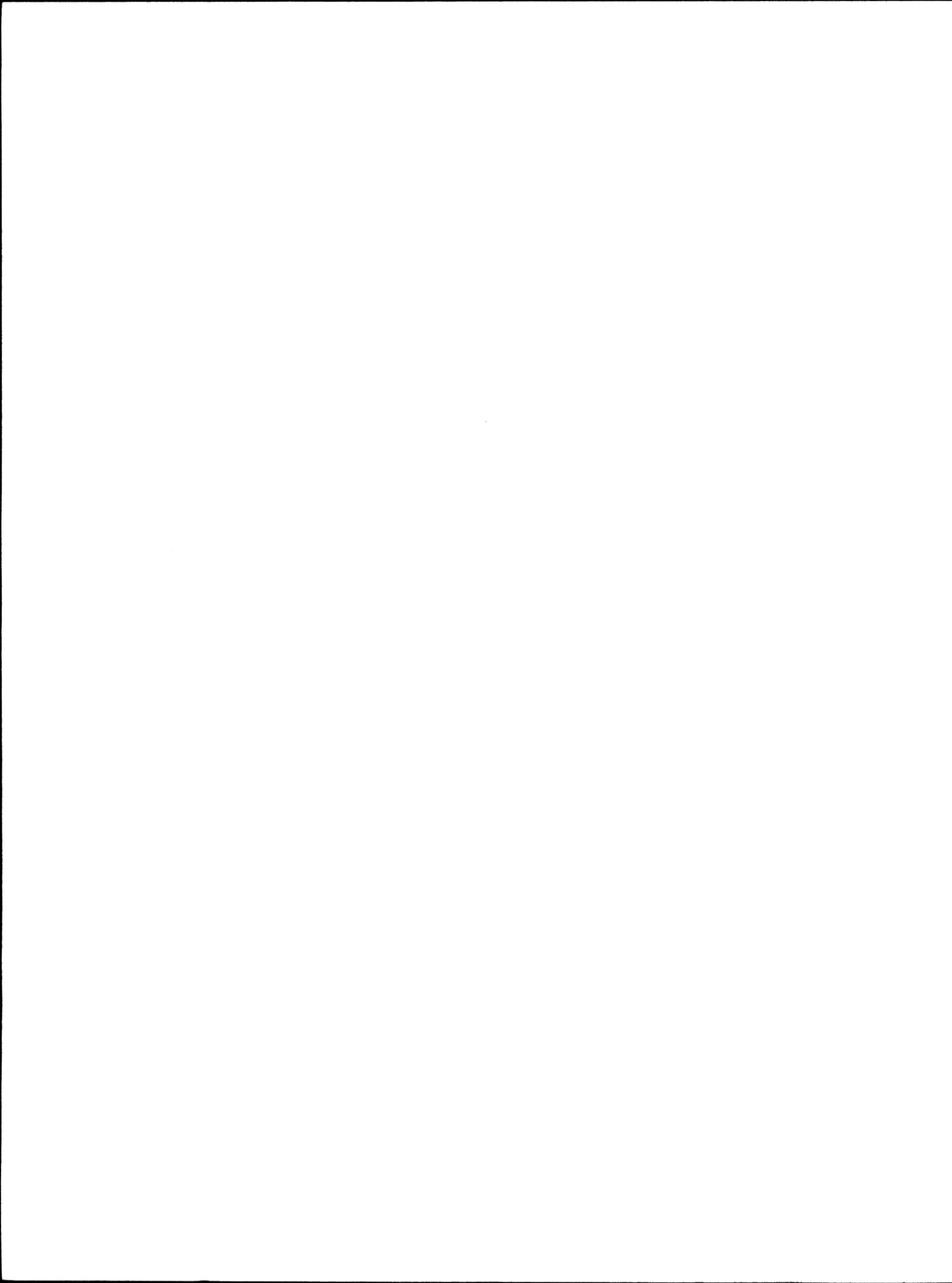
iv) Oldman River Basin Pilot Network Planning Study

This study was discussed at both Coordinating Committee meetings. At the February meeting, Alberta expressed agreement with the report changes suggested by Water Survey. It was also noted that the majority of work on this cooperative project had been conducted by Alberta Environment.

Recommendation: That the report be rewritten, utilizing Water Survey's comments and that the members of the Coordinating Committee prepare a foreward to the report.

Action by: Report Rewrite-Environment Canada

Report Foreward-Alberta Environment
Environment Canada



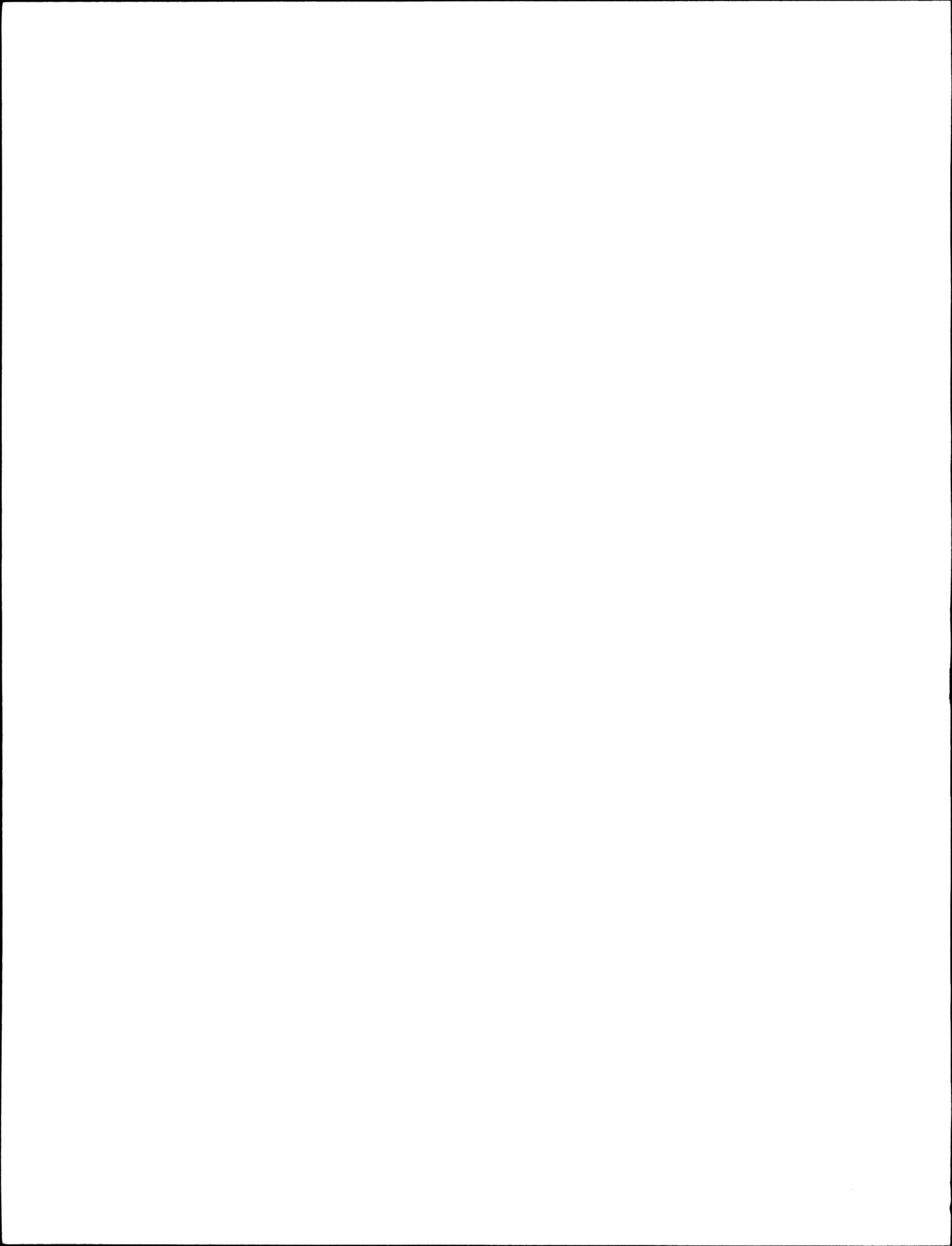
2.2 Operational Problems and Achievements

2.2.1 Problems

Staff resignations and unsatisfactory delays in the staffing process once again presented the greatest problems in terms of delivering the program. Field data collection was affected in both the spring of 1979 and 1980 with an early runoff occurring across most areas of the province which created problems in keeping gauging stations operational due to intermittent ice conditions. Also, during June 1980 a major flood event occurred in the headwaters of the Pembina River Basin; however, good field coverage was obtained on this event. Although the field component of the hydrometric program was fulfilled, it is worth noting that it was only achieved through considerable additional effort by technical and supervisory staff.

The approximately six-month delay in the publication of the 1979 Surface Water Data created problems in that an abnormally high number of requests for 1979 data had to be fulfilled at a local level until the publication was available. In all fairness, it must be noted that the delay in publication was due to bureaucratic bungling by another government department and was not the fault of Water Survey headquarters.

Late receipt of 1979 sediment laboratory results created a number of problems for the sediment surveys section in meeting publication deadlines for both the 1979 Sediment Data and 1980 Surface Water Data. This delay was primarily due to a laboratory priority being placed on analysis of results from a major flood



event and staff turnover and vacancies in the laboratory.

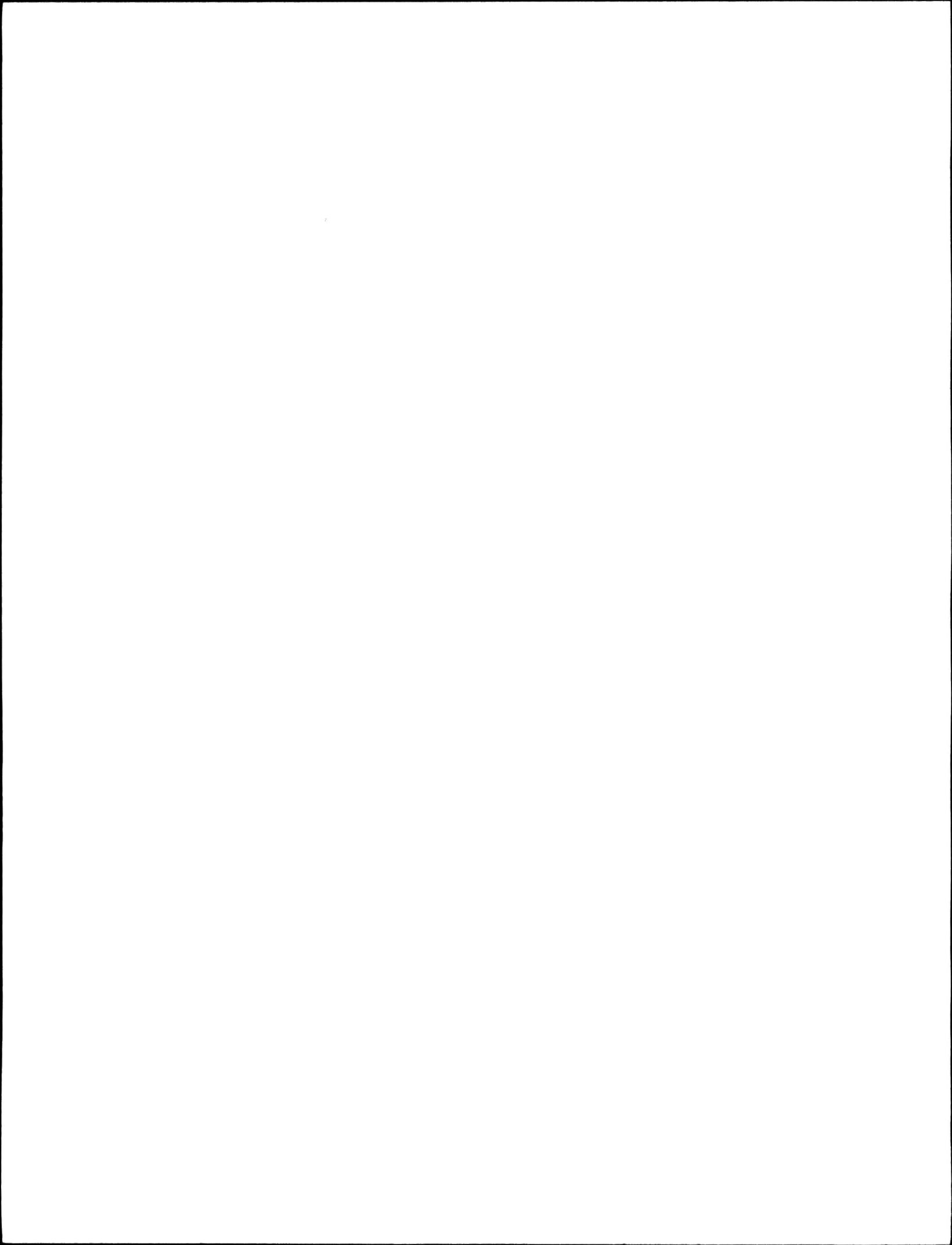
An outdated computer system continues to cause delays and inefficiencies in the computation of surface water data. A national study is currently underway on a system for the future and hopefully funds will be made available to implement the findings of this study within the next few years.

2.2.2 Achievements

In addition to satisfactorily conducting the field program during 1980-81 the other major achievements were meeting the May 1 deadline for the annual Surface Water Data publication, conducting a training program to allow new technical staff to undertake field and office activities at an early time in their career and satisfactory completion of the construction and maintenance program.

i) 1980 Surface Water Data Publication

A number of problems were encountered with meeting the May 1 deadline for submission to headquarters of the 1980 surface water data for Alberta. These included staff vacancies, a high number of inexperienced staff, an outdated computer system, late receipt of sediment laboratory results, and an early 1980 spring runoff. However, in spite of these stumbling blocks, the deadline was met due to increased monitoring of progress, improved internal lines of communication and the extra efforts of supervisory and experienced technical staff.

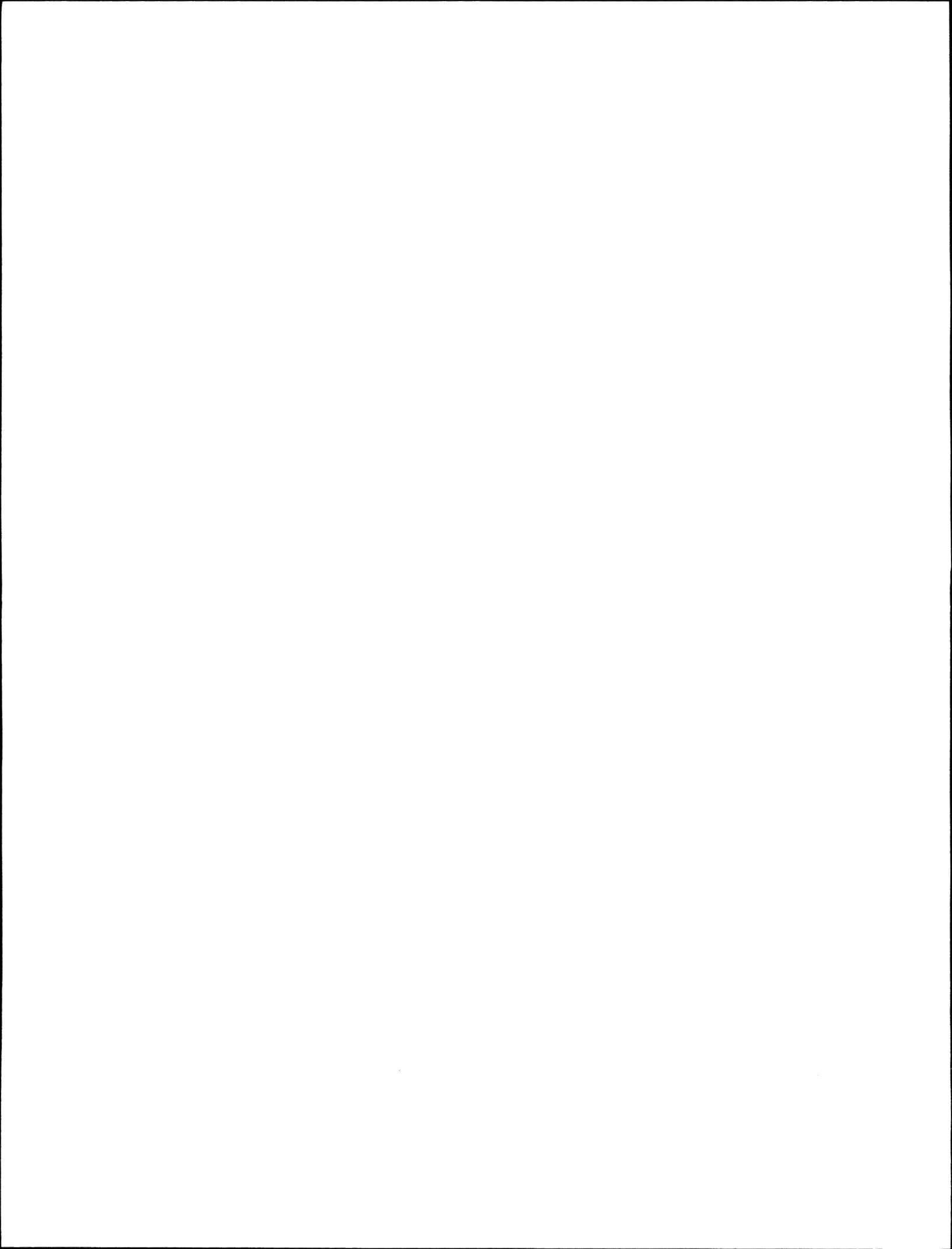


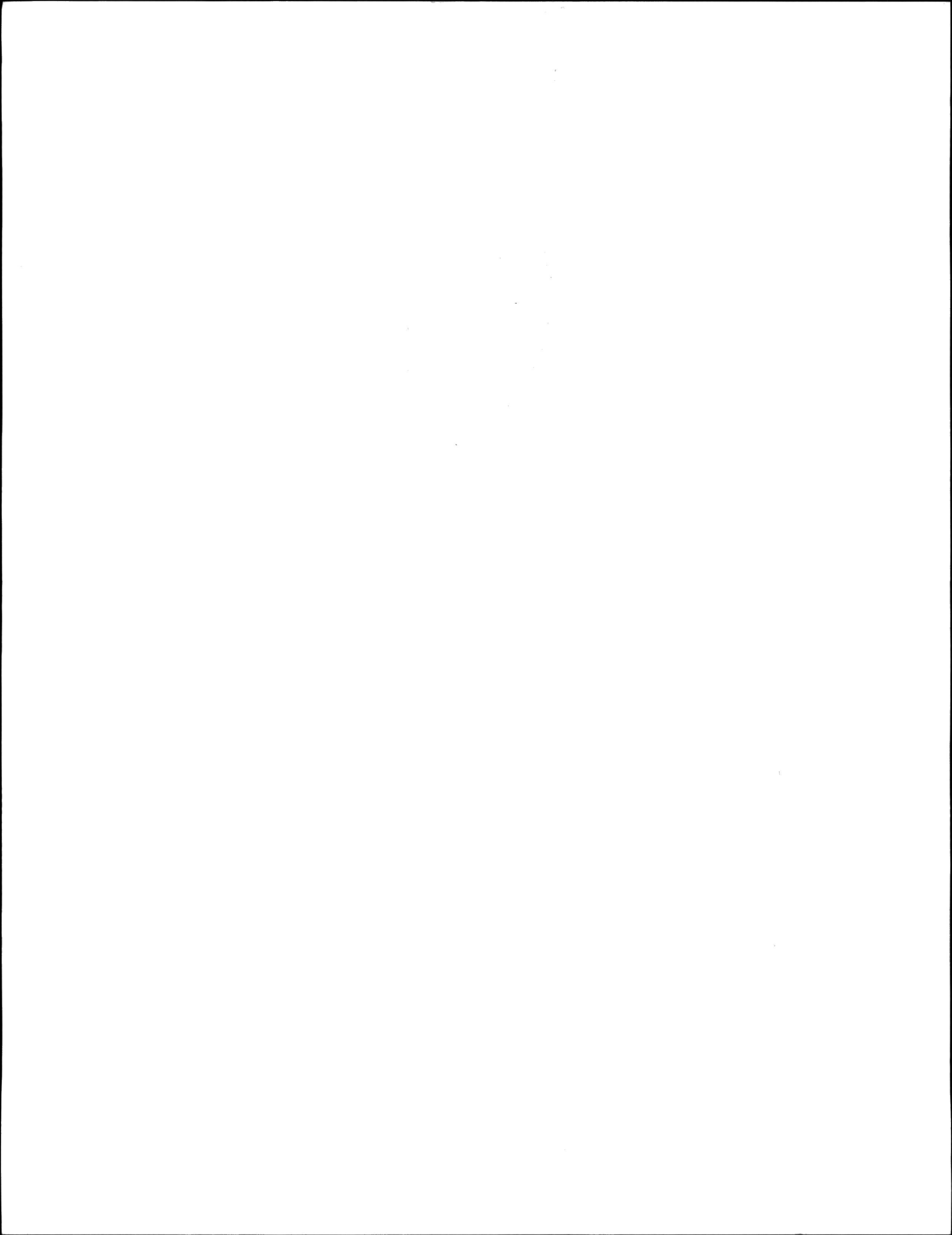
ii) Training Program

Due to the large amount of staff turnover during recent years, Water Survey found it was overextended in terms of delivering both the field and office components of the hydrometric program. The normal progression rate for technical staff to assume field responsibilities on their own is approximately one year; however, due to the large turnover rate, it was found necessary to put new staff in the mainstream at a much earlier date. Therefore, a two-month field and office training program was implemented during June and July 1980 under the planning and instruction of a supervisor. Four new staff were trained and by the results to date, it can be considered a large success, mainly due to the efforts of the supervisor conducting the program. As a partial followup, a two-week training program in manual and automated office procedures was conducted for an additional eight staff. Due to the success of the two-month training program and continuing staff turnover, a similar course will be conducted during 1981-82.

iii) Construction and Maintenance Program

The construction and maintenance program was of a significant size as compared to recent years and all aspects of the program were satisfactorily completed. A total of seventeen new hydrometric stations were installed of which sixteen were constructed by Water Survey of Canada and one provincial station was constructed by Alberta Environment.





Thirteen of the stations constructed by Water Survey are under the hydrometric cost-sharing agreement and the other three in the Ross Creek Basin were established under a separate memorandum of understanding; however, these three stations will be operated under the cost-sharing agreement.

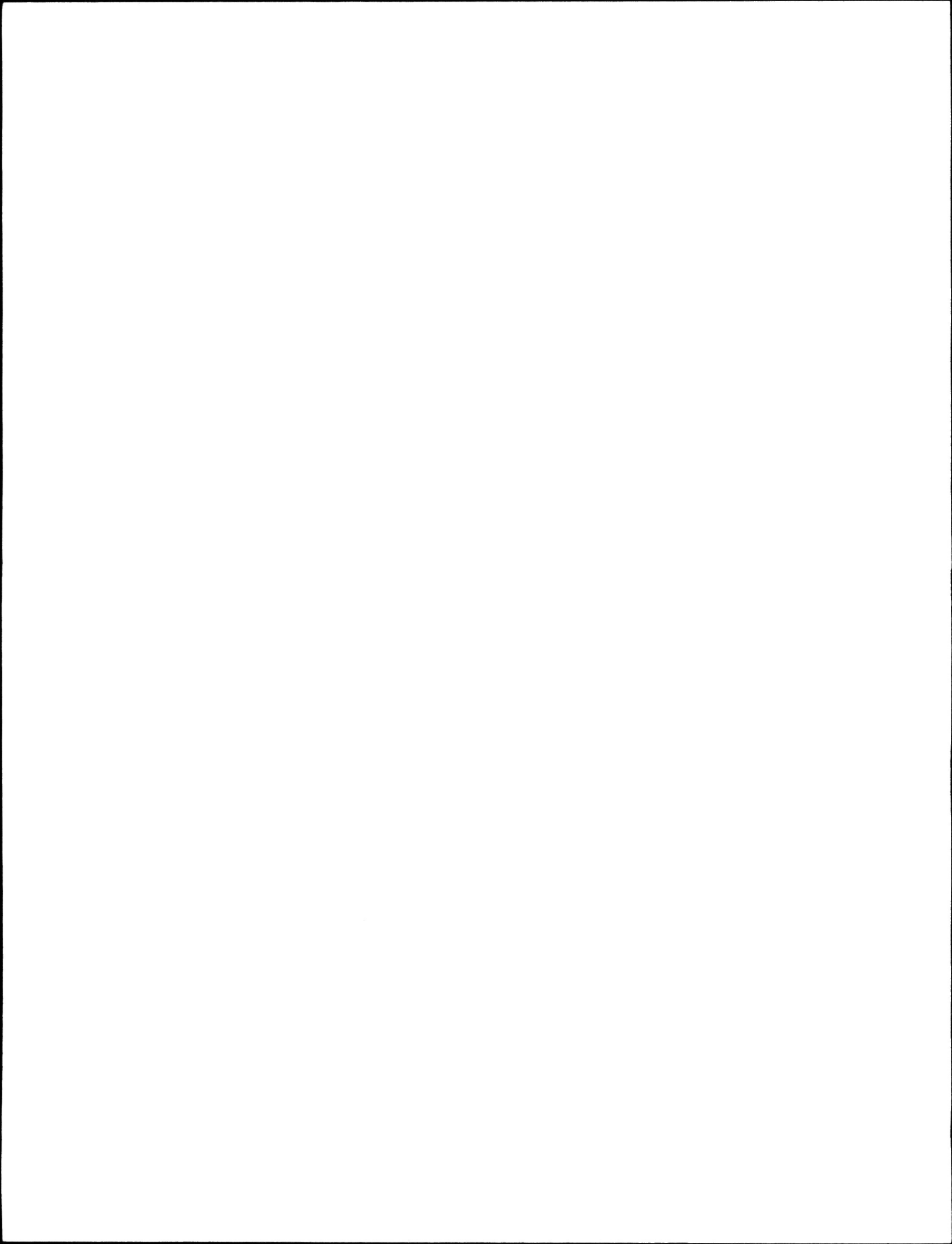
In addition to the construction program, maintenance was carried out at forty-four hydrometric stations. Localities where both maintenance and construction was carried out are indicated in Figure 1 and the corresponding station name for each site is identified in Appendix B, Table II. Additional details regarding the construction and maintenance program are provided in the annual report Alberta Gauging Station Construction and Maintenance, 1980-81.

2.3 Water Quantity and Sediment Networks

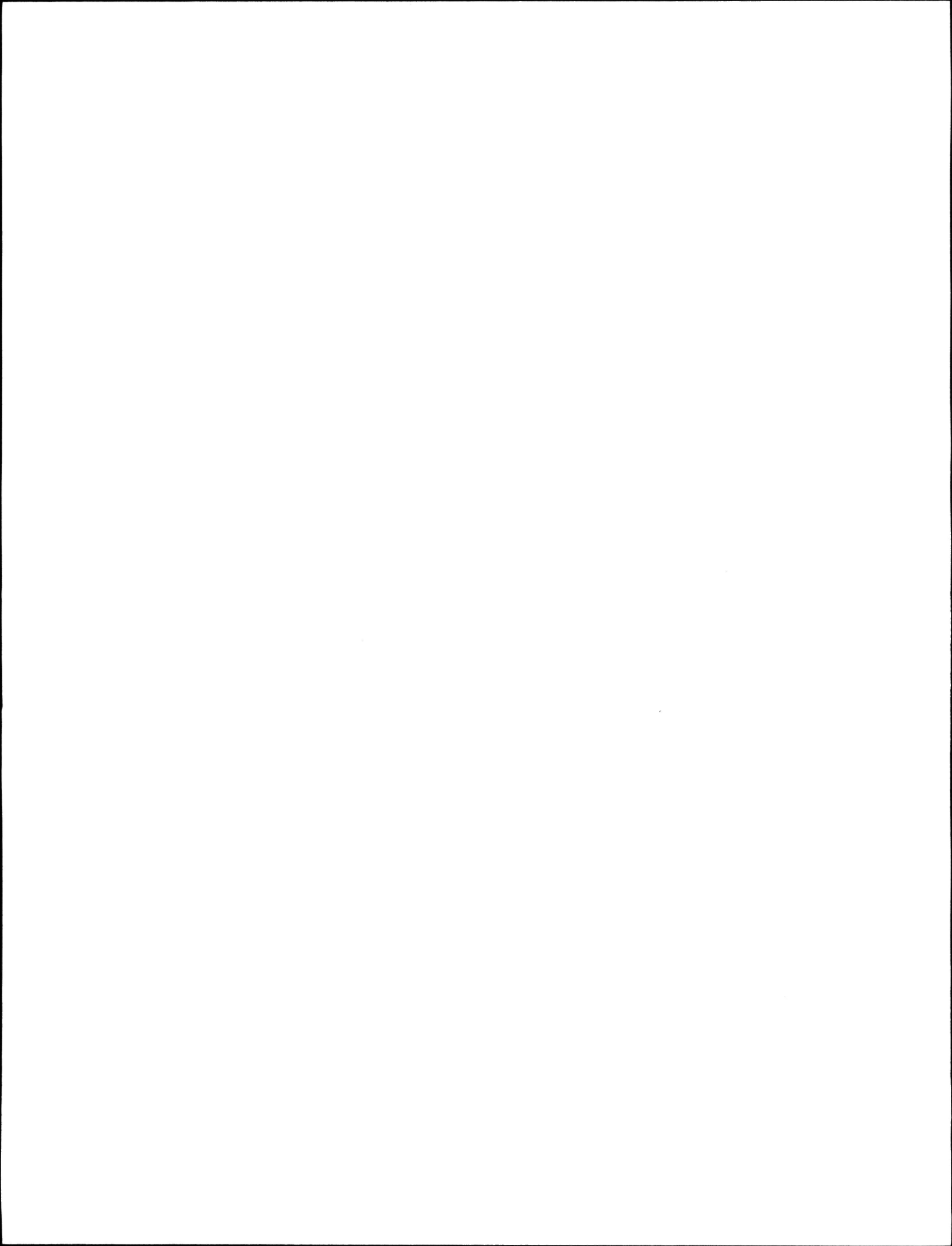
During 1980-81 a number of network changes occurred due to new station construction, discontinuance of existing stations, station relocations, name changes, discontinuance of sediment programs and re-designation of sediment stations. These changes will be reflected in Schedule "A" April 1, 1981 and are summarized as follows:

i) New Stations Established during 1980-81

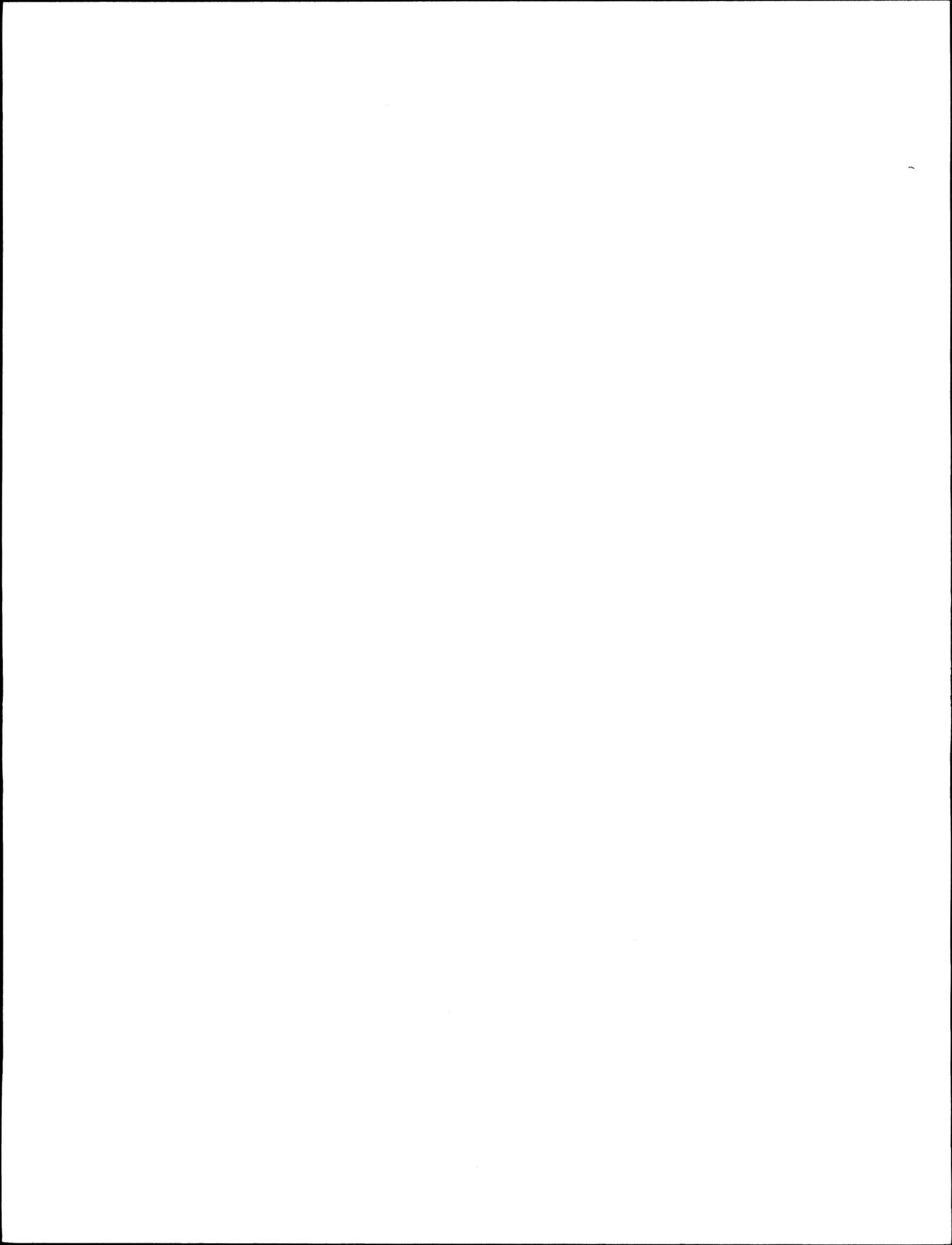
1. Dry Coulee near Magrath	05AE041	F-2
2. Bullpound Creek near Watts	05CG004	F-P
3. Ethel Lake near Cold Lake	06AC004	F-P
4. Flat Creek near Boyce	07CA003	F-P
5. Marie Lake near Cold Lake	06AC005	F-P
6. Cavan Lake Diversion near Dunmore	05AH044	P



7.	Hilda Lake near Cold Lake	06AC003	P
8.	Moore Lake near Cold Lake	06AC002	P
9.	Mooselake River near Franchere	06AC006	P
10.	Porter Creek above Baptise Lake	07BE003	P
11.	Ross Creek at Outlet Elkwater Lake	05AH046	P
12.	Ross Creek Diversion Canal nr Irvine	05AH045	P
13.	Snake Creek near Vulcan	05AC030	P
14.	South Heart Reservoir nr McLennan	07BF008	P
15.	Teepee Creek near LaCrete	07JD004	P
16.	Western Irrigation District Canal "B" near Headgate	05BM017	P
ii) <u>Stations Discontinued during 1980-81</u>			
1.	Salt River below Peace Point Highway	07NB007	F-1
2.	Bullpound Creek near Hanna	05CG002	F-P
3.	Natural Flow "A" near Pollockville	05CH009	F-P
4.	Six Mile Coulee Spillway nr Lethbridge	05AD020	P
5.	Western Irrigation District Canal "A" near Headgate	05BM016	P
iii) <u>Station Relocations (Corresponding Name Changes)</u>			
1.	Pigeon Lake at Grandview (replaces Pigeon Lake at Fisher Home)	05FA013	P
iv) <u>Changes to Alberta Environment Operated Stations (Peace-Athabasca Delta Area)</u>			
a) <u>New Stations Established During 1980-81</u>			
1.	Revillon Coupe below Riviere des Rochers		P
b) <u>Stations Discontinued During 1980-81</u>			
1.	Baril Lk. at Centre of Lake	07KF005	F-1
2.	Athabasca River ab Richardson R.	-	F-P



- | | | | |
|----|--------------------------------|---------|---|
| 3. | Jackfish Creek ab Athabasca R. | 07DD009 | P |
|----|--------------------------------|---------|---|
- c) Name Changes
- | | | | |
|----|---------------------------------------------------------------------------------------------------|---------|-----|
| 1. | Athabasca River near Old Fort
(formerly Athabasca River above
Embarras Channel - no Number) | 07DD011 | F-P |
| 2. | Mamawi Lake Channel at Old Dog Camp
(formerly Mamawi Lake at Poplar Island) | 07KF003 | P |
- d) Miscellaneous Changes
- | | | | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|
| 1. | Chenal Des Quatre Fourches below Four
Forks
(changed to water level only with
occasional miscellaneous discharge
measurements). | 07KF006 | F-1 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|
- v) Changes to Sediment Operations
- A. Sediment Operation Re-designations
- a) From Federal to Federal-Provincial
- | | | | |
|----|------------------------------------------------|---------|--|
| 1. | Athabasca R. at Embarras Airport | 07DD001 | |
| 2. | North Saskatchewan River at
Whirlpool Point | 05DA009 | |
| 3. | Oldman River near Lethbridge | 05AD007 | |
| 4. | Peace River at Peace River | 07HA001 | |
| 5. | Red Deer River at Red Deer | 05CC002 | |
- b) From Federal-Provincial to Provincial
- | | | | |
|----|---------------------------------|---------|--|
| 1. | Eunice Creek near Hinton | 07AF005 | |
| 2. | Oldman River near Brocket | 05AA024 | |
| 3. | Oldman River nr Waldrons Corner | 05AA023 | |
| 4. | Red Deer River at Drumheller | 05CE001 | |
| 5. | Whiskeyjack Creek nr Hinton* | 07AD004 | |
- * The sediment program was conducted but not indicated in the Schedule "A" of April 1, 1980.



B. New Sediment Stations*

1. Milk River at Eastern Crossing	11AA025	F-P
2. Milk River at Milk River	11AA005	F-P
3. North Milk R. nr Intn'l Boundary	11AA001	F-P
4. Lesser Slave River at Slave Lake	-	P

C. Discontinued Sediment Operations

1. Highwood River near the Mouth	05BC024	F-7
2. Crowsnest River near Frank	05AA008	F-P

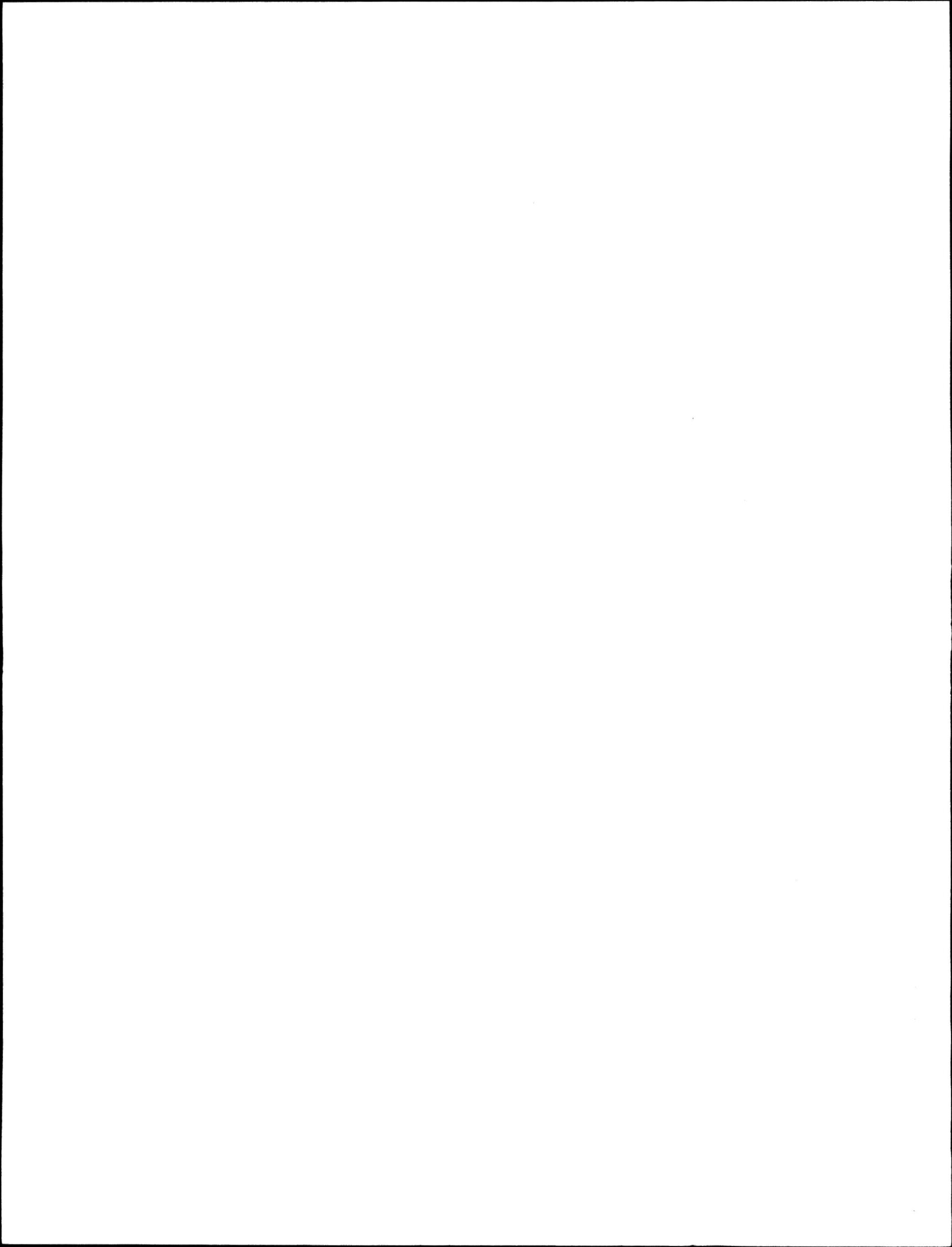
*In addition, less intensive sampling (at time of technician visit only) will be conducted at Milk River at Western Crossing, 11AA025, Milk River near Pendant D'Oreille, 11AA035, and at Milk River near Writing-on-Stone Park, 11AA034.

Tables 1 to 3 provide summary information for the Annual National Cost-sharing Report. Table 1 indicates additions and deletions to the hydro-metric network during 1980-81 which resulted in an increase of nine stations and the station designation effective April 1, 1980. Table 2 illustrates the changes which have occurred in each of the classification categories from the commencement of the cost-sharing agreement in April 1975 to April 1, 1980. Table 3 provides detailed gauging station data as of April 1, 1980.

2.4 Network Planning Activities

i) Sediment

The review of the classification of sediment stations originally tabled in February 1980 was discussed at both Coordinating Committee meetings during 1980-81. As a result, ten sediment stations will be reclassified effective April 1, 1981 and the sediment program will be discontinued at an additional two sites, as outlined in the preceding section. A start was made by Water Survey of Canada, Ottawa on



WATER QUANTITY SURVEYS
Gauging Station Data for 1980/81

No. of Stations			No. of Stations Added 1980-81	No. of Stations Discontinued 1980-81	Stn. Designation April 1, 1980			
April 1/79	April 1/80	Change			Fed.	F/P	Prov.	Contrib.
460(32)	460(31)	0	17	8	129 (14)	198 (10)	113 (7)	20

Bracketed numbers indicate number of sediment stations.

WATER QUANTITY SURVEYS
Comparative Gauging Station Data April 1/75¹ to April 1/80

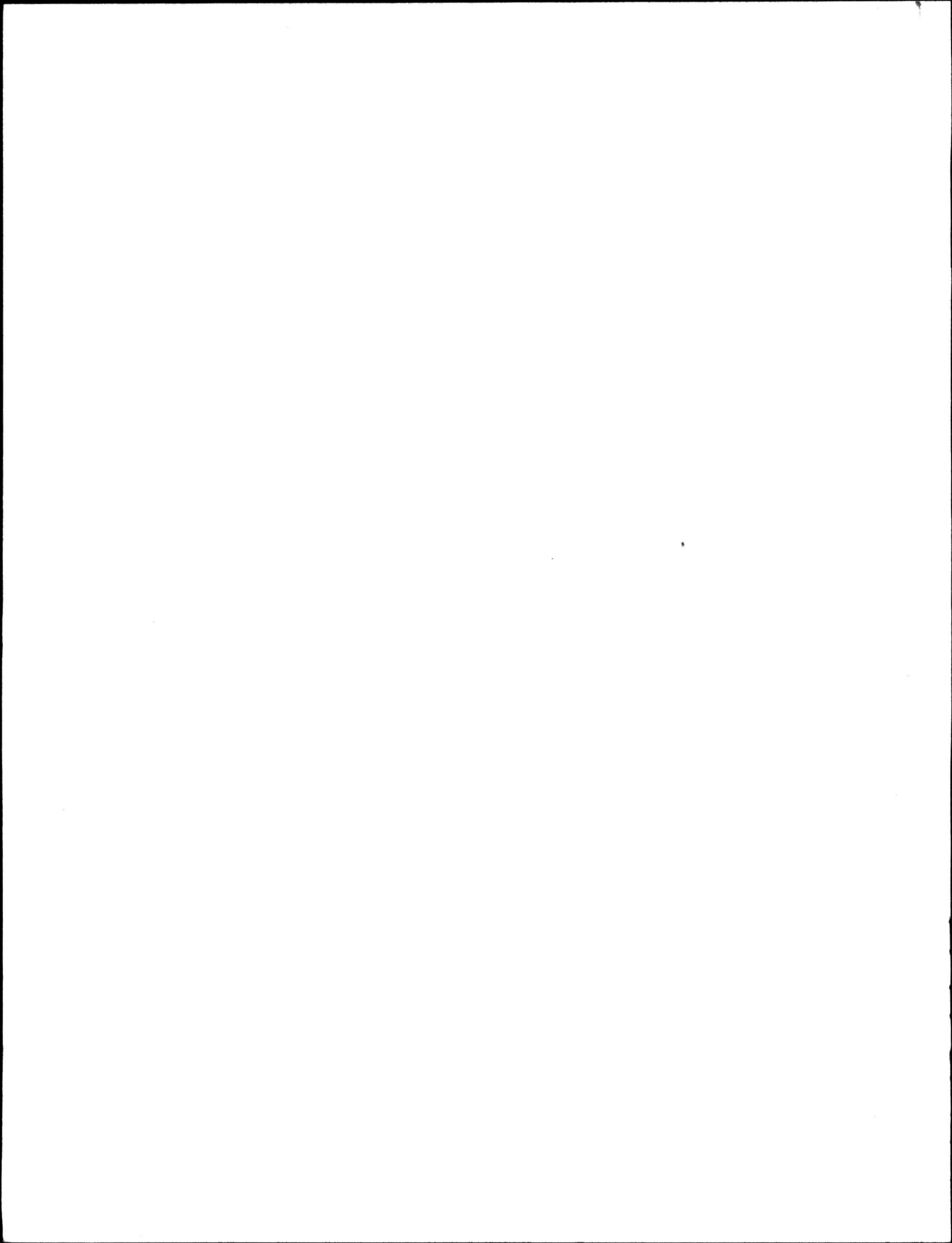
Federal Stations			F/P Stations			Provincial Stations			Total Stations		
Apr 1/75	Apr 1/80	Chge	Apr 1/75	Apr 1/80	Chge	Apr 1/75	Apr 1/80	Chge	Apr 1/75	Apr 1/80	Chge
157	129	-28	221	198	-23	46	113	+68	424	440	+16

¹ The April 1, 1975 station numbers supercede those published in other annual reports, which erroneously did not include stations operated by Alberta Environment.

WATER QUANTITY SURVEYS
Detailed Gauging Station Data April 1/80

F-1	F-2	F-3	F-4	F-5	F-6	F-7	Total F	F/P	P	Contributed	Total-All
32(4)	53(5)	32	0	0	0	12(5)	129(14)	198(10)	113(7)	20	460(31)

Bracketed numbers indicate number of sediment stations.



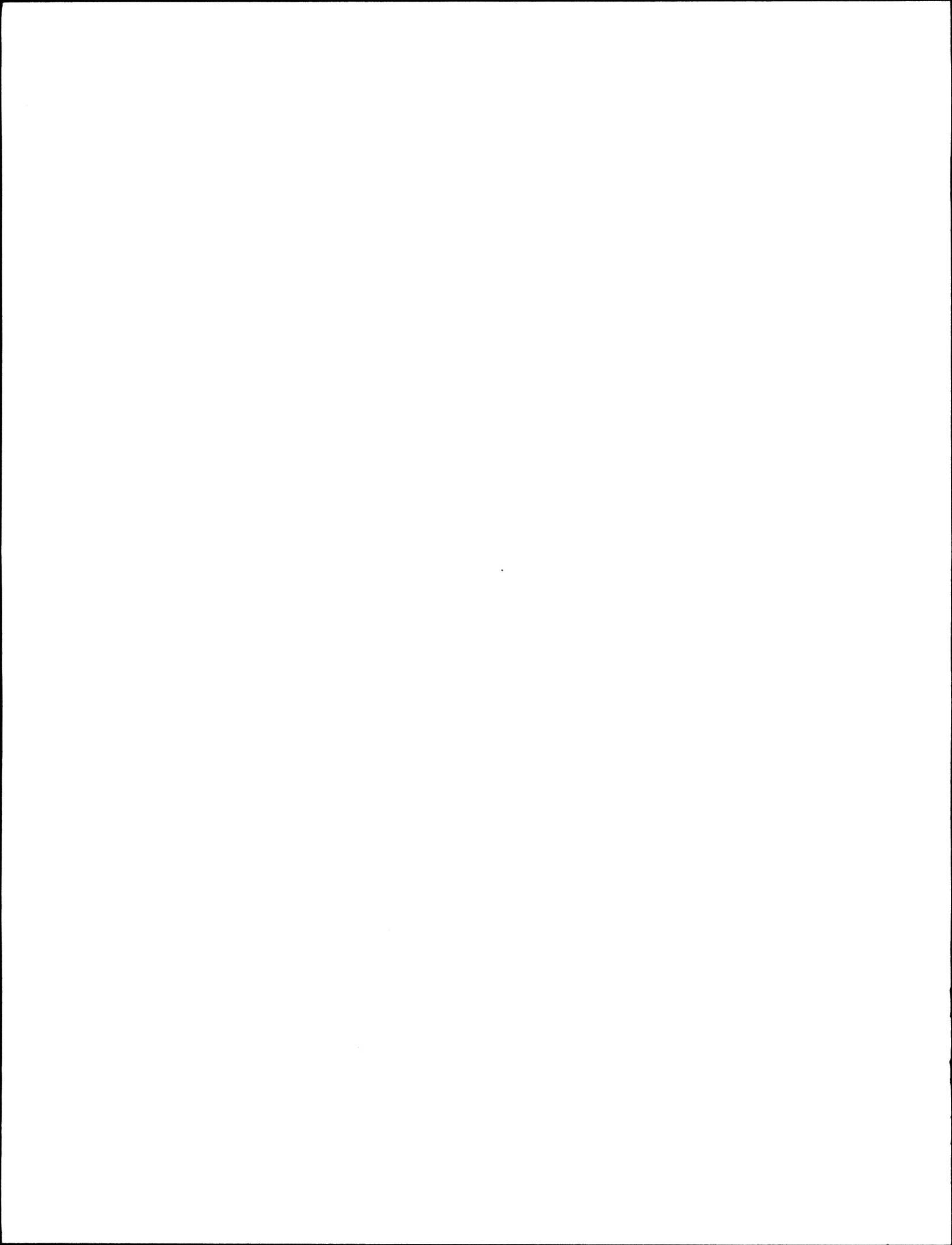
the planning analysis of long term sediment stations.

ii) Network Planning Project

Limited progress was made on the cooperative Oldman River Basin Network Planning Pilot Project. A draft of the report combining results of analysis by Alberta Environment and Water Survey was completed; however, a management review of the report indicated numerous revisions were required to finalize the report. The preliminary combined report indicates that there are few opportunities for network reduction and in fact, additional stations are required in some portions of the basin. Therefore, as the Oldman River Basin has the densest network in Alberta, it is readily apparent that when methods utilized in this study are applied to the remainder of the province, it will be shown that the hydrometric network is seriously deficient in many areas.

iii) Mackenzie Basin Network Planning

The major network planning activities during 1980-81 occurred outside the cost-sharing agreement and under the umbrella of Mackenzie Basin studies. Although these studies are not currently applicable to the cost-sharing agreement, they deserve mention, as the ultimate funding of any hydrometric stations recommended through this study will likely fall under the cost-sharing agreement. During the year, Water Survey of Canada completed planning studies on the hydrometric network, sediment network, snow course network and contracted out studies to other components of the Department of Environment on the meteorological and water quality networks. These reports were then utilized by a private consultant contracted by Water Survey to prepare a coordinated



network design which will be utilized as input to the main Mackenzie Basin Study reports.

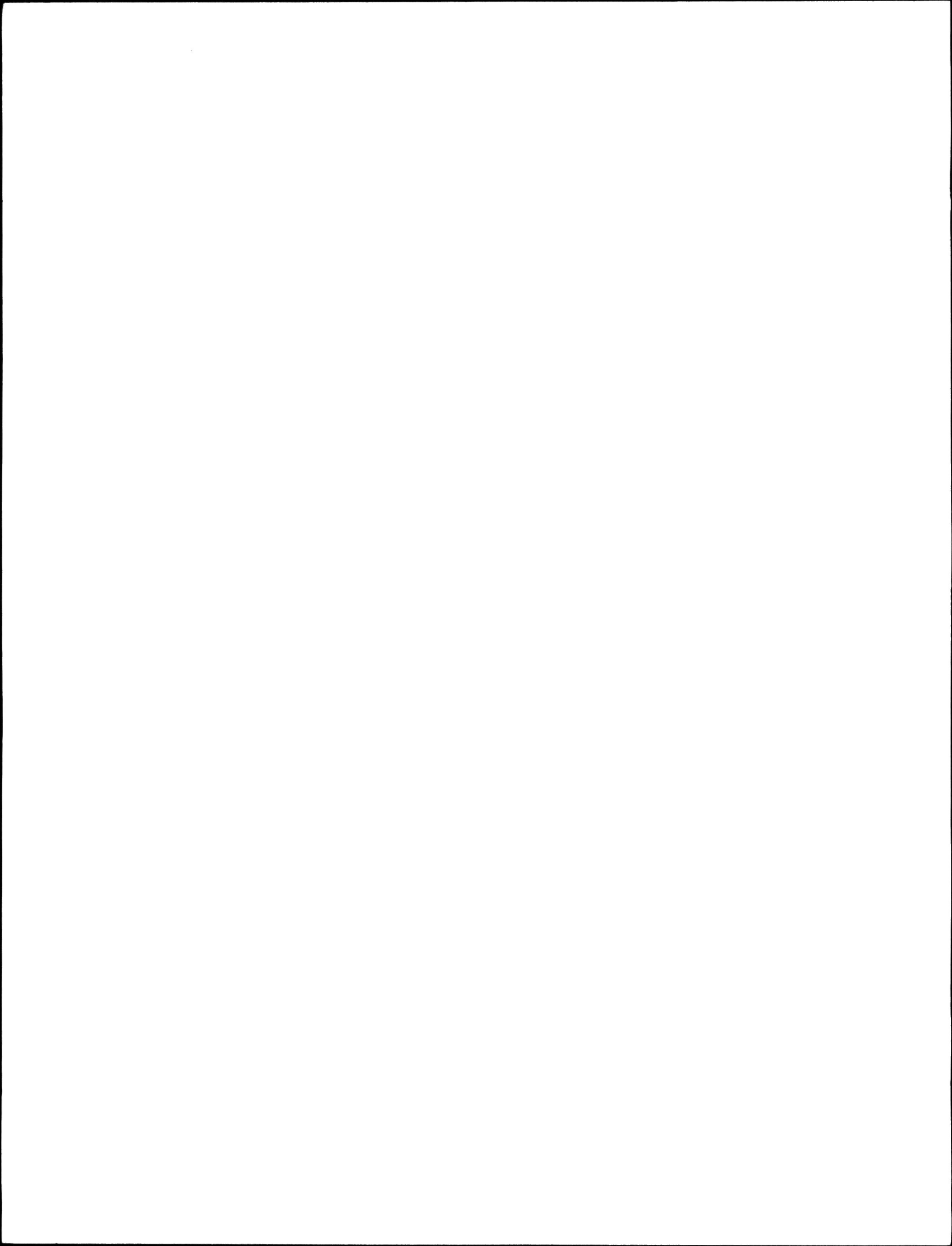
iv) Historical Network Changes

As the total number of stations in the hydrometric network may remain the same or change by a small amount from year to year, it can appear that the network is dormant and that network planning is not occurring. This is actually far from the truth and in fact, dynamic changes have occurred in the network from the inception of the cost-sharing agreement, as indicated in the following summary:

<u>Year</u>	<u>New Stations Established</u>	<u>Stations Discontinued</u>
1975-76	33	14
1976-77	21	10
1977-78	11	25
1978-79	15	15
1979-80	5	5
1980-81	<u>17</u>	<u>8</u>
Total	102	77

The new stations established over this six-year period represent approximately 23% of the hydrometric network operated by Water Survey and Alberta Environment as of April 1, 1981 and the discontinued stations represent 17% of the network.

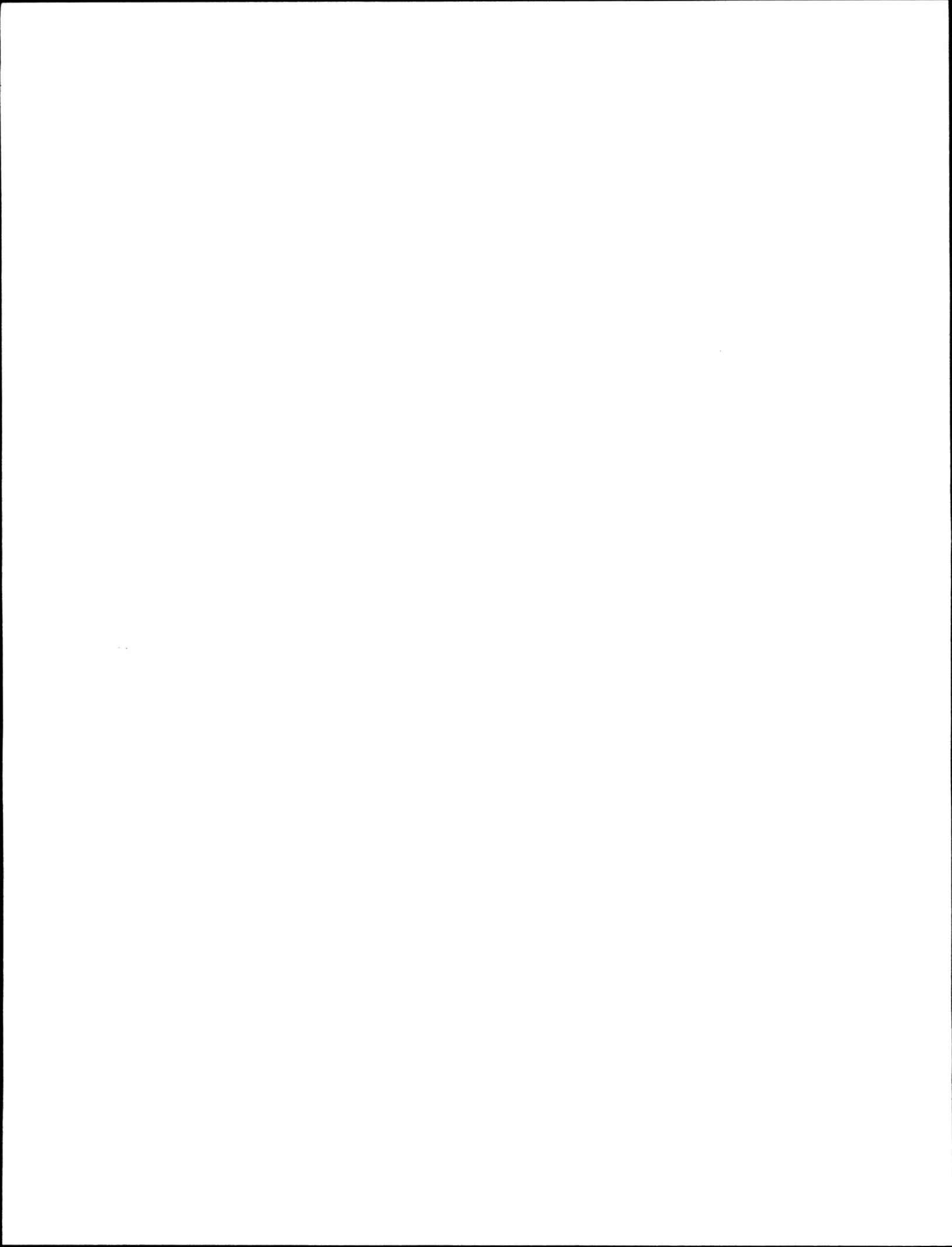
In addition to the 179 stations which have been added or deleted from the network, a large number of station designation changes have also occurred over this six-year period and these are summarized as follows:



<u>Designation Change</u>	<u>Number of Stations</u>
F to F-P	8
F to P	13
F-P to F	4
F-P to P	27
F-P to Contributed	1
P to F-P	1
F to F-P (Sediment)	5
F-P to P (Sediment)	<u>5</u>
Total	64

These designation changes represent 14% of the network and therefore between designation changes, new station construction and station discontinuance, there has been a change of 54% during the period of the cost-sharing agreement.

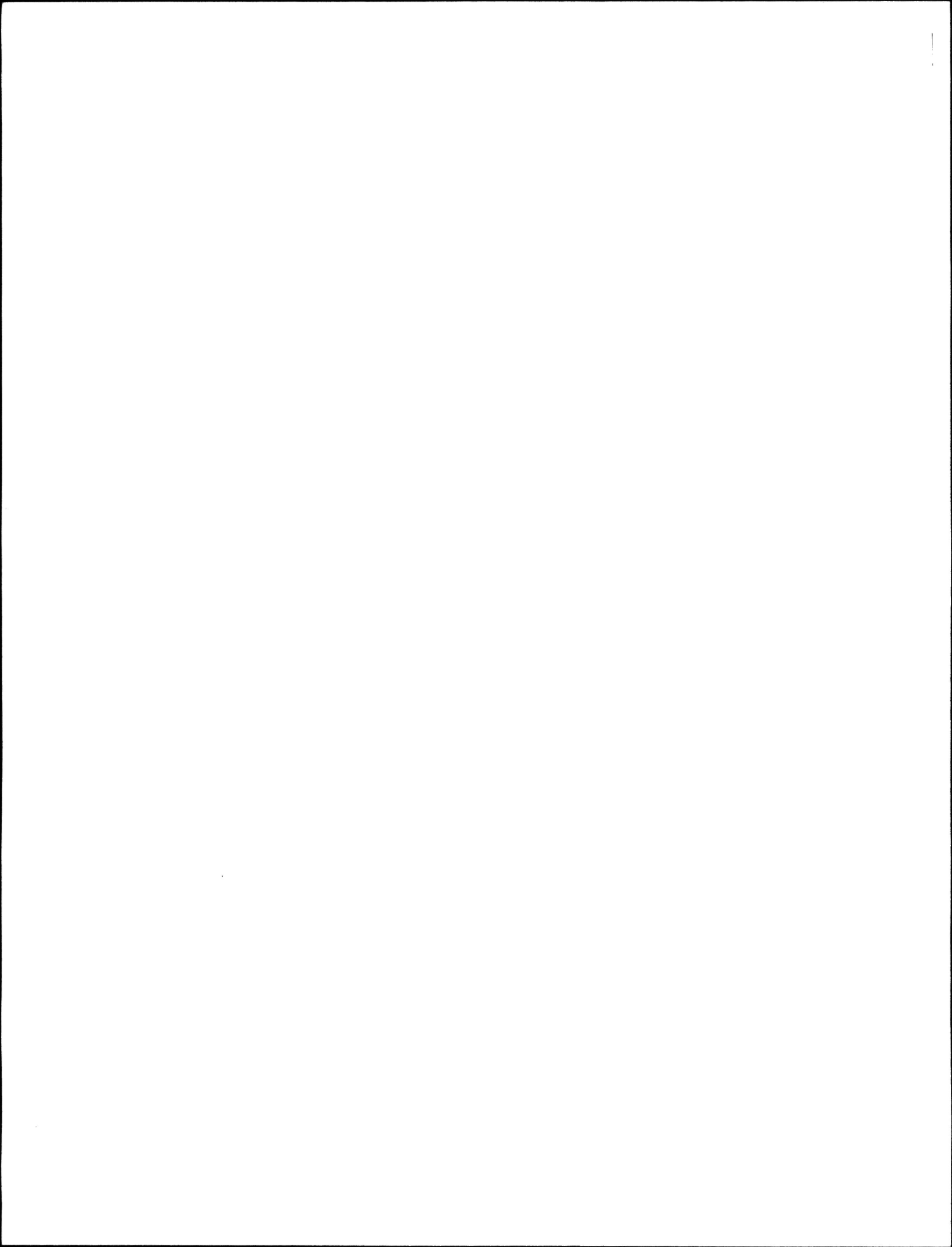
The changing nature for financial responsibility of the hydrometric network since the inception of the cost-sharing agreement is illustrated in Figures 2 to 5. It should be noted that these figures only include the stations operated by Water Survey of Canada and do not include provincially operated stations. Figure 2 is a combined graph of the three designation categories, whereas Figures 3 to 5 are individual graphs for each of the designation categories. It is readily apparent from these graphs that there has been a significant decrease in the federal financial involvement in the network and a significant increase in the provincial involvement since the inception of the agreement. The main reason for this is that a thorough review of Federal and Federal-Provincial stations indicated that there was no longer a federal interest in a large number of stations and the province assumed financial responsibility for these stations. Also, since the inception



of the agreement the requirements for additional stations have mainly been of a provincial nature for regional water resource inventory and studies, water rights, and flow forecasting.

The history of the size of the hydrometric network in Alberta is illustrated in Figure 6. In terms of the current era, it can be seen that the hydrometric network increased rapidly from the mid-50's until the signing of the cost-sharing agreement in 1975. Since the implementation of the agreement, the network has remained relatively stable in size with only a small increase occurring from April 1, 1975 to the present time.

Figure 7 is a histogram of active gauging station maturity in Alberta and Figure 8 is a similar histogram which also includes discontinued gauging stations. The histogram of active gauging stations depicts the lack of maturity of the Alberta network as 34% of the network has 10 years or less of record and that the modal value for years of data for the active network is only 15 years.



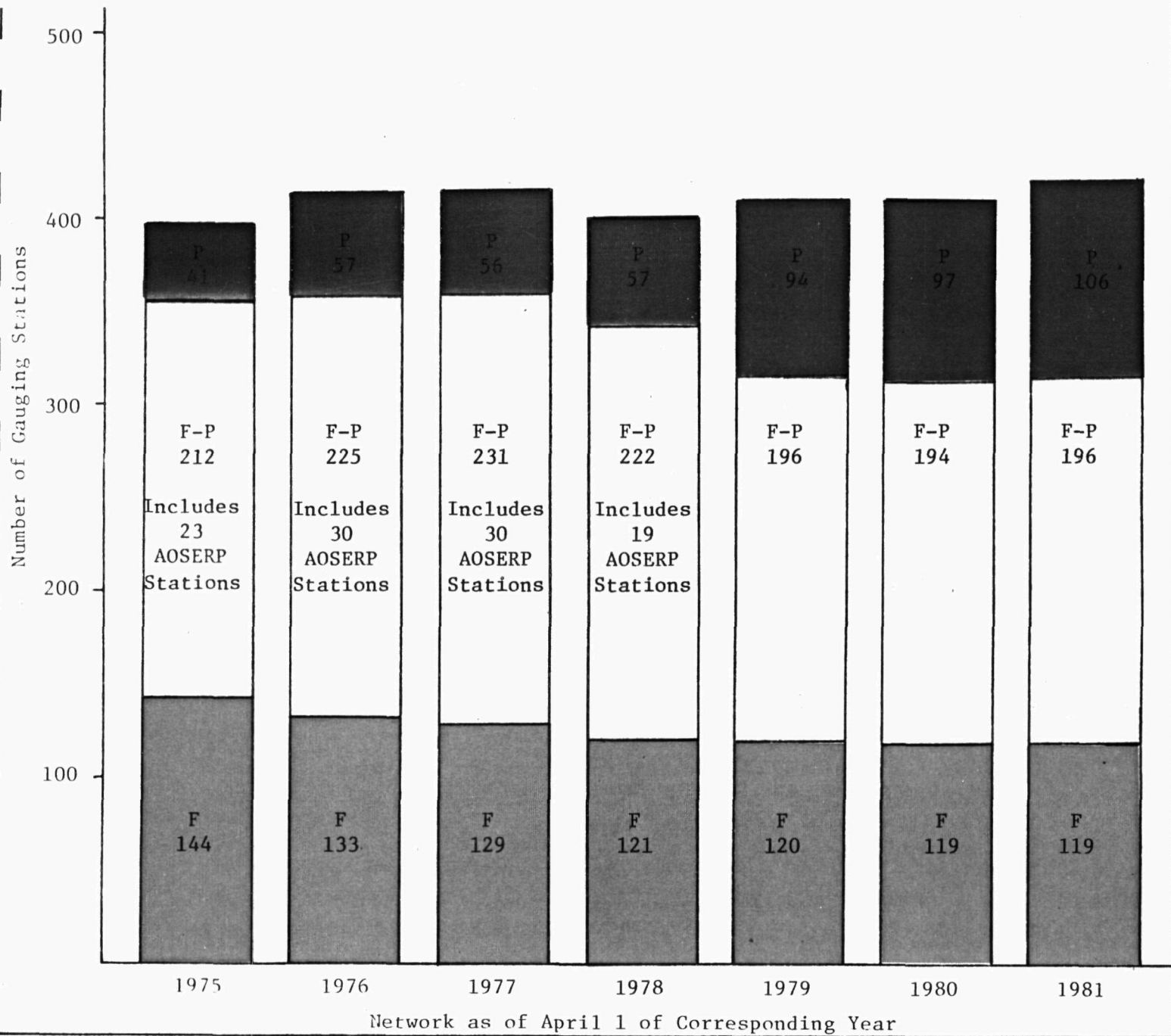
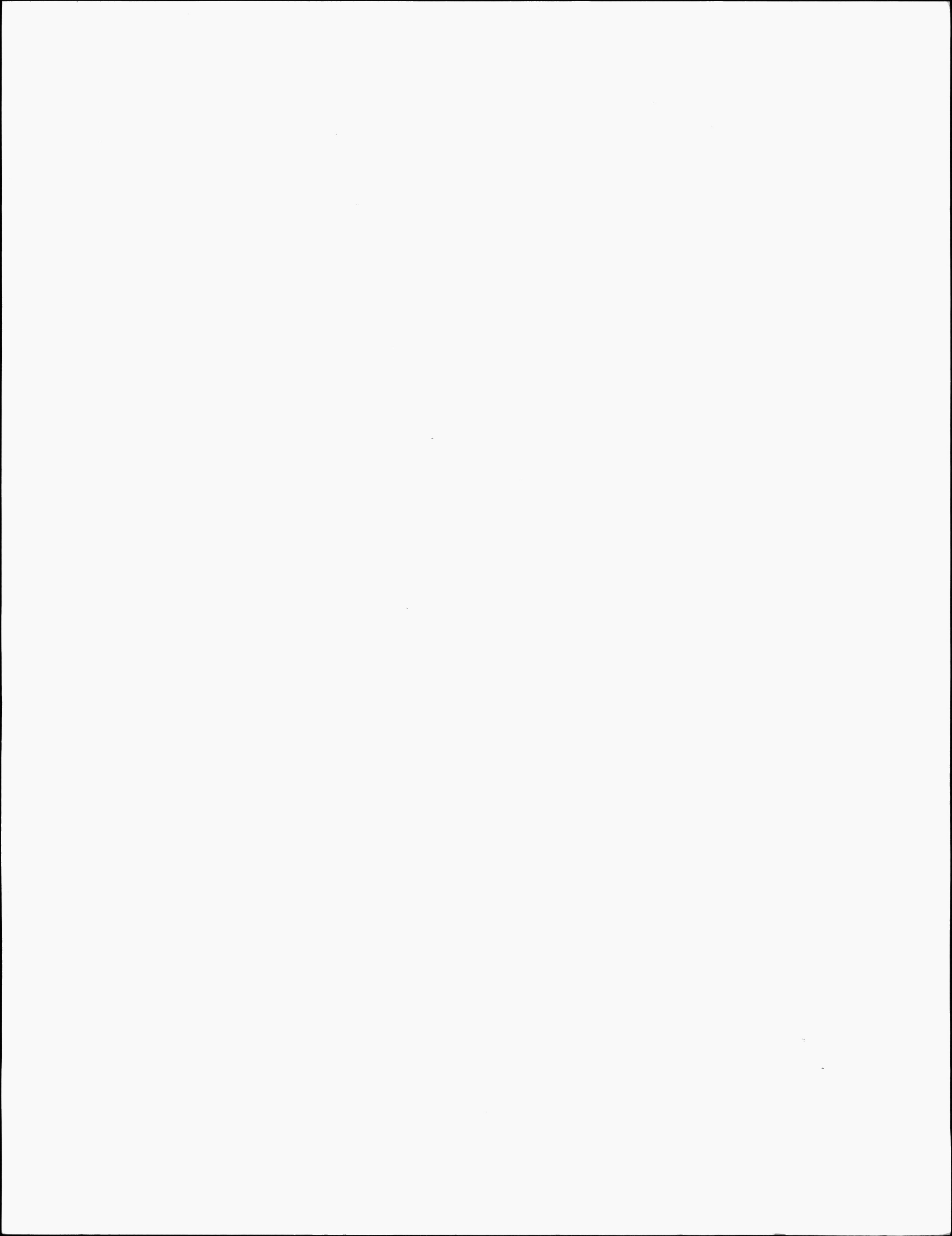


Figure 2.

FINANCIAL RESPONSIBILITY AND NETWORK CHANGES
IN ALBERTA 1975 TO 1980

(Graph only includes those stations operated
by Water Survey of Canada)



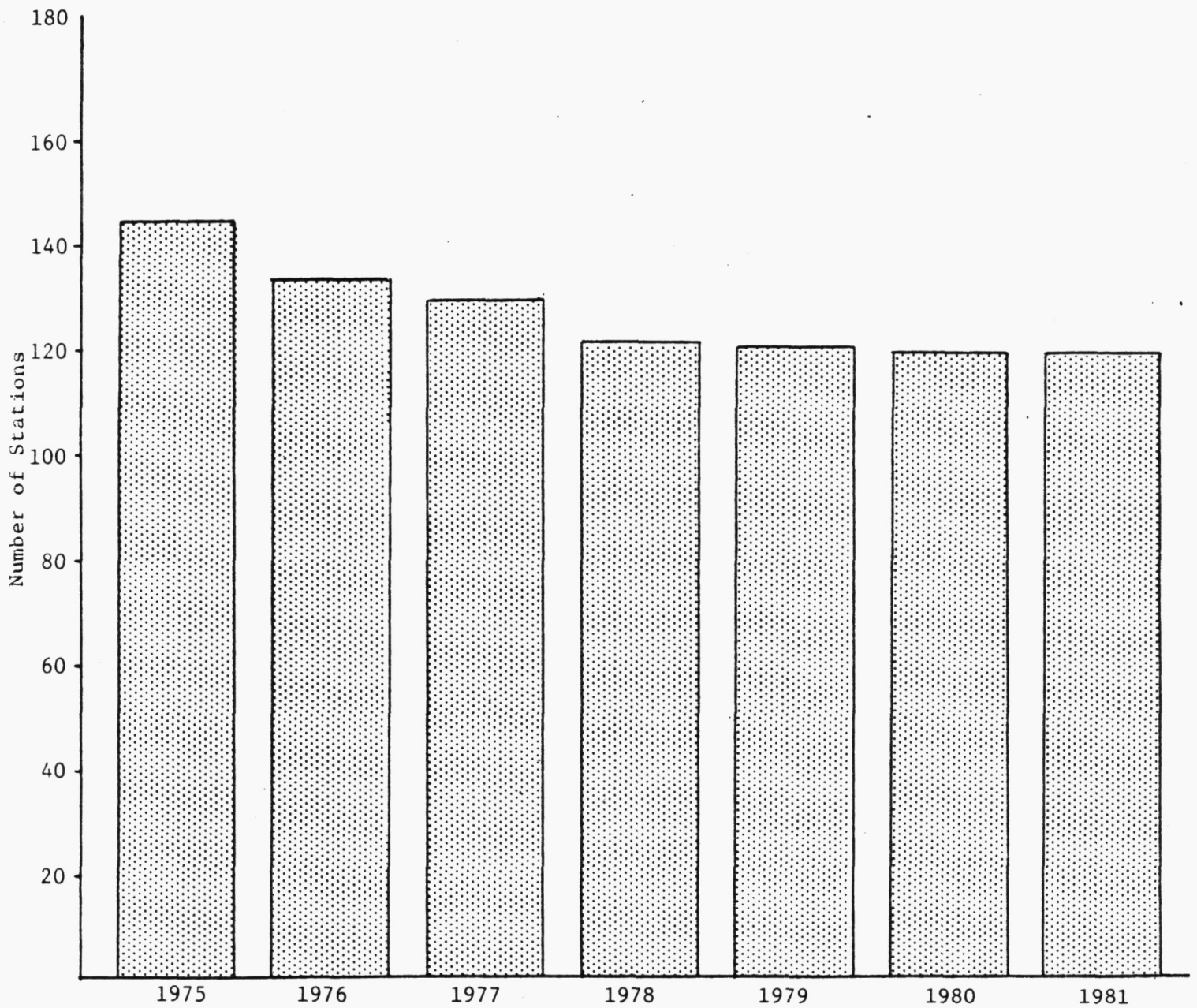
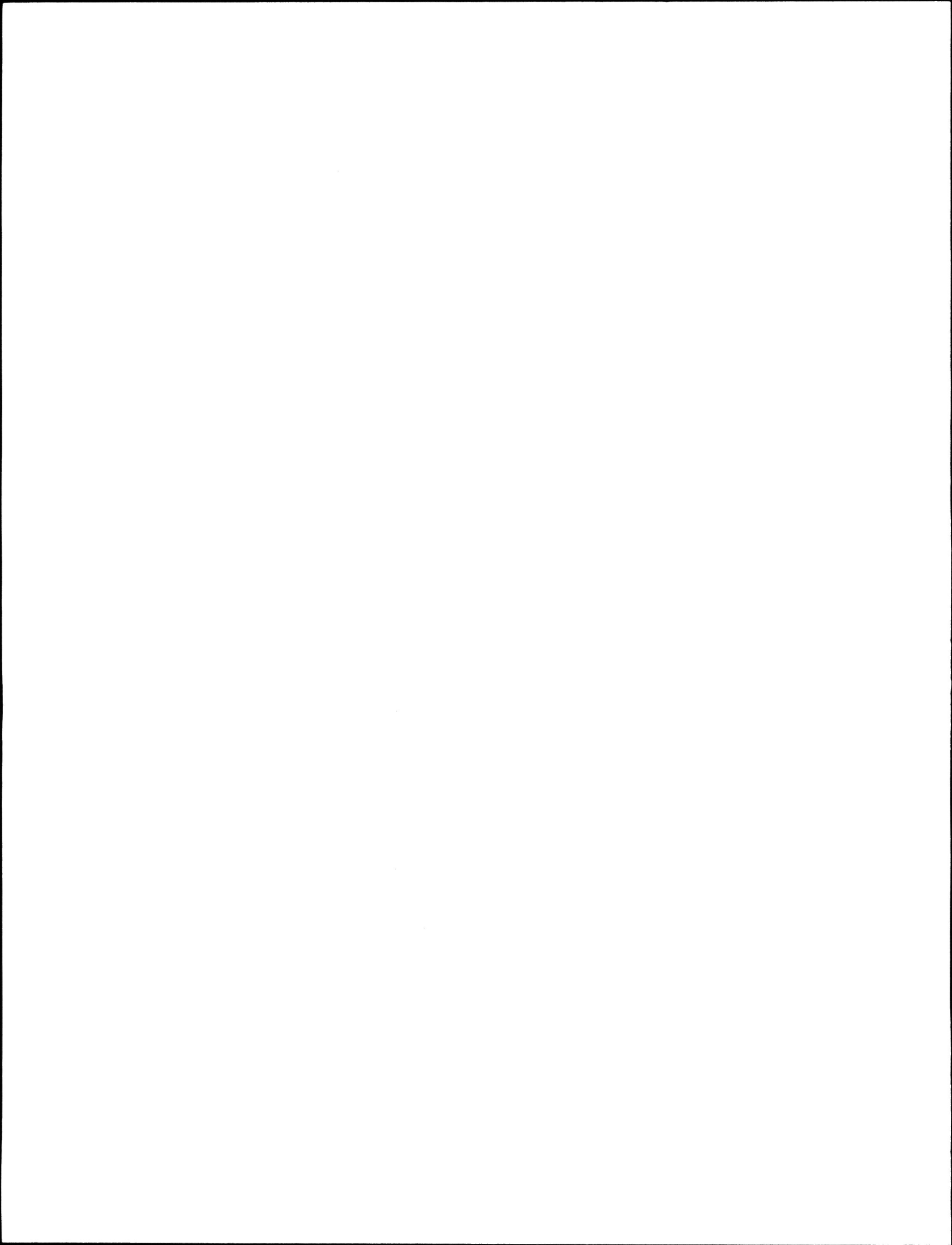


Figure 3

NUMBER OF STREAM GAUGING STATIONS OPERATED
BY WSC IN ALBERTA WHICH ARE DESIGNATED "FEDERAL"



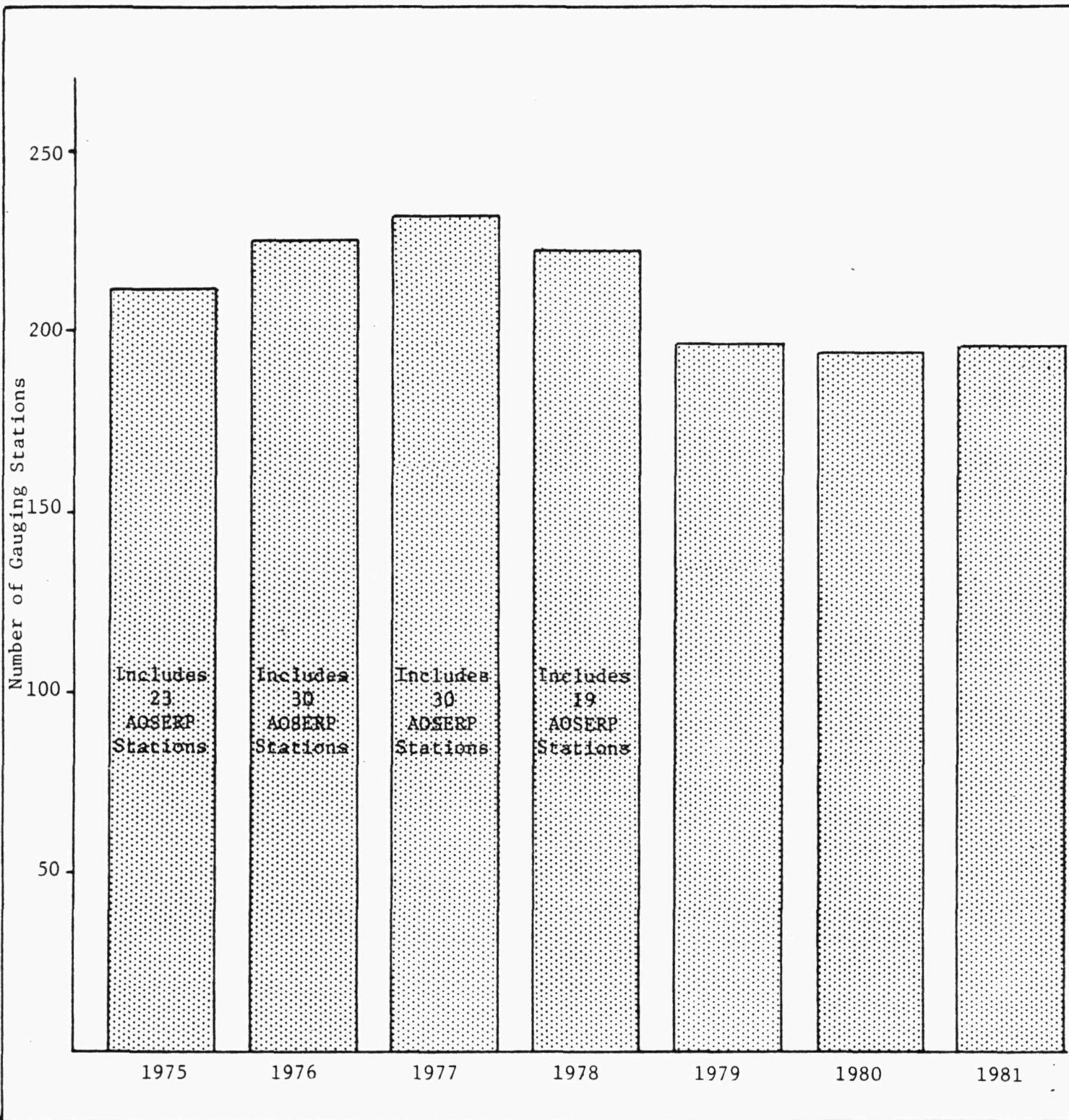
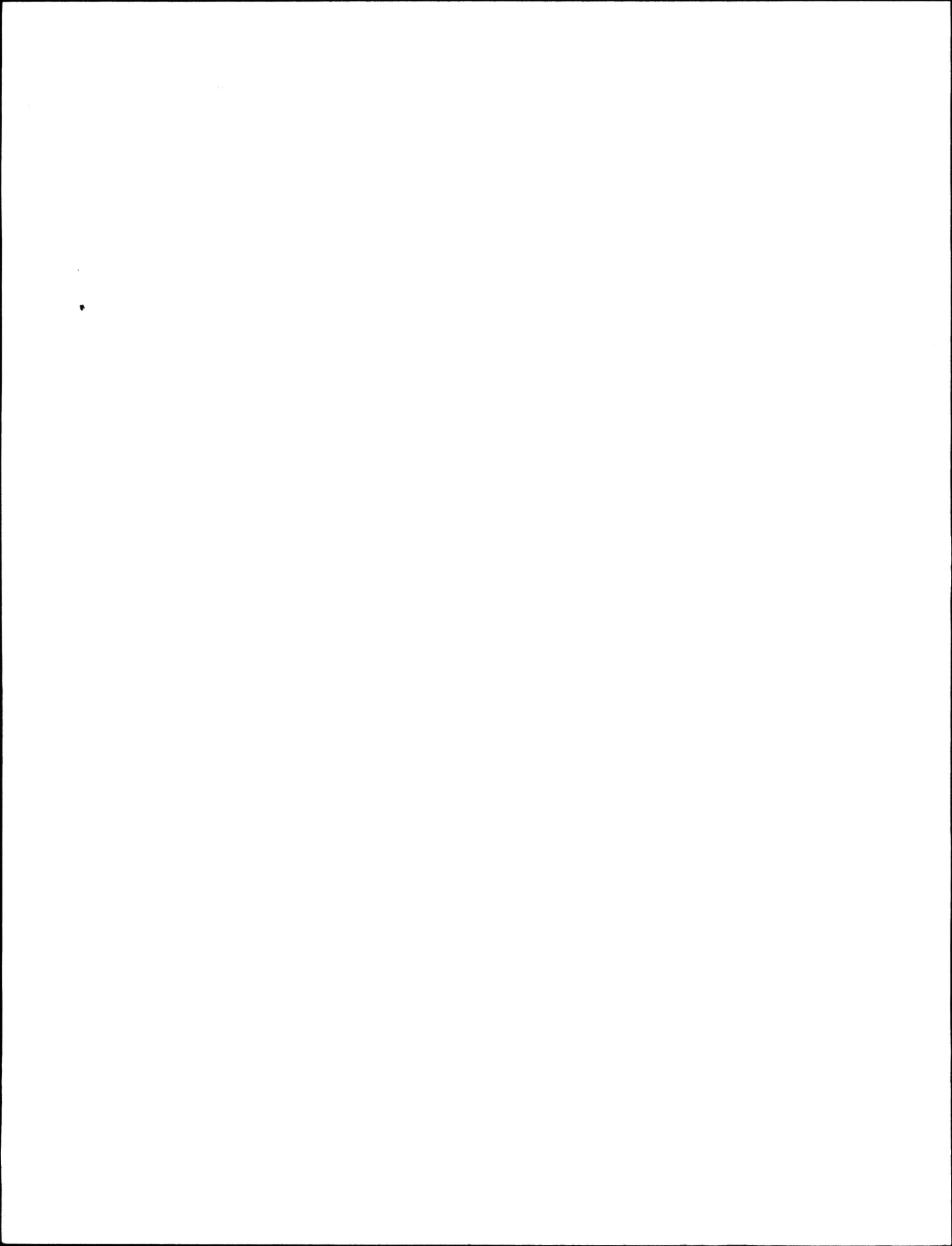


Figure 4

NUMBER OF STREAM GAUGING STATIONS OPERATED
 BY WSC WHICH ARE DESIGNATED "FEDERAL-PROVINCIAL"



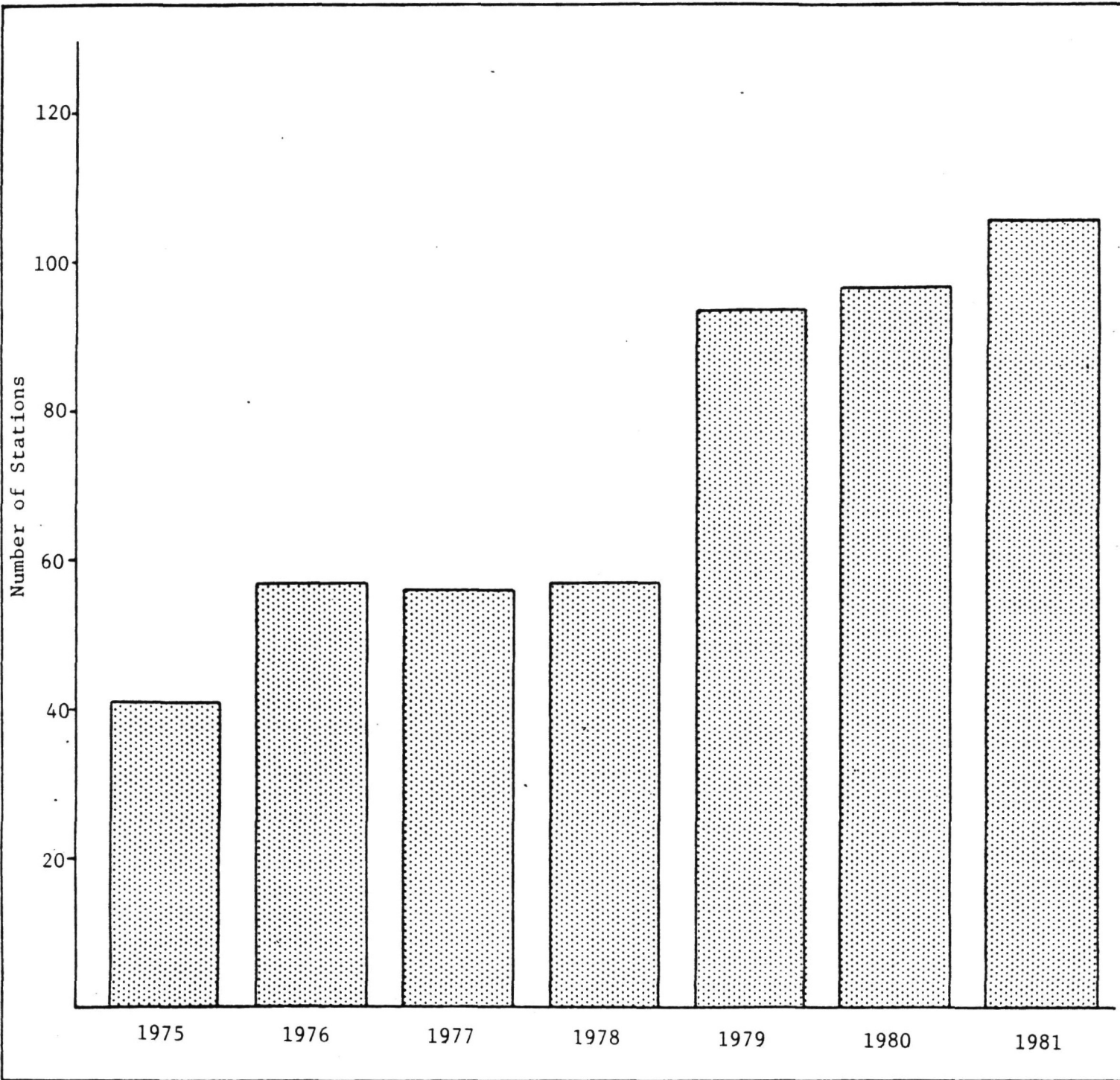
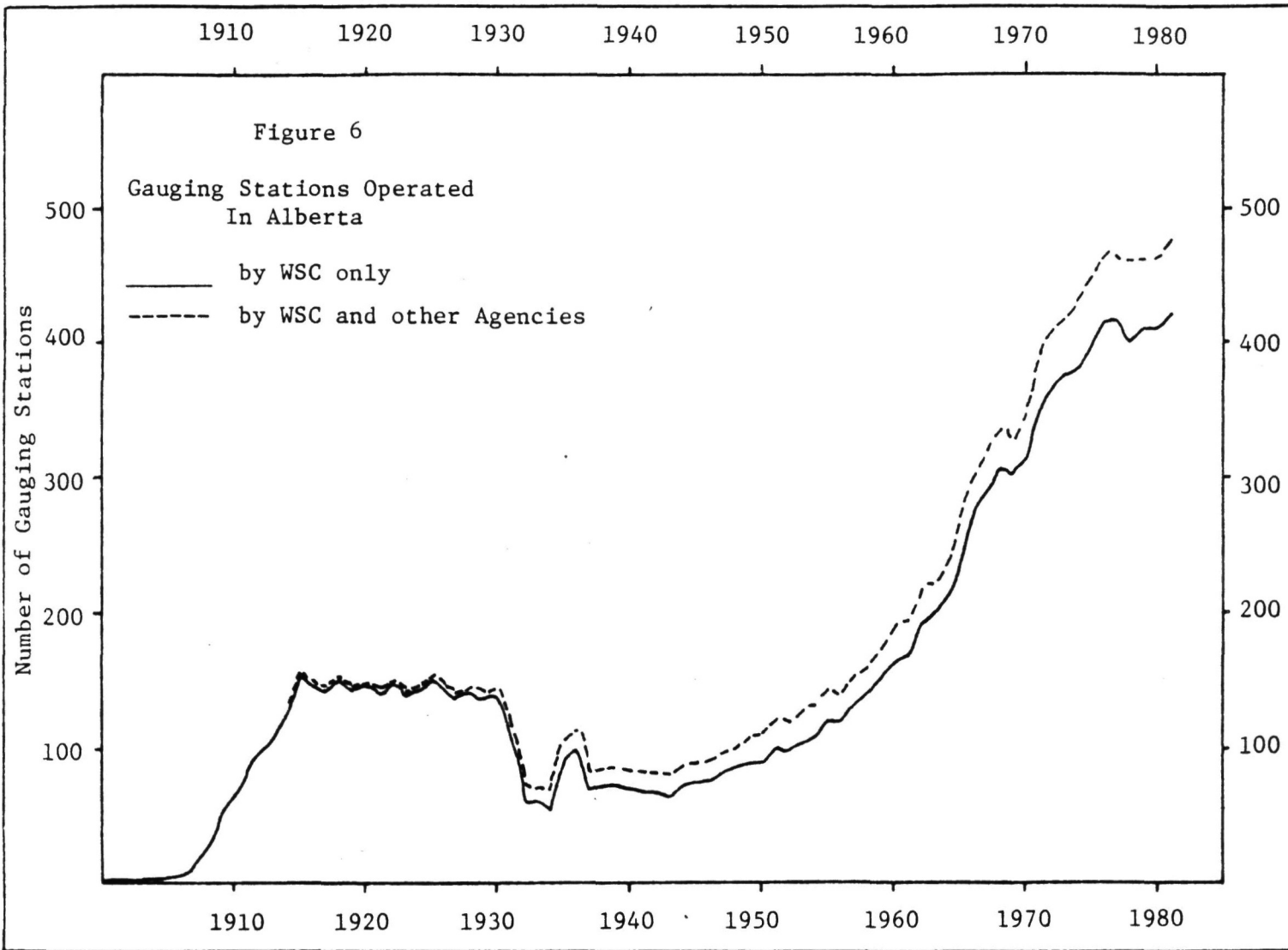


Figure 5

NUMBER OF STREAM GAUGING STATIONS OPERATED
BY WSC WHICH ARE DESIGNATED "PROVINCIAL"





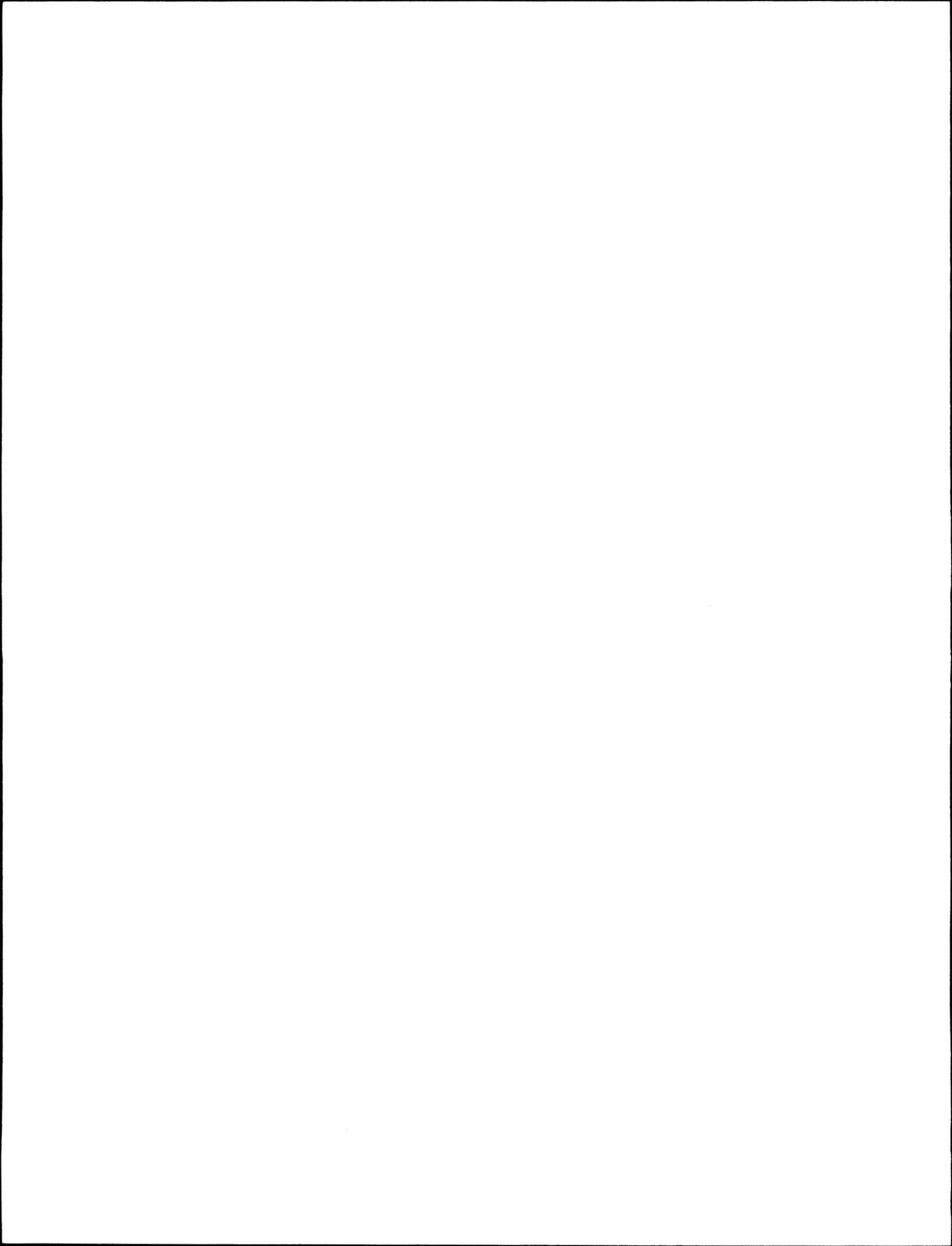
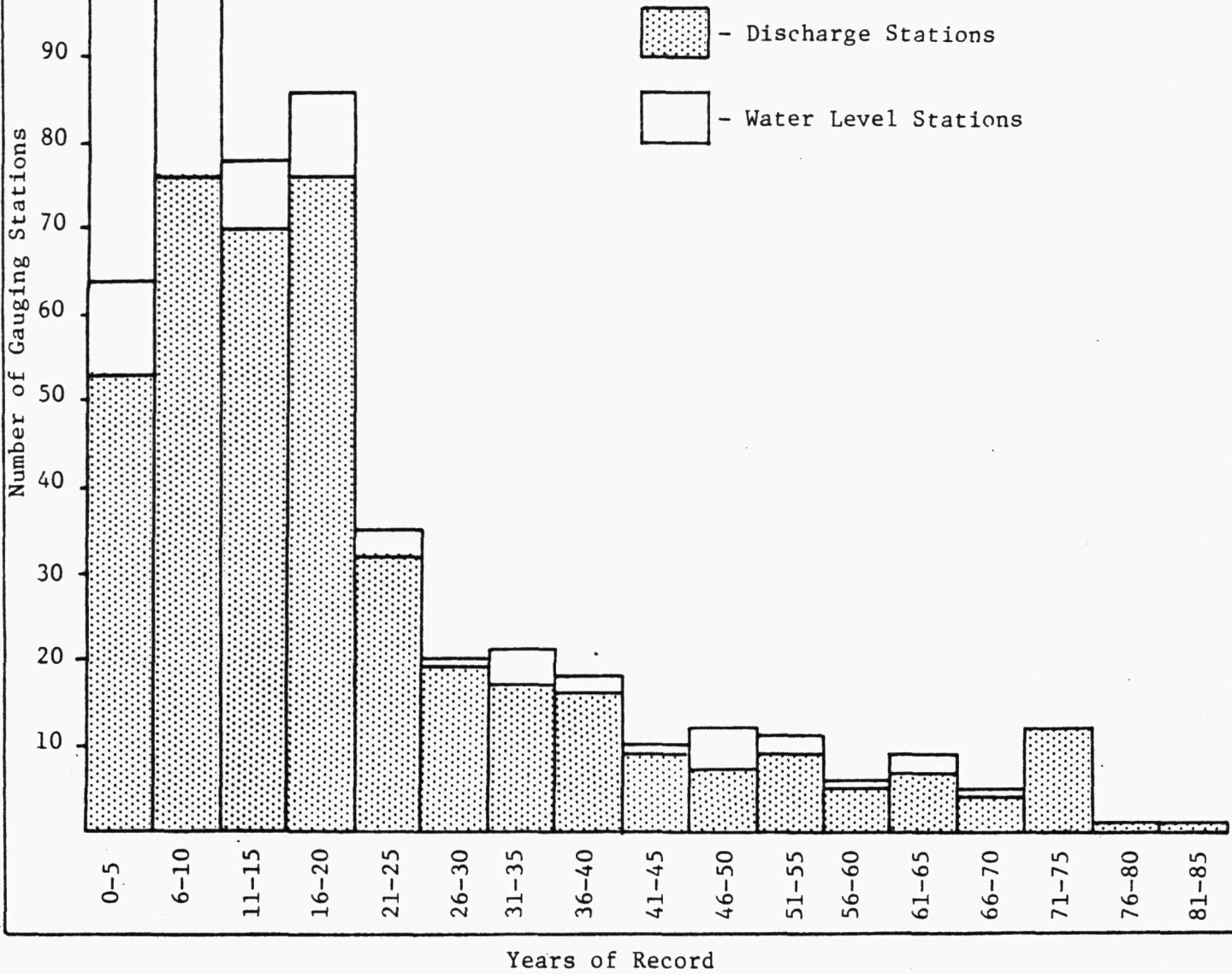


Figure 7

Histogram of Active Gauging Stations in Alberta



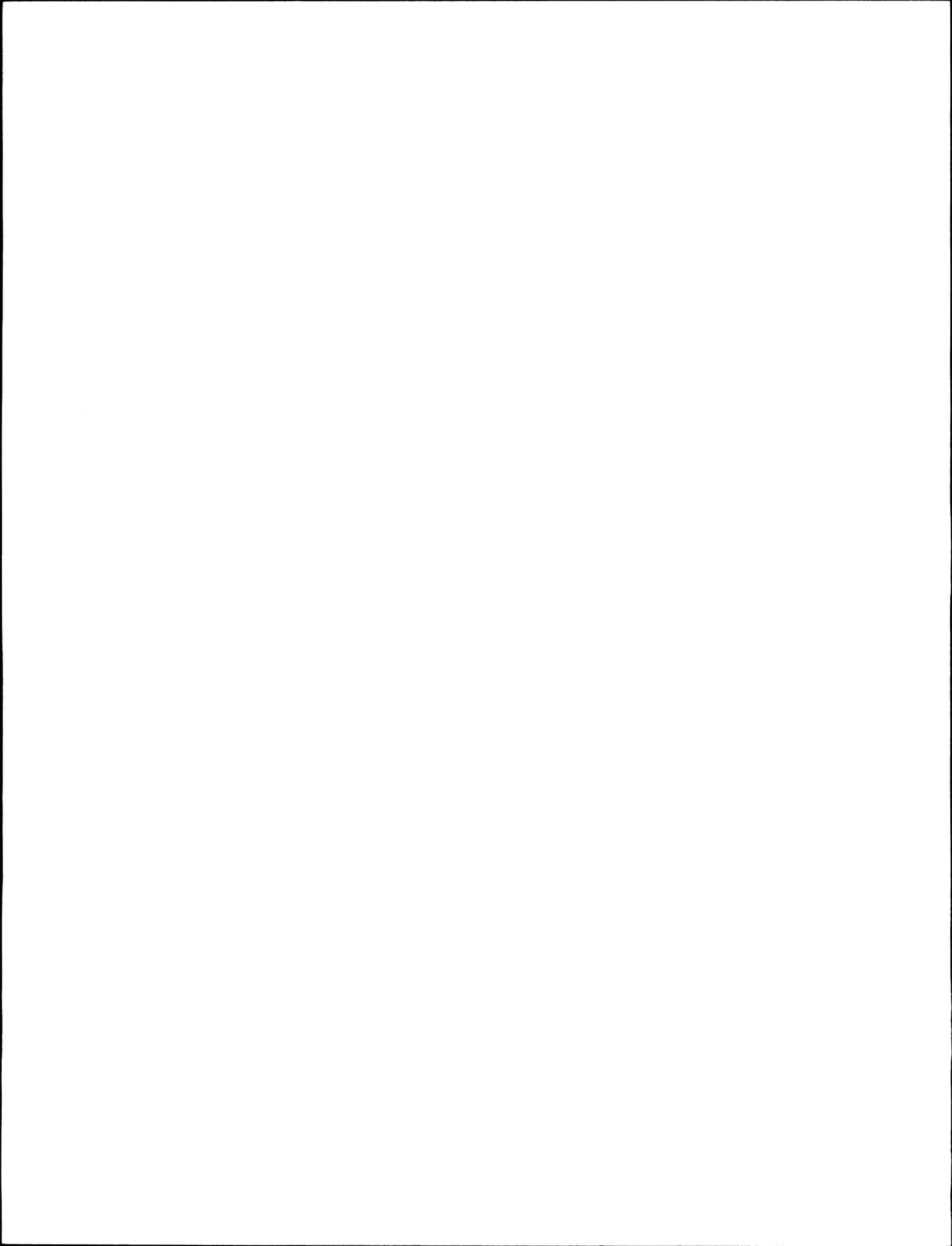
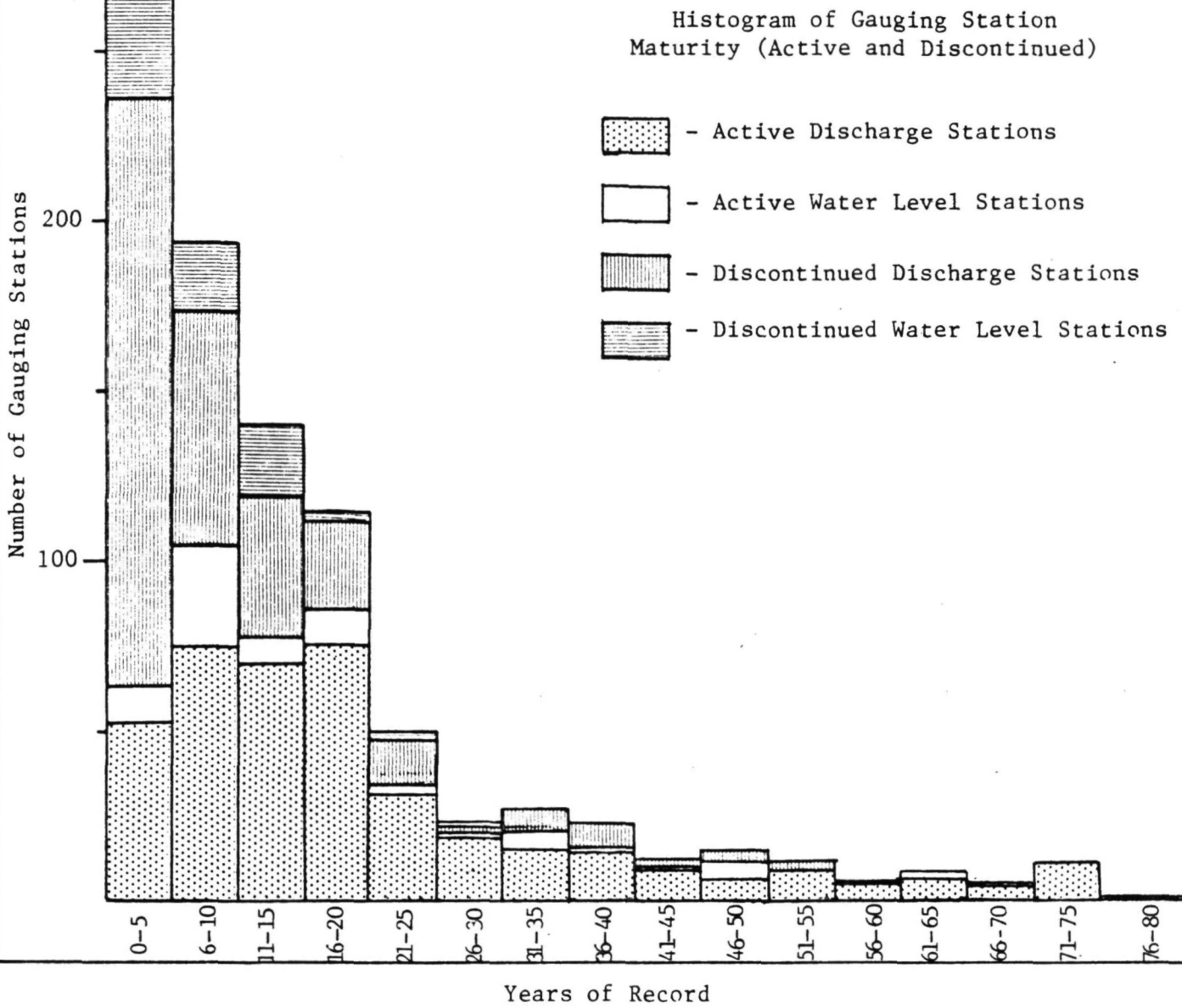
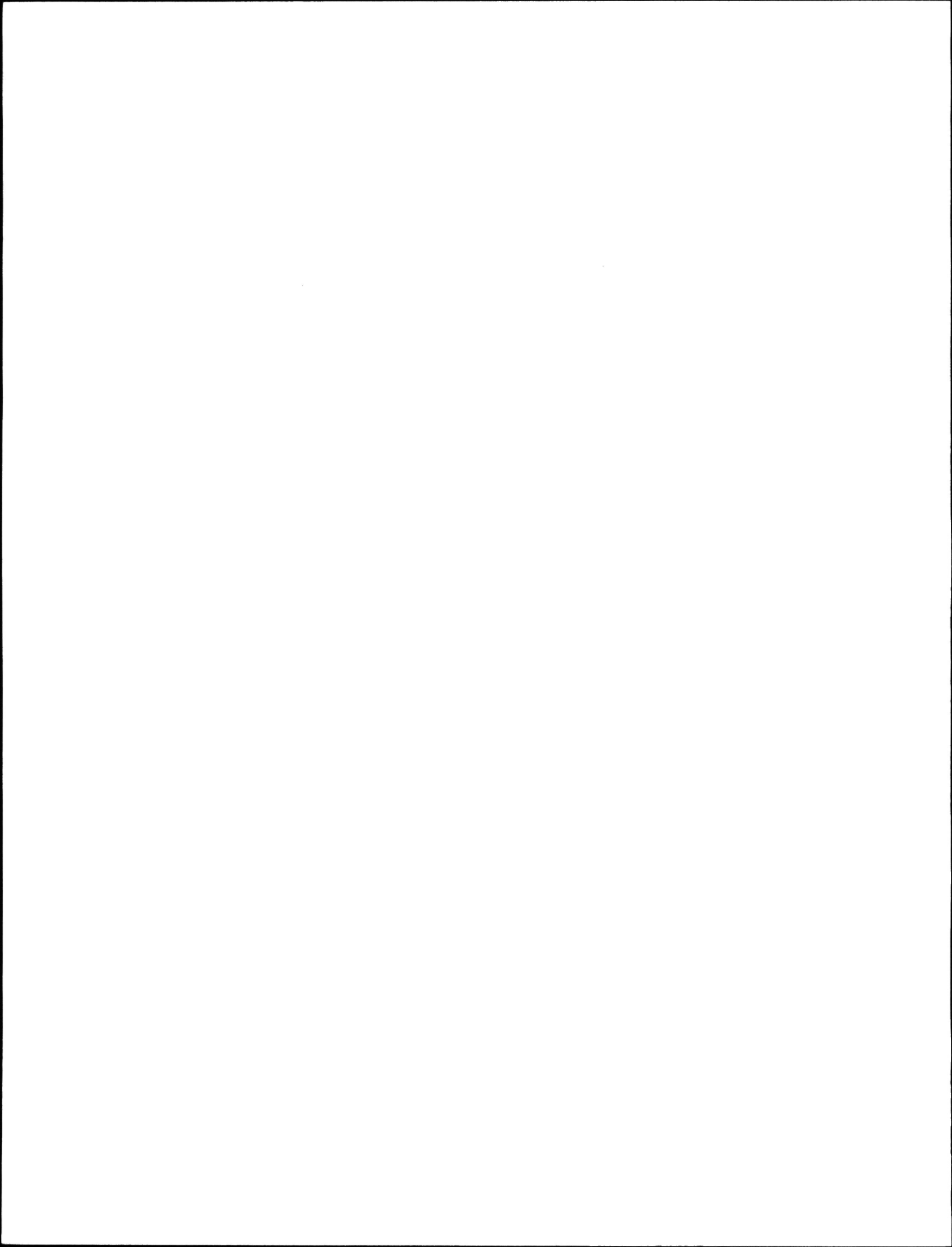


Figure 8

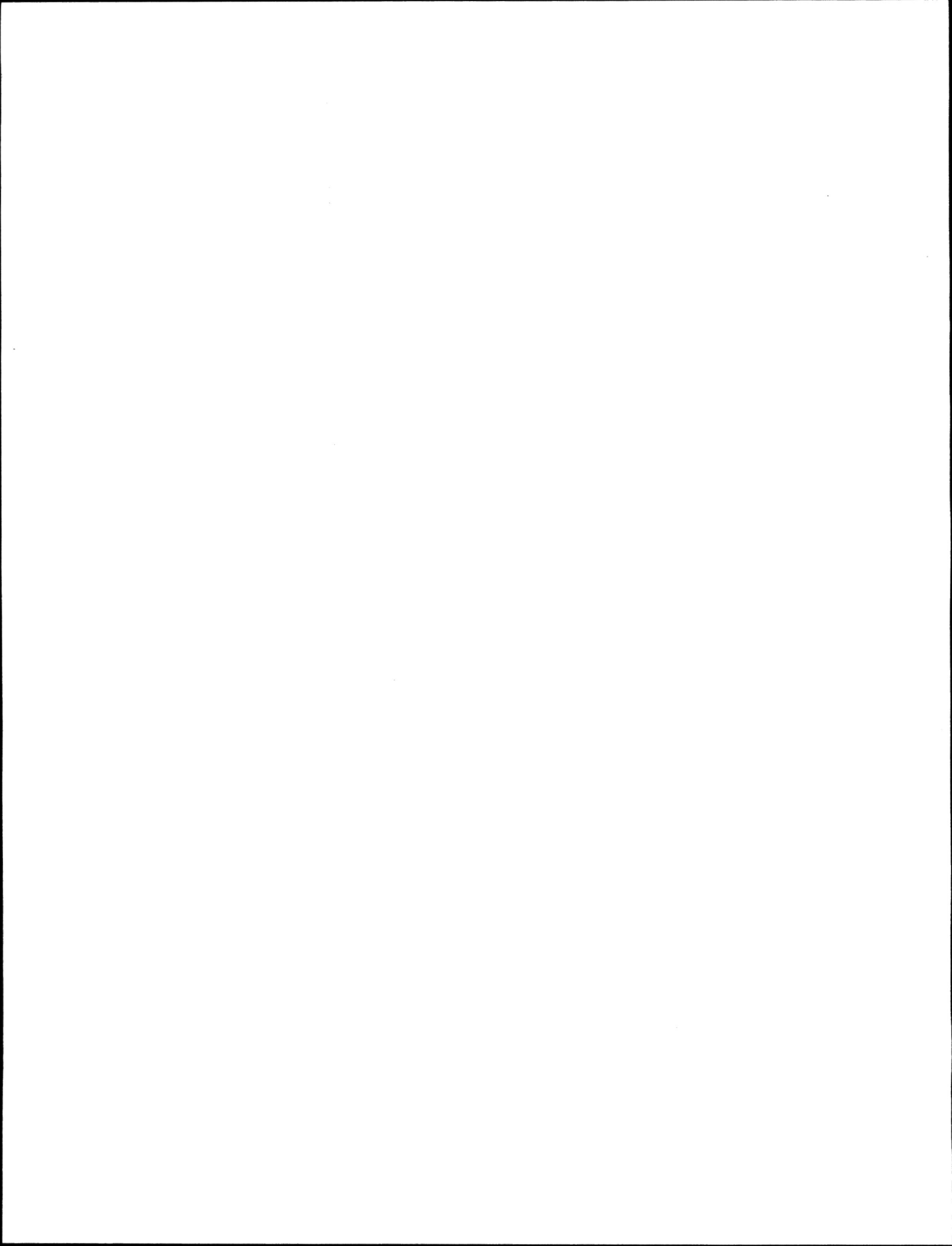




2.5 Program Plans for 1981-82

The major program plan for 1981-82 is the operation of the hydrometric and sediment networks as listed in Schedule "A" dated April 1, 1981. Cooperative program plans for 1981-82 include monitoring of Eastern Irrigation District diversion canals during periods of low flow, field monitoring of channel losses in the Oldman and Bow River basins during periods of low flow, and continuing work on the Oldman River Basin network planning pilot project. Water Survey will be conducting a number of field and office surveys, including Milk River natural flow studies, return flow in the South Saskatchewan River Basin, and analysis of long term sediment stations.

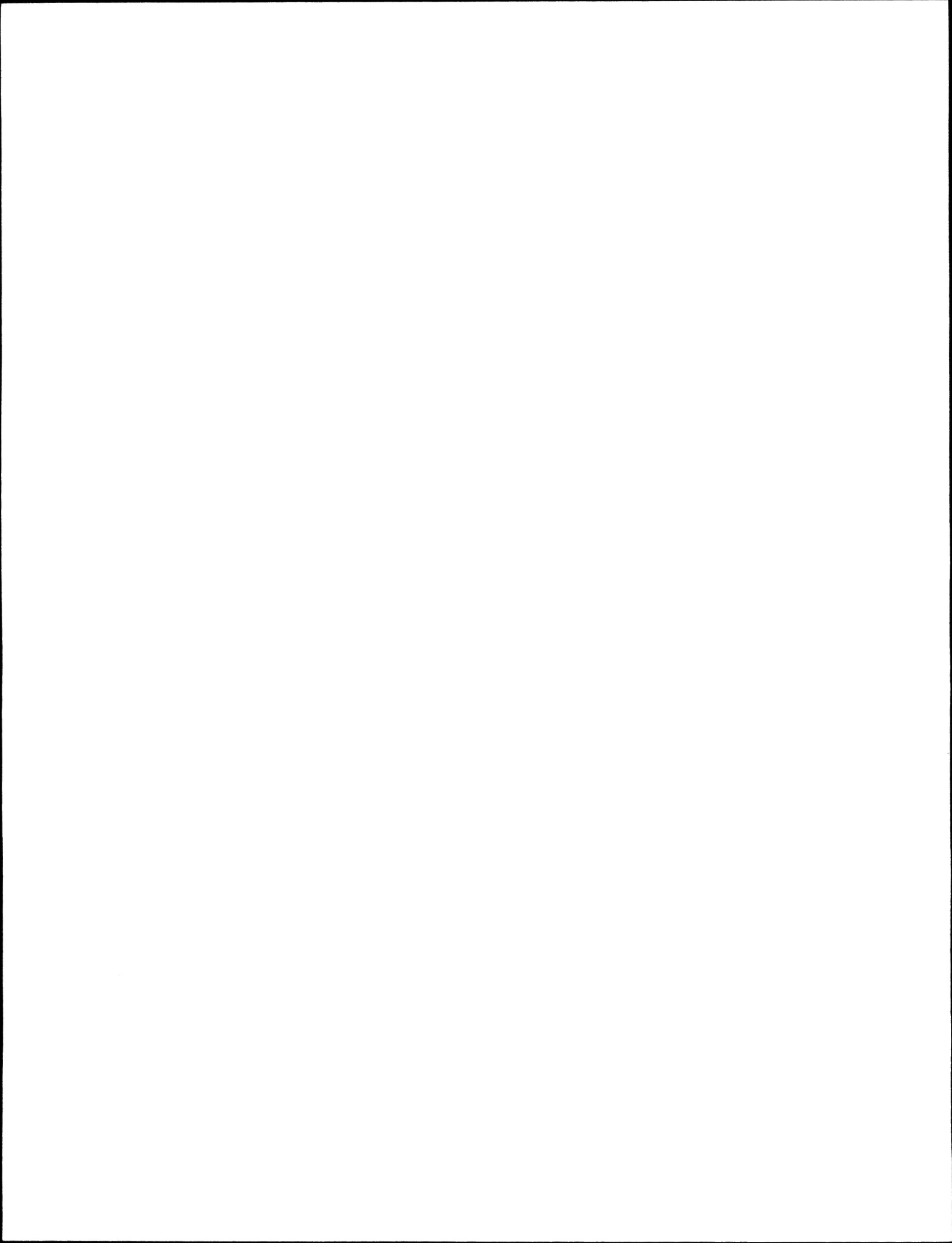
The construction and maintenance program for 1981-82 also comprises a significant portion of the program plans. Alberta has provided funding for the construction of eighteen new hydrometric stations during 1981-82; however, the problem is that Water Survey doesn't have the funds to install recording equipment at this number of stations.



3.0 COST OF OPERATION

The Summary of Financial Considerations 1980-81 is largely based on information contained in Appendix "B", which provides detailed information on the respective federal and provincial share of salaries and O&M for the hydrometric and sediment networks. Appendix "B" also provides a detailed breakdown of hydrometric station construction and maintenance costs and a brief description of the procedure utilized for the calculation of depreciation. During 1980-81 Alberta paid \$416 000 to the hydrometric agreement as listed in Schedule "D", contained in Appendix "C", whereas the actual cost was \$449 906, resulting in an underpayment of \$33 906 by Alberta.

The main reason for this underpayment was that O&M hydrometric costs were significantly higher than estimated in Schedule "D".



SUMMARY OF FINANCIAL CONSIDERATIONS

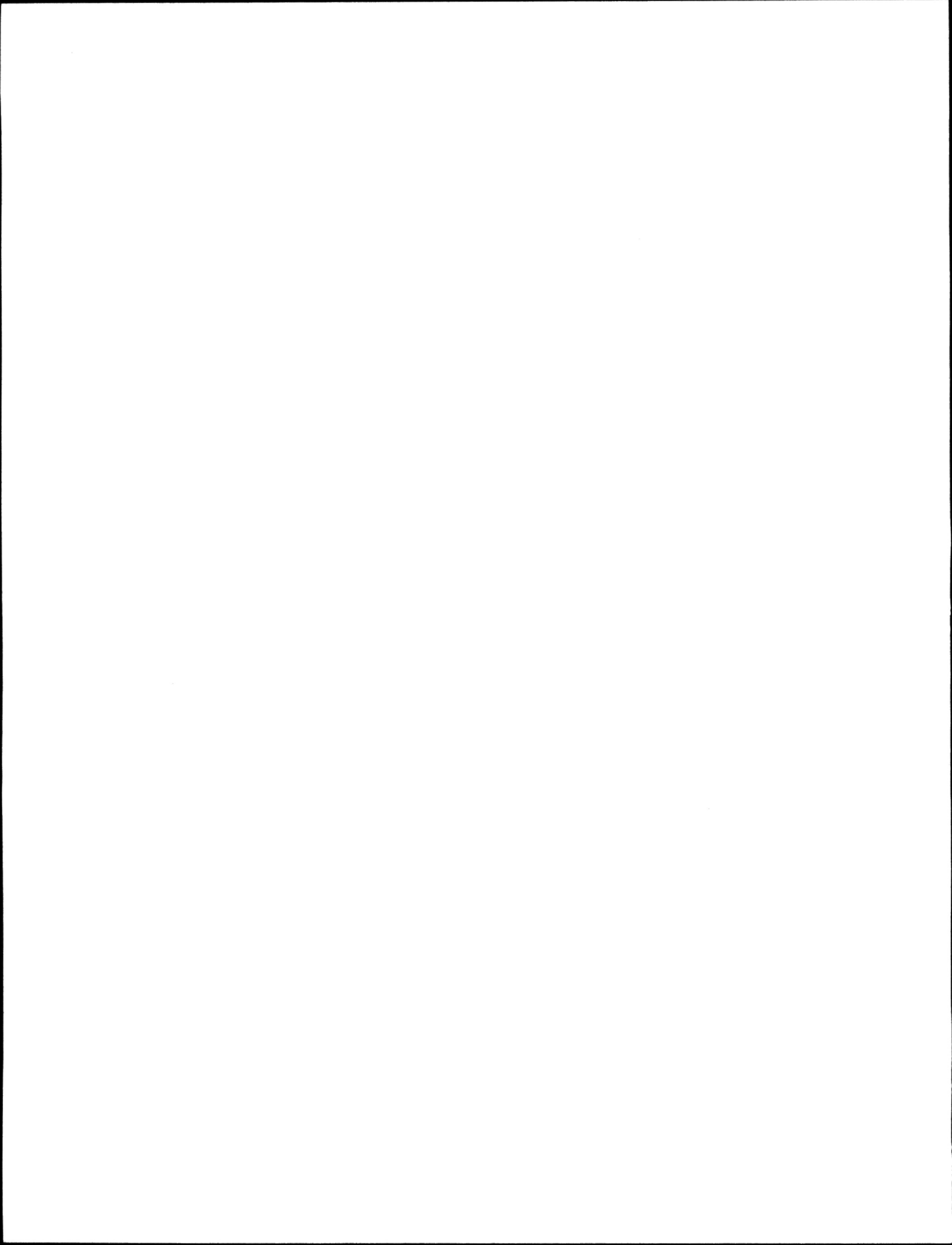
1980-81

	No. of Stns.	Total Cost	Share	
			Federal	Alberta
<u>1. Hydrometric Network</u>				
Operated by Water Survey of Canada	373	788 311	434 160	354 151
Depreciation - Hydrometric and Construction Equipment and Vehicles		58 349	32 136	26 213
Depreciation - Federal Equipment		6 137	6 137	
<u>2. Sediment Stations</u>				
Full program operated by Water Survey of Canada	23	77 503	61 446	16 057
Lesser Slave Lake Area (a)	3	12 363		12 363
Laboratory cost of miscellaneous sediment stations		5 872	5 872	
Depreciation - Sediment Equipment		5 958	4 074	1 884
<u>3. Construction & Maintenance (b)</u>		160 843	99 645	61 198
TOTAL	399	1 115 336	643 470	471 866

Alberta Net Share: 471 866 - 35 000(c) - 1 520(d) = 435 346(e)

An explanation of the above figures and computation procedures are contained in Appendix "B".

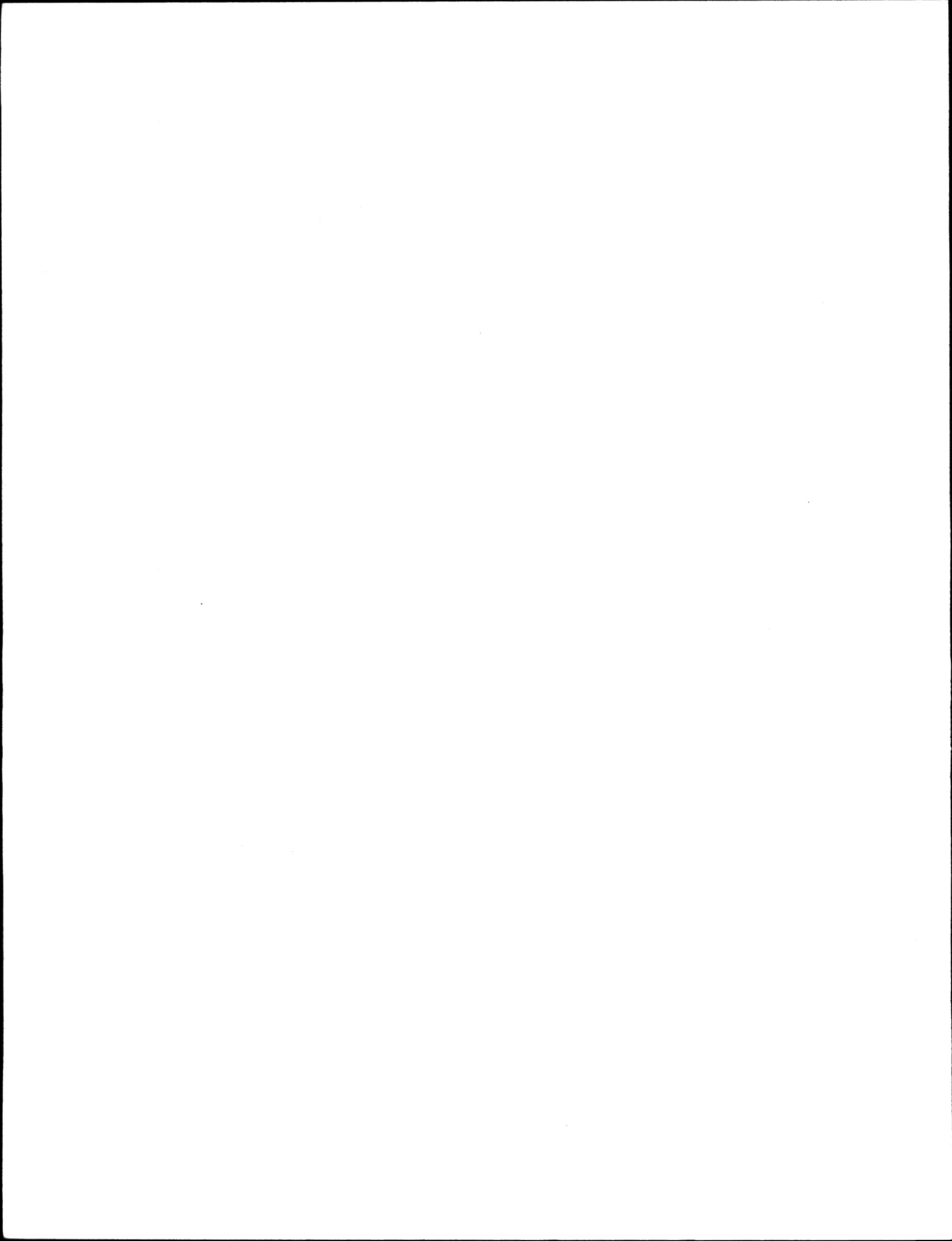
- (a) The full sediment costs for two F-P stations (i.e. Driftpile River near Driftpile and Swan River near Kinuso) and one F station (i.e. Lesser Slave River at Highway No. 2) have been charged to Alberta as agreed at the January 19, 1979 Coordinating Committee meeting.
- (b) Depreciation of construction equipment is included in depreciation of hydrometric equipment.
- (c) Credit to Alberta for stations of federal interest operated in the Peace-Athabasca Delta (PAD) Area by Alberta Environment.
- (d) Credit to Alberta for F-P station Spring Creek near Valleyview.
- (e) Alberta was also responsible for direct payment of 26 000 in helicopter costs in the Ft. McMurray Area of which 11 440 was of federal responsibility and 14 560 was of provincial responsibility. Therefore, the 'true' Alberta Net Share is 449 906.



The following summary of over and under annual payments by Alberta for the period of the agreement indicates that although Alberta had underpaid during the initial years of the agreement, the overpayment in 1979-80 had brought the payments for the five-year period up to that time to be almost identical to the actual cost of the program to Alberta (N.B. The actual cost for 1978-79 differs from the amount in the National Memorandum of Agreement report and the reason for this is provided in the 1978-79 Alberta Memorandum of Agreement report). At the end of the six-year period from 1975-76 to 1980-81, the underpayment by Alberta was approximately two percent of the total payment Alberta made during this period. The large underpayment during 1980-81 was mainly due to an erroneous calculation of Schedule "D" and care will be taken to ensure this magnitude of error does not occur in future years.

Cumulative Provincial Over or Underpayment for Period of Agreement				
<u>Year</u>	<u>Actual Cost</u>	<u>Annual Payment</u>	<u>Overpayment (+) Underpayment (-)</u>	<u>% of Annual Payment</u>
1975-76	197 852	197 400	(-) 452	(-) 0.23
1976-77	231 100	231 100	Nil	Nil
1977-78	247 430	240 000	(-) 7 430	(-) 3.10
1978-79	267 055	260 000	(-) 7 055	(-) 2.71
1979-80	353 768	370 000	(+) 16 232	(+) 4.39
1980-81	423 906	390 000	(-) 33 906	(-) 8.69
Total	<u>1 721 111</u>	<u>1 688 500</u>	<u>(-) 32 611</u>	<u>(-) 1.93</u>

Schedule "C" of the Memorandum of Agreement for Water Quantity Surveys describes procedures for preparation of annual reports. The procedure described in Schedule "C" is designed to make an approximation of



Schedule "D" for the forecast year of 1982-83 for utilization by both the federal and provincial agencies for budgetary purposes. Data contained in this report with respect to annual unit costs for operating water quantity survey and sediment stations, Schedule "A" estimated for 1982-83, depreciation, a cost index factor and an estimate of construction costs for 1982-83 is utilized in the preparation of the cost estimate for the forecast year. Based on the average annual unit costs contained in this report, and proposed classification and operation changes, it was possible to calculate the estimated operation costs of Schedule "D" for 1982-83 and this is provided in Appendix "D". The estimated costs in Appendix "D" also include the Alberta share of maintenance but do not include costs for 1982-83 hydrometric station construction.

The financial information contained in Tables 4 to 6 is a summary for input to the Annual National Cost-Sharing Report. The format and required input to Tables 4 and 6 varies from the determination of the cost-sharing amounts in Alberta and thus these values should not be compared.

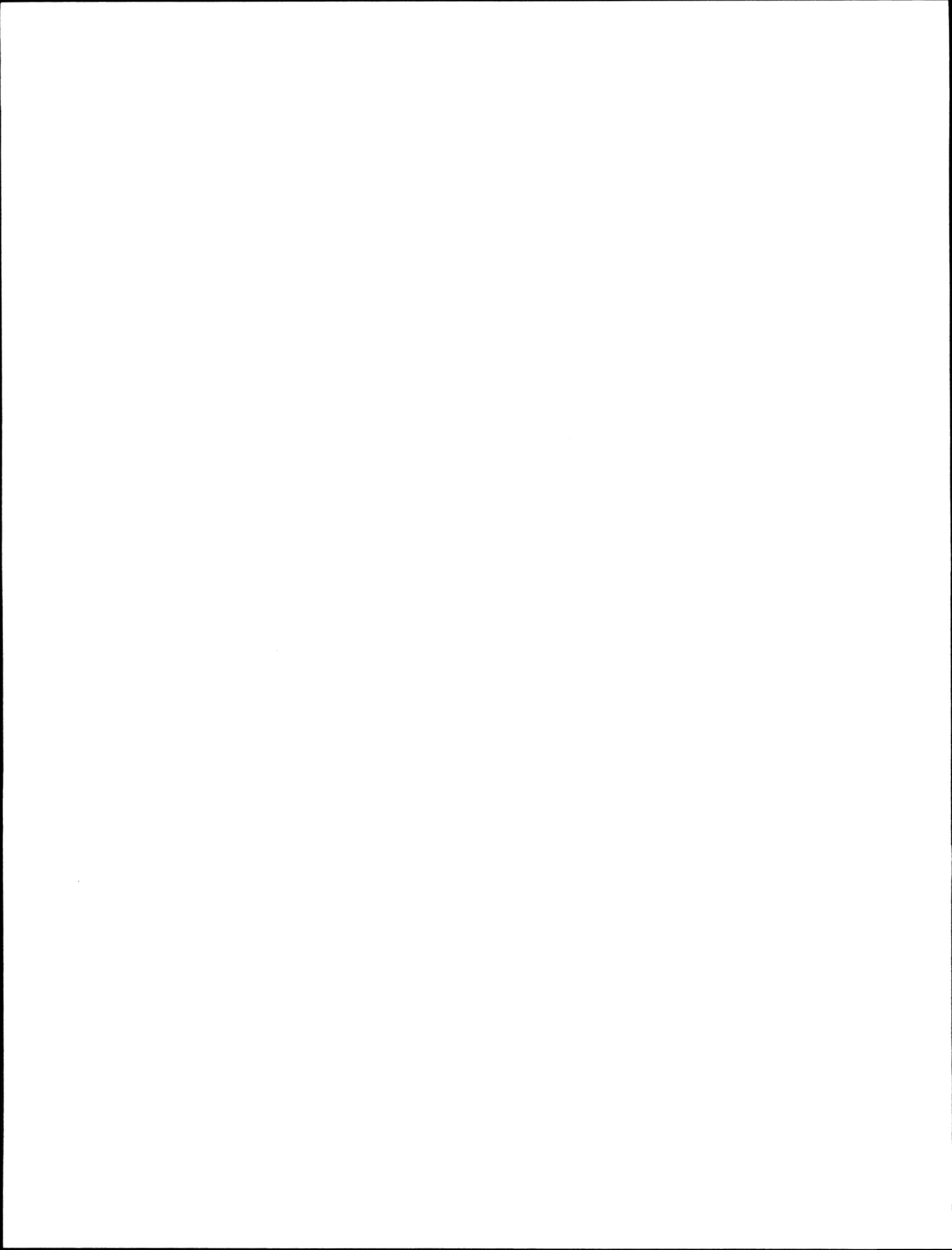


Table 4

WATER QUANTITY SURVEYS

TOTAL PROGRAM COSTS & SHAREABLE COSTS FOR 1980-81
(\$1000)

Province	Total Program					Shareable Costs						
	P/Yrs	Salary	Operating	Capital	Total	P/Yrs	Salary	Operating ¹	Const.	Total	Fed. Share	Prov. Share ²
Alberta	47.6	1041.7	495.2	182.9	1717.8	26.0	559.7	420.8	160.8	1141.3	658.0	483.3

NOTE: ¹ Operating costs are comprised of \$315.2K as shown in Appendix "B", \$26.0K for helicopter costs in the Ft. McMurray Area, and \$70.4K for depreciation and \$9.1K for sediment laboratory costs, as shown in the Summary of Financial Considerations.
² Credit to Alberta for payment of all helicopter costs in Ft. McMurray, operation of Federal and Federal-Provincial stations in the Peace-Athabasca Delta and operation of a Federal-Provincial station in the Spring Creek Basin resulted in an Alberta Actual Cost of \$423.9K, as shown in Table 6.

Table 5

WATER QUANTITY SURVEYS

SCHEDULE "D" - 1980-81
SUMMARY OF ANNUAL PAYMENT
(\$1000)

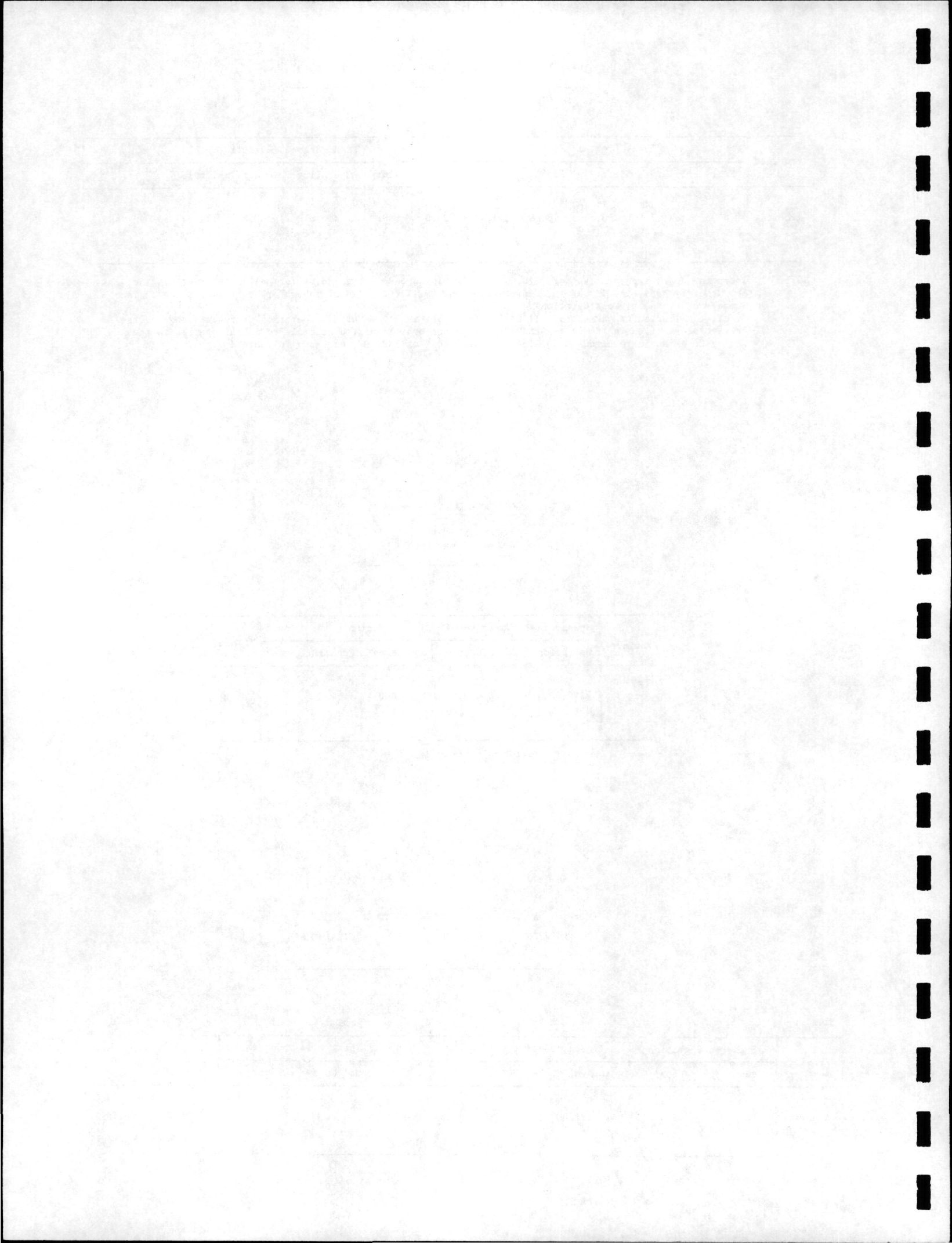
Province	Streamflow & Water Level		Sediment		Total
	Operation	Construction	Operation	Construction	
Alberta	279 000	88 000	23 000	0	390 000

Table 6

WATER QUANTITY SURVEYS

COMPARISON - SCHEDULE "D" COSTS WITH ACTUAL COSTS
1980-81
(Dollars)

Province	Salary & Operation		Construction		Total			Annual Payment Received	Received Minus Actual
	Sched. "D"	Actual Cost	Sched. "D"	Actual Cost	Sched. "D"	Actual Cost	Difference		
Alberta	302 000	334 611	88 000	89 295	390 000	423 906	33 906	390 000	(-)33 906



A P P E N D I X "A"

SCHEDULE "A"

OF

MEMORANDUM OF AGREEMENT

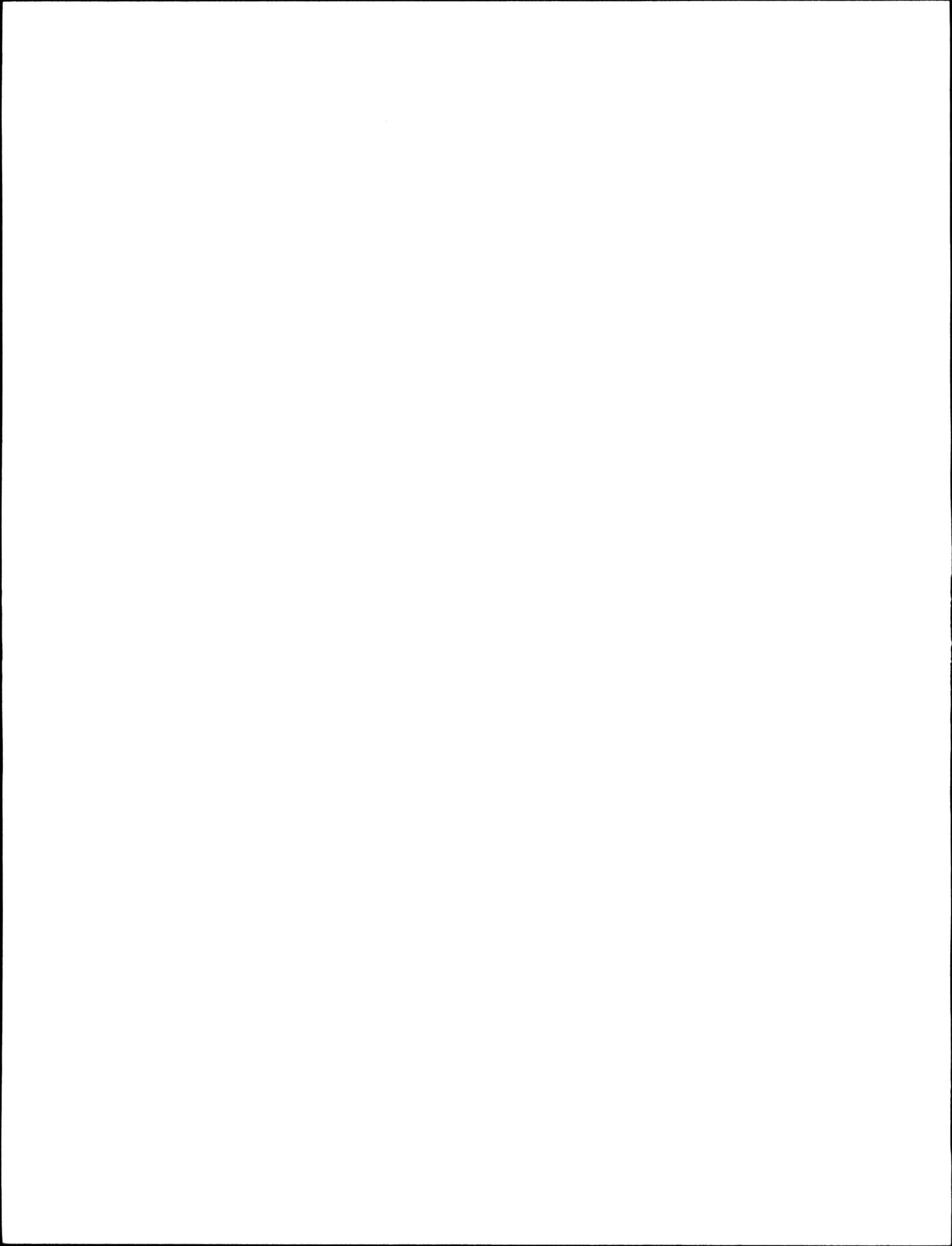
BETWEEN

GOVERNMENT OF CANADA

AND

GOVERNMENT OF ALBERTA

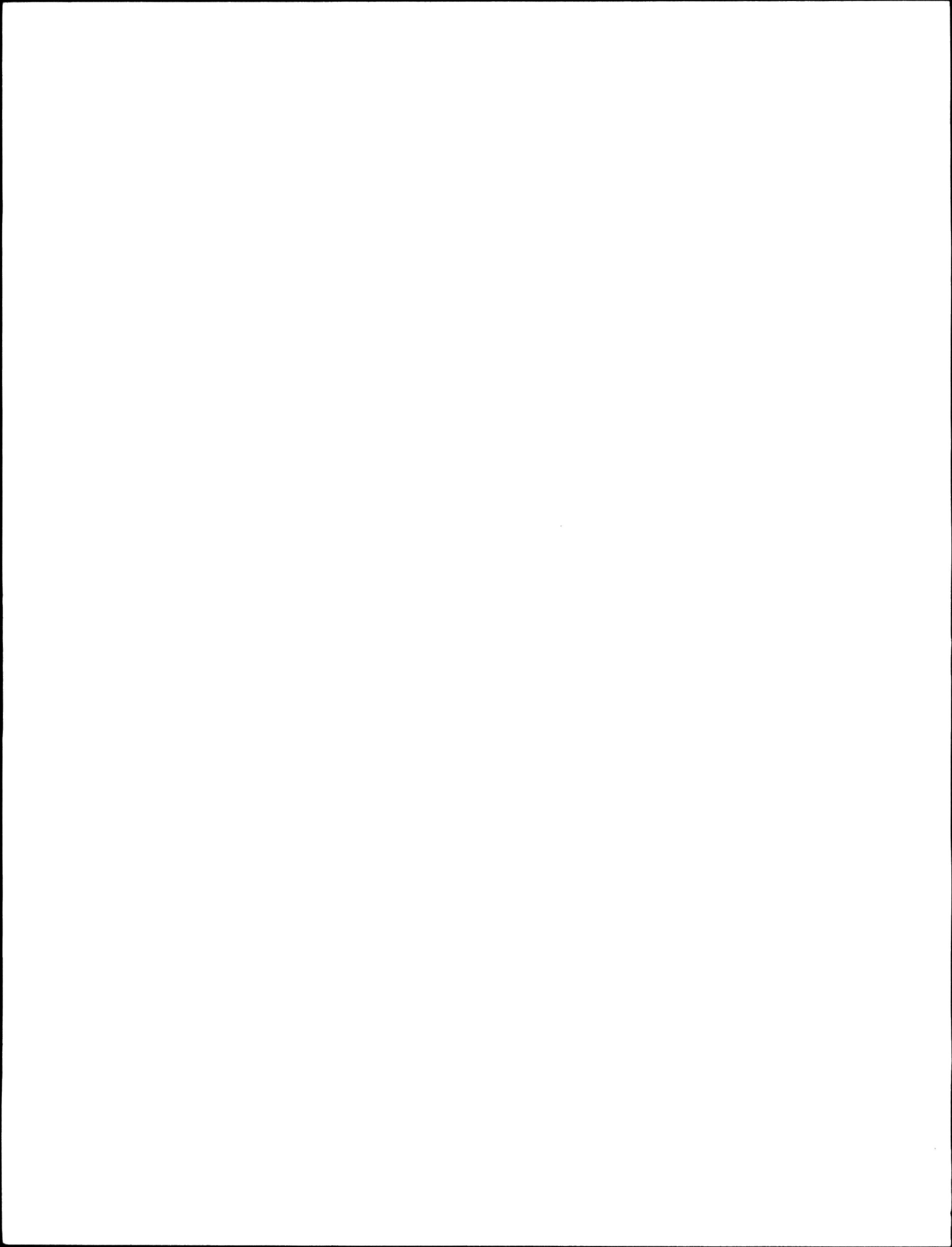
April 1, 1980



MAJOR CLASSIFICATION - FEDERAL

SUBCLASSIFICATION - SUPPORT NATIONAL PROGRAM (1)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORM
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
1	BENCH MARK CREEK NEAR FORT SMITH	07NB006	X				X		X
2	BOW RIVER AT BANFF	058B001	X				X		X
3	BOW RIVER AT LAKE LOUISE	058A001	X				X		X
4	BREWSTER CREEK NEAR BANFF	058B004	X			X			X
5	CABIN CREEK NEAR SEEBE	058F019	X		X		X		X
6	CASCADE RIVER ABOVE LAKE MINNEWANKA	058D005	X			X			X
7	JOHNSTON CREEK NEAR THE MOUTH	058A006	X			X			X
8	MALIGNE RIVER NEAR JASPER	07AA004	X				X		X
9	MARMOT CREEK MAIN STEM	058F016	X		X		X		X
10	MIDDLE FORK CREEK NEAR SEEBE	058F017	X		X		X		X
11	MIDDLE STREETER SPRING NO. 2 NEAR NANTON	05AB035	X				X		X
12	MLETTE RIVER NEAR JASPER	07AA001	X				X		X
13	MISTAYA RIVER NEAR SASKATCHEWAN CROSSING	05DA007	X				X		X
14	REDEARTH CREEK NEAR THE MOUTH	058B005	X			X			X
15	SALT RIVER BELOW PEACE POINT HIGHWAY	07NB007	X				X		X
16	SILVERHORN CREEK NEAR THE MOUTH	05DA010	X				X		X
17	SNAKE INDIAN RIVER NEAR THE MOUTH	07AB002	X			X			X
18	SUNWAPTA RIVER ATHABASCA GLACIER	07AA007	X			X			X
19	TWIN CREEK NEAR SEEBE	058F018	X		X		X		X
20	WEST STREETER SPRING NO. 1 NEAR NANTON	05AB025	X				X		X
21	WHIRLPOOL RIVER NEAR THE MOUTH	07AA009	X			X			X
OPERATED BY - ALBERTA GOVERNMENT									
1	ATHABASCA RIVER ABOVE JACKFISH CREEK	07DD007		X				X	X
2	BARIL LAKE AT CENTRE OF LAKE	07KF005		X		X			X
3	CHENAL DES QUATRE FOURCHES AT QUATRE FOURCHES	07KF001		X		X			X
4	CHENAL DES QUATRE FOURCHES BELOW FOUR FORKS	07KF006	X				X		X
5	LAKE ATHABASCA AT FORT CHIPEWYAN	07MD001		X			X		X
6	LAKE CLAIRE NEAR OUTLET TO PRAIRIE RIVER	07KF002		X			X		X
7	MAMAWI LAKE CHANNEL AT DOG CAMP	07KF010	MISC X			X			X
8	PEACE RIVER BELOW CHENAL DES QUATRE FOURCHES	07KC005		X			X		X
9	RIVIERE DES ROCHERS ABOVE SLAVE RIVER	07NA001		X			X		X
10	RIVIERE DES ROCHERS EAST OF LITTLE RAPIDS	07NA007		X		X			X
11	RIVIERE DES ROCHERS WEST OF LITTLE RAPIDS	07NA008		X		X			X



MAJOR CLASSIFICATION - FEDERAL

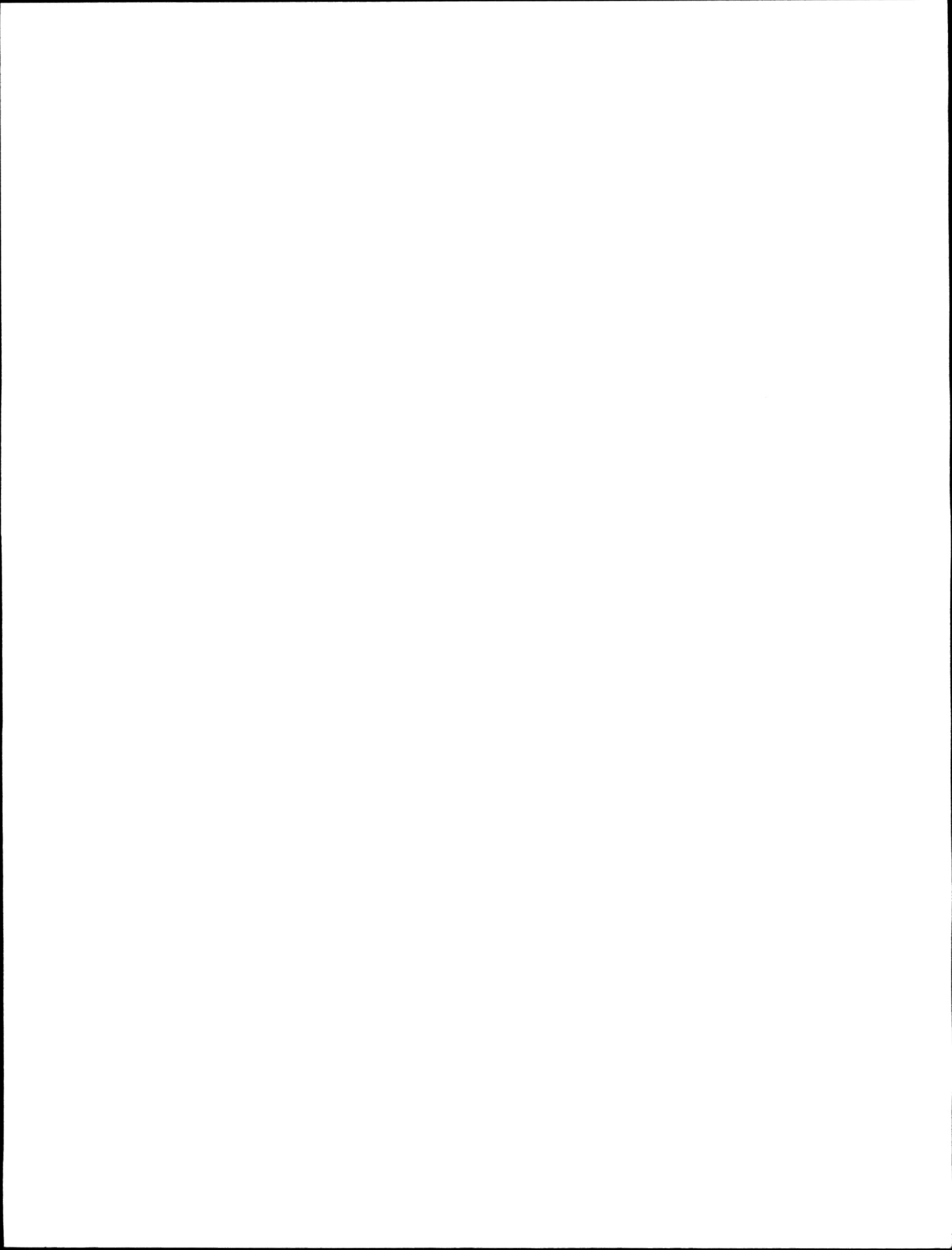
SUBCLASSIFICATION - INTERPROVINCIAL RIVERS (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL

OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									

1	ANTELOPE COULEE SPILLWAY	05BN010	X			X			X
2	ATHABASCA RIVER AT EMBARRAS AIRPORT	07DD001	X		X	X		X	
3	BATTERSEA DRAIN NEAR THE MOUTH	05AD038	X			X			X
4	REAVER RIVER AT COLD LAKE RESERVE	06AD006	X				X		X
5	ROUNTIFUL COULEE NEAR CRANFORD	05AG008	X			X			X
6	BOW RIVER AT CALGARY	05BH004	X				X		X
7	BOW RIVER NEAR THE MOUTH	05BN012	X				X		X
8	*ROXELDER CREEK NEAR WALSH	05AH001	X			X			X
9	B.R.D. DRAIN K NEAR VAUXHALL	05BN009	X			X			X
10	B.R.D. MAIN CANAL	05AC004	X			X			X
11	CAIRN HILL SPILLWAY NEAR THE MOUTH	05BM012	X			X			X
12	CANADIAN ST. MARY CANAL NEAR SPRING COULEE	05AE026	X			X			X
13	CLEARWATER RIVER ABOVE CHRISTINA RIVER	07CD005	X				X	X	
14	COAL LAKE RESERVOIR NEAR WETASKIWIN	05FA016		X			X		X
15	COLD LAKE AT COLD LAKE	06AF002		X			X		X
16	CROWFOOT CREEK NEAR CLUNY	05BM008	X			X			X
17	DRAIN S-10 NEAR BOW ISLAND	05AJ003	X			X			X
18	DRAIN S-4 NEAR GRASSY LAKE	05AJ002	X			X			X
19	DRAIN T-11 NEAR FINCASTLE	05AG025	X			X			X
20	DRAIN T-2 NEAR TABER	05AG023	X			X			X
21	E.I.D. EAST BRANCH CANAL NEAR LATHOM	05CJ003	X			X			X
22	E.I.D. NORTH BRANCH CANAL NEAR BASSANO	05CJ001	X			X			X
23	E.I.D. SPRINGHILL CANAL NEAR LATHOM	05CJ004	X			X			X
24	EXPANSE COULEE NEAR THE MOUTH	05AG003	X			X			X
25	HIGHWOOD DIVERSION CANAL NEAR HEADGATES	05BL025	X			X			X
26	L.N.I.D. CANAL AT MENZAGHIES BRIDGE	05AB016	X			X			X
27	LITTLE BOW CANAL AT HIGH RIVER	05BL015	X				X		X
28	LITTLE BOW RIVER AT CARMANGAY	05AC003	X			X			X
29	LITTLE BOW RIVER BELOW TRAVERS DAM	05AC012	X			X			X
30	LITTLE BOW RIVER NEAR THE MOUTH	05AC023	X			X			X
31	M.I.D. CANAL NEAR SPRING COULEE	05AE021	X			X			X
32	MATZHIWIN CREEK ABOVE WARE COULEE	05CJ007	X			X			X
33	NEW WEST COULEE NEAR THE MOUTH	05BN006	X			X			X
34	NORTH SASKATCHEWAN RIVER AT EDMONTON	05DF001	X				X		X
35	NORTH SASKATCHEWAN RIVER NEAR ROCKY MOUNTAIN HOUSE	05DC001	X			X			X
36	OLDMAN RIVER NEAR LETHBRIDGE	05AD007	X		X		X		X
37	ONETREE CREEK NEAR PATRICIA	05CJ006	X			X			X
38	PEACE RIVER AT PEACE POINT	07KC001	X				X	X	
39	PIYAHI DRAIN NEAR PICTURE BUTTE	05AD037	X			X			X
40	POTHOLE CREEK AT RUSSELL'S RANCH	05AE016	X			X			X
41	RED DEER RIVER NEAR BINDLOSS	05CK004	X		X		X		X
42	RONALANE WASTEWAY NEAR HAYS	05BN007	X			X			X
43	ROSERUD RIVER AT REDLAND	05CE005	X			X			X
44	SEVEN PERSONS CREEK AT MEDICINE HAT	05AH005	X			X			X
45	SOUTH SASKATCHEWAN RIVER AT HIGHWAY NO. 41	05AK001	X		X		X		X
46	SLAVE RIVER AT FITZGERALD	07NB001	X		X		X	X	
47	ST. MARY RESERVOIR NEAR SPRING COULEE	05AE025		X			X		X
48	TWELVE MILE COULEE SPILLWAY NEAR CARSELAND	05BM009	X			X			X
49	TWELVE MILE CREEK NEAR CECIL	05BN002	X			X			X
50	U.I.D. CANAL NEAR HILL SPRING	05AD013	X			X			X
51	WAPITI RIVER NEAR GRANDE PRAIRIE	07GE001	X				X		X
52	WARE COULEE ABOVE MATZHIWIN CREEK	05CJ008	X			X			X
53	WATERTON RESERVOIR	05AD026		X			X		X
54	W.I.D. CANAL NEAR CHESTERMERE LAKE	05BM003	X			X			X

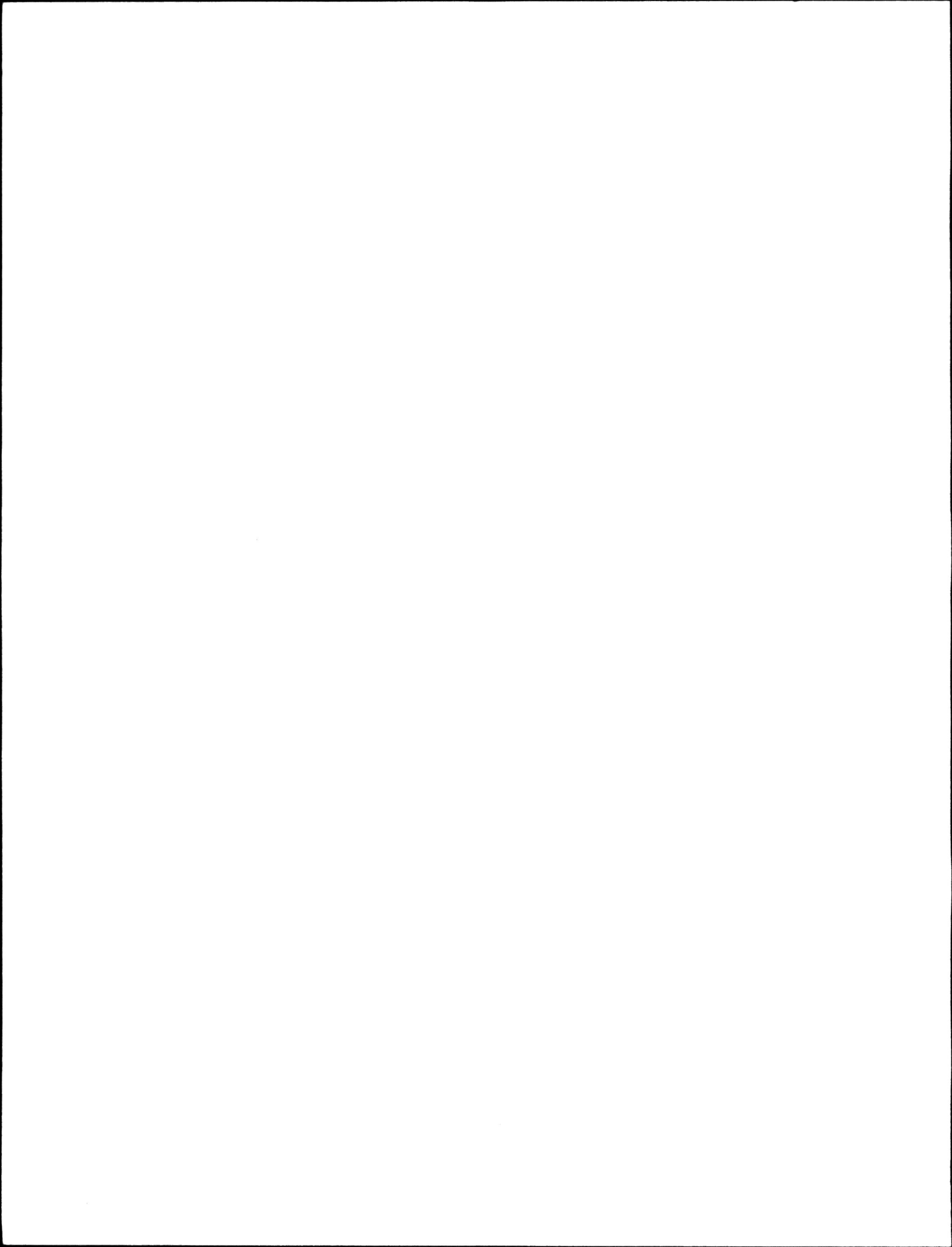
*GAUGING STATION LOCATED ON SASKATCHEWAN SIDE OF ALBERTA-SASKATCHEWAN BOUNDARY BUT OPERATED BY THE CALGARY DISTRICT.



MAJOR CLASSIFICATION - FEDERAL

SUBCLASSIFICATION - INTERNATIONAL COMMITMENTS (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
(STATIONS WITH ASTERISKS ARE OPERATED BY WATER SURVEY OF CANADA, REGINA DISTRICT.)									
1	*BARE CREEK RESERVOIR NEAR ELKWATER	11AB094		X		X			X
2	BEAR CREEK NEAR INTERNATIONAL BOUNDARY	11AA028	X			X			X
3	BELLY RIVER NEAR MOUNTAIN VIEW	05AD005	X				X		X
4	*CRESSDAY RESERVOIR NEAR CRESSDAY	11AB097		X		X			X
5	*GREASEWOOD RESERVOIR NEAR ELKWATER	11AB092		X		X			X
6	*JAYDOT RESERVOIR NEAR JAYDOT	11AB098		X		X			X
7	LAKE SHERBURNE	05AE036		X			X		X
8	LEE CREEK AT CARDSTON	05AE002	X				X		X
9	*MASSY RESERVOIR NEAR ELKWATER	11AB104		X		X			X
10	*MICHELE RESERVOIR NEAR ELKWATER	11AB091		X		X			X
11	*MIDDLE CREEK NEAR ALBERTA BOUNDARY	11AB009	X			X			X
12	MILK RIVER AT EASTERN CROSSING OF INT'L BOUNDARY	11AA031	X			X			X
13	MILK RIVER AT MILK RIVER	11AA005	X				X		X
14	MILK RIVER AT WESTERN CROSSING OF INT'L BOUNDARY	11AA025	X			X			X
15	MILK RIVER NEAR PENDANT D'OREILLE	11AA035	X			X			X
16	MILK RIVER NEAR WRITING-ON-STONE PARK	11AA034	X			X			X
17	MINERS COULEE NEAR INTERNATIONAL BOUNDARY	11AA029	X			X			X
18	*MITCHELL RESERVOIR NEAR ELKWATER	11AB099		X		X			X
19	MOUNTAIN VIEW IRRIGATION DISTRICT CANAL	05AD017	X			X			X
20	NORTH FORK MILK RIVER ABOVE ST. MARY CANAL	11AA032	X			X			X
21	NORTH MILK RIVER NEAR INTERNATIONAL BOUNDARY	11AA001	X			X			X
22	*REESOR RESERVOIR NEAR ELKWATER	11AB090		X		X			X
23	ROLPH CREEK NEAR KIMBALL	05AE005	X			X			X
24	SAGE CREEK AT Q RANCH NEAR WILD HORSE	11AA026	X			X			X
25	SAGE CREEK NEAR INTERNATIONAL BOUNDARY	11AA027	X			X			X
26	SOUTH FORK MILK RIVER NEAR BABB	11AA033	X			X			X
27	ST. MARY CANAL AT ST. MARY CROSSING	05AE029	X			X			X
28	ST. MARY RIVER AT INTERNATIONAL BOUNDARY	05AE027	X				X		X
29	SWIFTCURRENT CREEK AT SHERBURNE	05AE033	X			X			X
30	*WALBURGER COULEE BELOW DIVERSIONS	11AB086	X			X			X
31	WATERTON LAKE AT WATERTON PARK	05AD025		X			X		X
32	WATERTON RIVER NEAR WATERTON PARK	05AD003	X				X		X



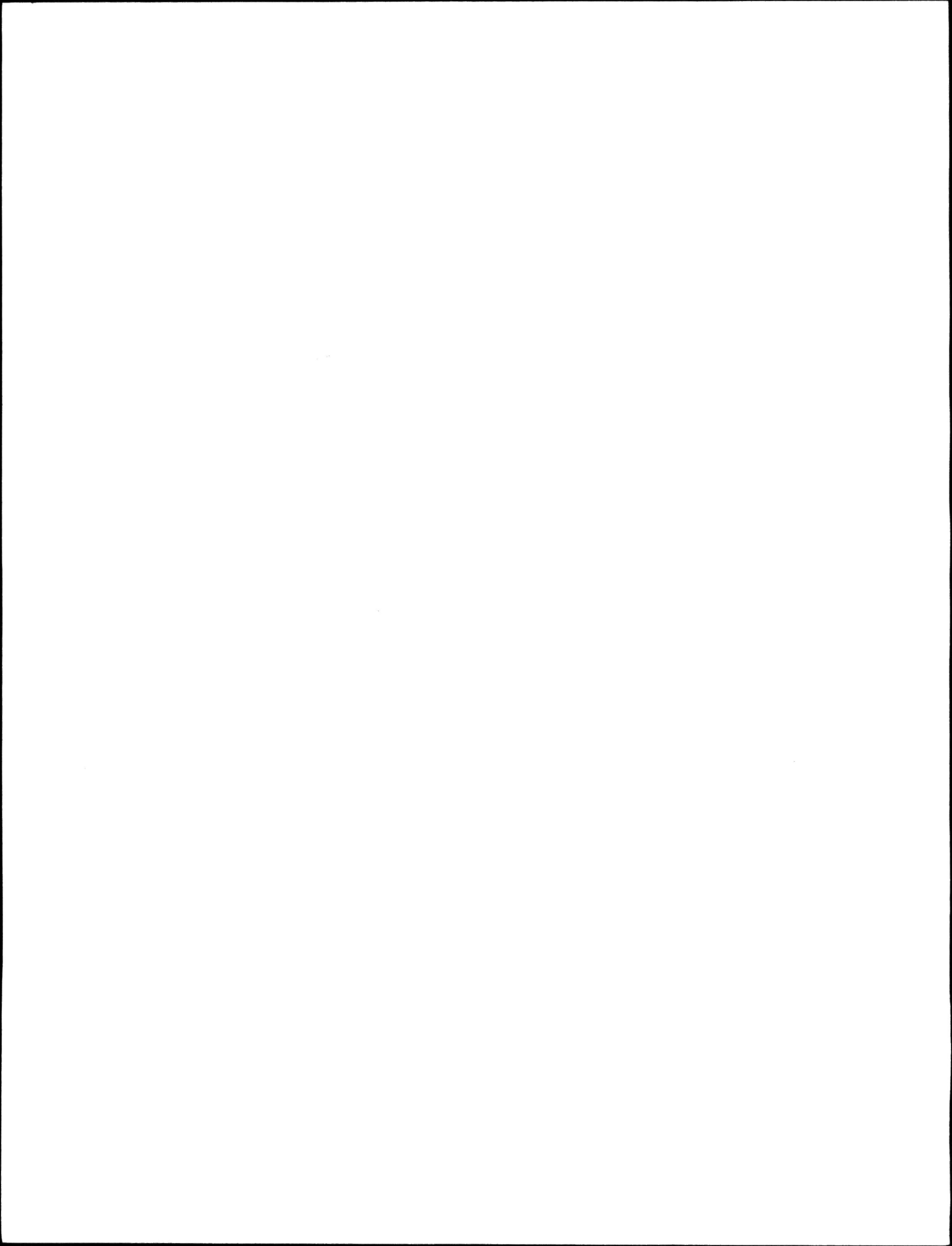
MAJOR CLASSIFICATION - FEDERAL

SUBCLASSIFICATION - NATIONAL STREAM INVENTORY (7)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL

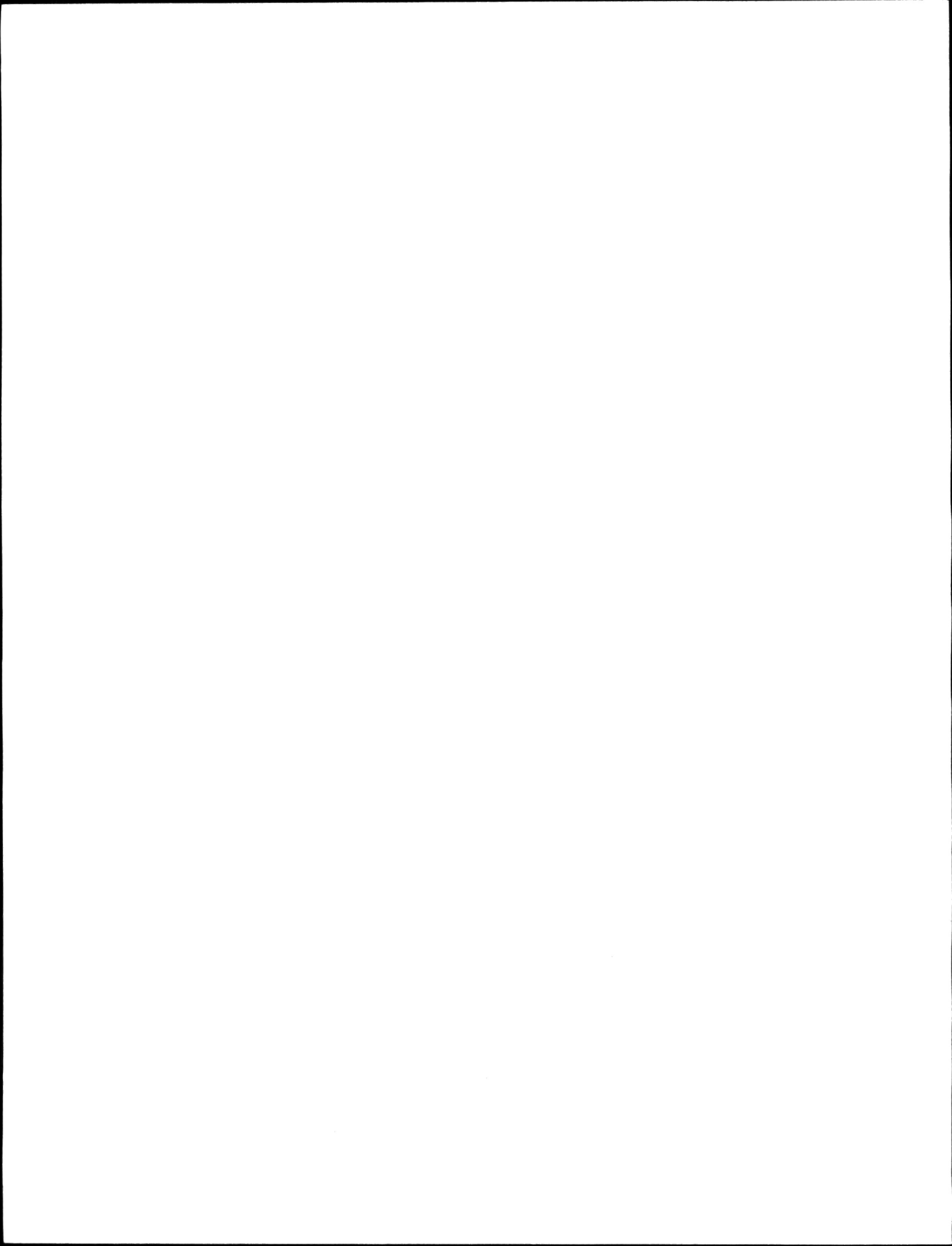
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									

1	ATHABASCA RIVER AT HINTON	07AD002	X				X		X
2	BIRCH RIVER BELOW ALICE CREEK	07KE001	X				X		X
3	HIGHWOOD RIVER NEAR THE MOUTH	05BL024	X		X		X	X	X
4	LESSER SLAVE RIVER AT HIGHWAY NO. 2	07BK006	X		X		X		X
5	MCLEOD RIVER NEAR WOLF CREEK	07AG001	X				X		X
6	NORTH SASKATCHEWAN RIVER AT WHIRLPOOL POINT	05DA009	X		X		X		X
7	NOTIKEWIN RIVER AT MANNING	07HC001	X				X		X
8	PEACE RIVER AT PEACE RIVER	07HA001	X		X		X		X
9	PEMBINA RIVER AT JARVIE	07BC002	X				X		X
10	RED DEER RIVER AT RED DEER	05CC002	X		X		X		X
11	SMOKY RIVER AT WATINO	07GJ001	X				X		X
12	WABASCA RIVER AT WADLIN LAKE ROAD	07JD002	X				X		X



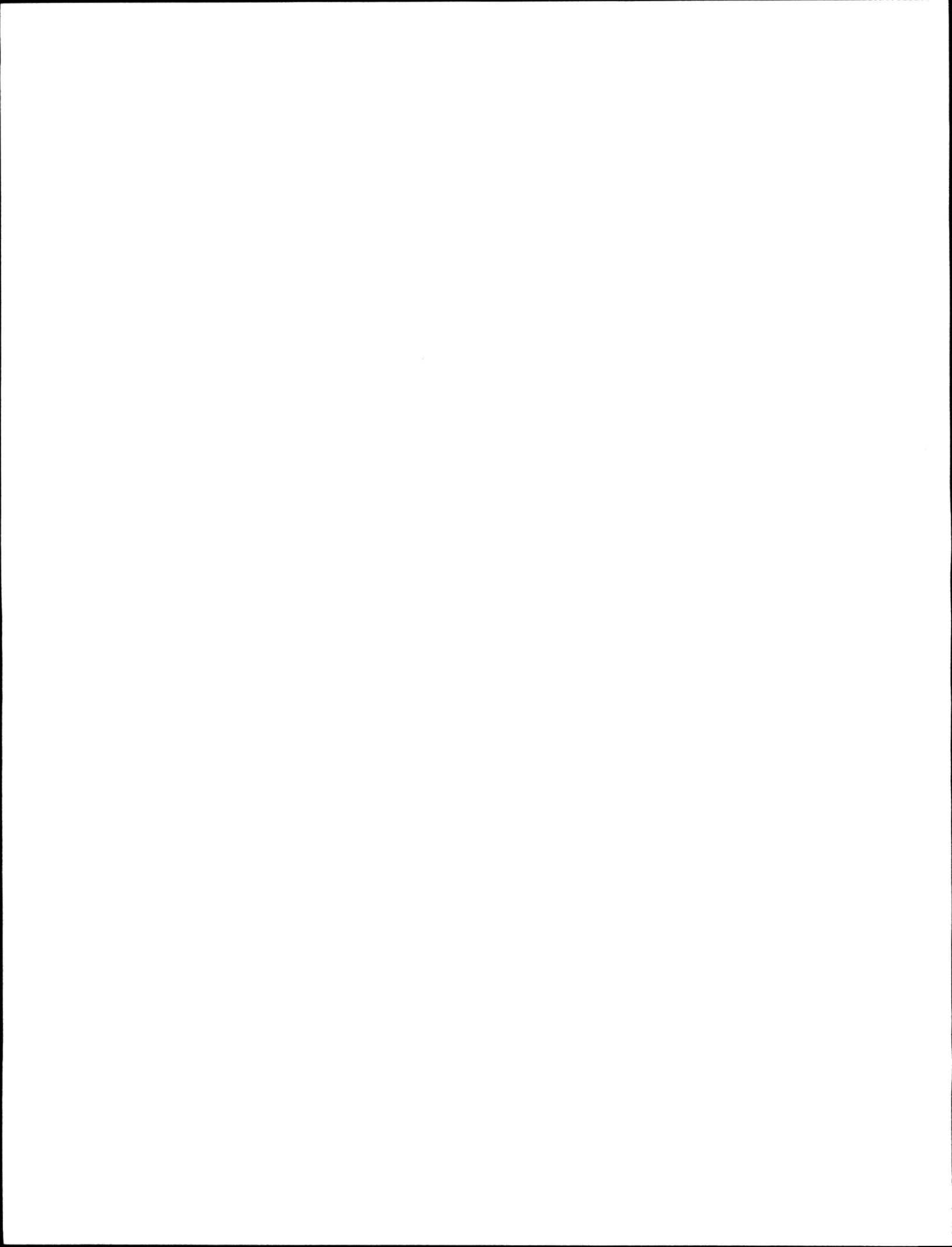
MAJOR CLASSIFICATION - FEDERAL-PROVINCIAL
 SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
1	ADAMS CREEK NEAR KINUSO	07BJ004	X				X		X
2	ALKALI CREEK NEAR THE MOUTH	05CK005	X				X		X
3	AMISK CREEK NEAR SHONTS	05EB016	X				X		X
4	AMISK RIVER AT HIGHWAY NO. 36	06AA002	X				X		X
5	ATHABASCA RIVER AT ATHABASCA	07BE001	X					X	X
6	ATHABASCA RIVER BELOW MCMURRAY	07DA001	X		X		X		X
7	ATHABASCA RIVER NEAR JASPER	07AA002	X				X		X
8	ATIMOSWE CREEK NEAR ELK POINT	05ED002	X				X		X
9	BATTLE RIVER NEAR PONOKA	05FA001	X				X		X
10	BEAVER CREEK NEAR BROCKET	05AB013	X				X		X
11	BEAVER RIVER ABOVE SYNCRUDE	07DA018	X				X		X
12	BEAVER RIVER NEAR GOODRIDGE	06AA001	X				X		X
13	BEAVERDAM CREEK NEAR COCHRANE	05CB005	X				X		X
14	BEAVERHILL CREEK NEAR THE MOUTH	05EB015	X				X		X
15	BEAVERLODGE RIVER NEAR BEAVERLODGE	07GD001	X				X		X
16	BELLY RIVER NEAR STAND OFF	05AD002	X				X		X
17	BERRY CREEK NEAR ROSE LYNN	05CH008	X				X		X
18	BIGKNIFE CREEK NEAR GADSBY	05FC002	X				X		X
19	BLACKMUD CREEK NEAR ELLERSLIE	05DF003	X				X		X
20	BLINDMAN RIVER NEAR BLACKFALDS	05CC001	X				X		X
21	BOW RIVER BELOW BASSANO DAM	05BM004	X				X		X
22	BOW RIVER BELOW CARSELAND DAM	05BM002	X				X		X
23	BOW RIVER BELOW GHOST DAM	05BE006	X				X		X
24	BOYER RIVER NEAR FORT VERMILION	07JF002	X				X		X
25	BRAZEAU RIVER BELOW CARDINAL RIVER	05DD007	X				X		X
26	BROWN CREEK AT FORESTRY ROAD	05DD004	X				X		X
27	BUFFALO CREEK AT HIGHWAY NO. 41	05FE002	X				X		X
28	BULLPOUND CREEK NEAR HANNA	05CG002	X				X		X
29	CARDINAL RIVER NEAR THE MOUTH	05DD008	X				X		X
30	CASTLE RIVER AT RANGER STATION	05AA028	X				X		X
31	CASTLE RIVER NEAR BEAVER MINES	05AA022	X				X		X
32	CATARACT CREEK NEAR FORESTRY ROAD	05BL022	X				X		X
33	CHAIN LAKES RESERVOIR NEAR NANTON	05AB037	X		X		X		X
34	CHINCHAGA RIVER NEAR HIGH LEVEL	07OC001	X				X		X
35	CHRISTMAS CREEK NEAR BLUE RIDGE	07AH002	X				X		X
36	CLEAR RIVER NEAR BEAR CANYON	07FD009	X				X		X
37	CLEARWATER RIVER ABOVE LIMESTONE CREEK	05DB003	X				X		X
38	CLEARWATER RIVER AT DRAPER	07CD001	X		X		X		X
39	CLEARWATER RIVER NEAR DOVERCOURT	05DB006	X				X		X
40	CROWSNEST RIVER AT FRANK	05AA008	X		X		X		X
41	CUTBANK RIVER NEAR GRANDE PRAIRIE	07GB001	X				X		X
42	DAPP CREEK AT HIGHWAY NO. 44	07BC006	X				X		X
43	DEER CREEK MAIN STEM	05CA003	X				X		X
44	DOG RIVER NEAR FITZGERALD	07NB008	X				X		X
45	DRIEDMEAT CREEK NEAR THE MOUTH	05FA018	X				X		X
46	DRIFTPILE RIVER NEAR DRIFTPILE	07BH003	X		X		X		X
47	DRIFTWOOD RIVER NEAR THE MOUTH	07BK007	X				X		X
48	DRYWOOD CREEK NEAR TWIN BUTTE	05AD016	X				X		X
49	DUTCH CREEK NEAR THE MOUTH	05AA026	X				X		X
50	EAST PRAIRIE RIVER NEAR ENILDA	07BF001	X				X		X
51	ELBOW RIVER AT BRAGG CREEK	05BJ004	X				X		X
52	ELLS RIVER NEAR THE MOUTH	07DA017	X				X		X
53	ENUNICE CREEK NEAR HINTON	07AF005	X		X		X		X
54	EUREKA RIVER NEAR WORSLEY	07FD013	X				X		X
55	FIREBAG RIVER NEAR THE MOUTH	07DC001	X				X		X
56	FISH CREEK NEAR PRIDDIS	05BK001	X				X		X
57	FREEMAN RIVER NEAR FORT ASSINIBOINE	07AH001	X				X		X
58	GHOST RIVER NEAR COCHRANE	05BG001	X				X		X
59	GRANDE PRAIRIE CREEK NEAR SEXSMITH	07GE003	X				X		X
60	GREGOIRE LAKE NEAR FORT MCMURRAY	07CE001	X		X		X		X
61	GROS VENTRE CREEK NEAR DUNMORE	05AH037	X				X		X
62	HANGINGSTONE RIVER AT MCMURRAY	07CD004	X				X		X
63	HAY RIVER NEAR MEANDER RIVER	07OB003	X				X		X
64	HAYNES CREEK NEAR HAYNES	05CD006	X				X		X
65	HEART RIVER NEAR NAMPA	07HA003	X				X		X
66	HIGHWOOD RIVER AT DIEBEL'S RANCH	05BL019	X				X		X
67	HIGHWOOD RIVER BELOW PICKLEJAR CREEK	05BL021	X				X		X
68	HINES CREEK ABOVE GERRY LAKE	07FD011	X				X		X
69	HUTCH LAKE TRIBUTARY NEAR HIGH LEVEL	07OB007	X				X		X
70	IOSEGUN RIVER NEAR LITTLE SHOKY	07GG003	X				X		X
71	IRON CREEK NEAR HARDISTY	05FB002	X				X		X
72	JACKFISH CREEK NEAR LA COREY	06AC001	X				X		X
73	JACKPINE CREEK AT WADLIN LAKE ROAD	07JD003	X				X		X
74	JAMES RIVER NEAR SUNDRE	05CA002	X				X		X
75	JUMPINGPOUND CREEK NEAR COX HILL	05BH013	X				X		X
76	JUMPINGPOUND CREEK NEAR THE MOUTH	05BH009	X				X		X
77	KAKWA RIVER NEAR GRANDE PRAIRIE	07CB002	X				X		X
78	KEG RIVER AT HIGHWAY NO. 35	07HF005	X				X		X
79	KLESKUN HILLS MAIN DRAIN NEAR GRANDE PRAIRIE	07GE005	X				X		X
80	KNEEHILLS CREEK NEAR DRUMHELLER	05CE002	X				X		X



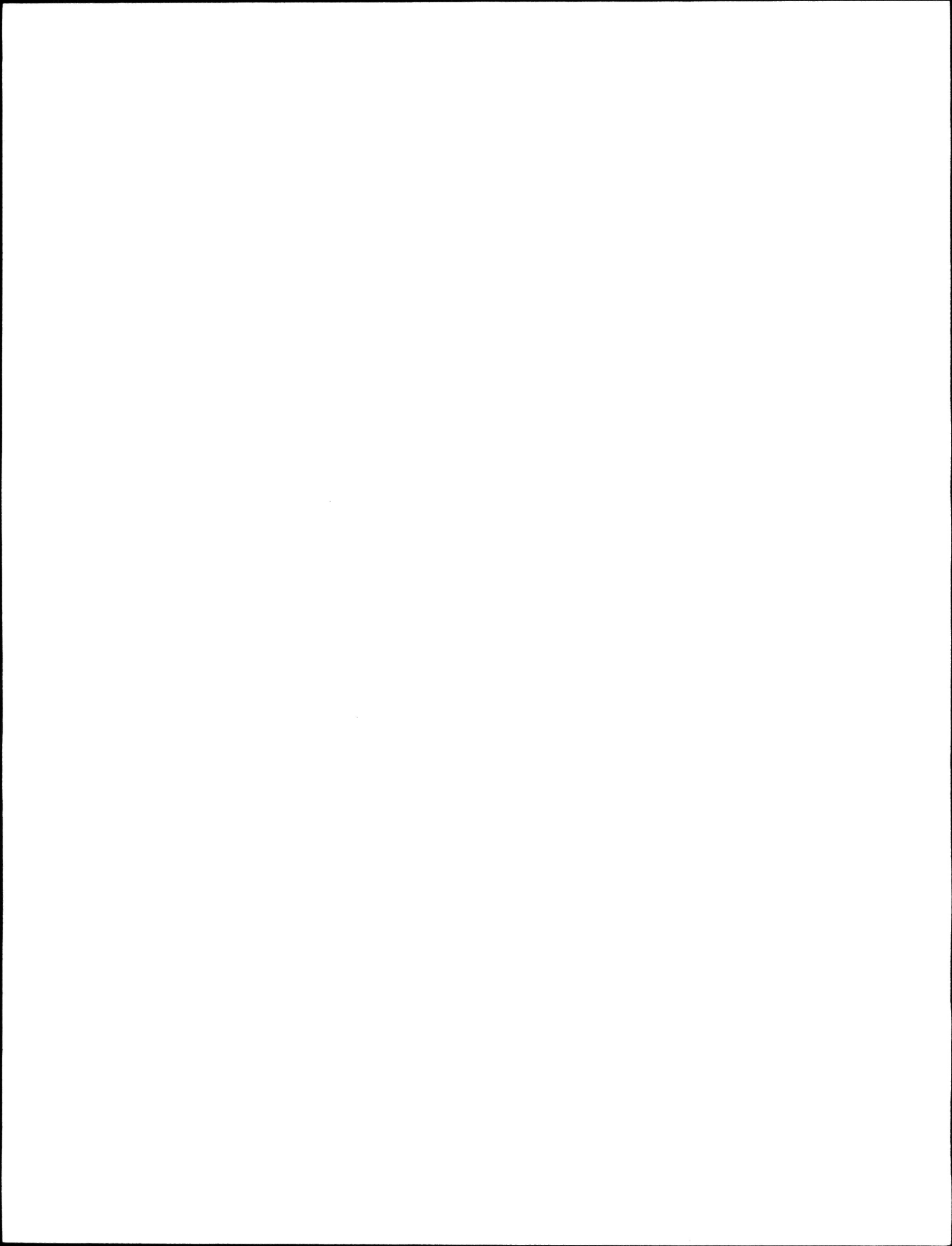
MAJOR CLASSIFICATION - FEDERAL-PROVINCIAL
 SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
81	LAFOND CREEK NEAR RED EARTH CREEK	07JC001	X				X		X
82	LALBY CREEK NEAR GIROUXVILLE	07GJ005	X				X		X
83	LESSER SLAVE LAKE AT FAUST	07BJ002		X			X		X
84	LITTLE PADDLE RIVER NEAR HAYERTHORPE	07BB005	X				X		X
85	LITTLE RED DEER RIVER NEAR THE MOUTH	05CB001	X					X	X
86	LITTLE RED DEER RIVER NEAR WATER VALLEY	05CB002	X				X		X
87	LITTLE SMOKY RIVER NEAR GUY	07GH002	X					X	X
88	LLOYD CREEK NEAR BLUFFTON	05CC009	X				X		X
89	LOBSTICK RIVER NEAR STYAL	07BB003	X				X	X	X
90	LOVETT RIVER NEAR THE MOUTH	07BA003	X				X		X
91	LUTOSE CREEK NEAR STEEN RIVER	07OB006	X				X		X
92	MACKAY CREEK AT WALSH	05AH002	X				X		X
93	MACKAY RIVER NEAR FORT MACKAY	07DB001	X					X	X
94	MANYBERRIES CREEK AT BROODIN'S FARM	05AF010	X				X		X
95	MASKWA CREEK NO. 1 ABOVE BEARHILLS LAKE	05FA014	X				X		X
96	MCLEOD RIVER ABOVE EMBARRAS RIVER	07AF002	X					X	X
97	MEADOW CREEK NEAR THE MOUTH	05AB029	X				X		X
98	MEANDER RIVER AT OUTLET HUTCH LAKE	07OB005	X				X		X
99	MEDICINE RIVER NEAR ECKVILLE	05CC007	X					X	X
100	MEETING CREEK NEAR THE MOUTH	05FC003	X				X		X
101	MIDDLE FORK CREEK IN CIRQUE NEAR SEEBE	05BF020	X				X		X
102	MILL CREEK NEAR THE MOUTH	05AA011	X				X		X
103	MONITOR CREEK NEAR MONITOR	05GA003	X				X		X
104	MONTAGNEUSE RIVER NEAR EUREKA RIVER	07FD012	X				X		X
105	MUSKEG RIVER NEAR FORT MACKAY	07DA008	X					X	X
106	MUSKEG RIVER NEAR GRANDE CACHE	07GA002	X					X	X
107	NAMEPI CREEK NEAR THE MOUTH	05EC004	X				X		X
108	NATURAL FLOW A NEAR POLLOCKVILLE	05CH009	X				X		X
109	NATURAL FLOW B NEAR PRINCESS	05CJ011	X				X		X
110	NATURAL FLOW C NEAR BOW CITY	05BN024	X				X		X
111	NORDEGG RIVER AT SUNCHILD ROAD	05DD009	X					X	X
112	NORTH RAM RIVER AT FORESTRY ROAD	05DC011	X				X		X
113	OLDMAN RIVER NEAR WALDRON'S CORNER	05AA023	X					X	X
114	OLDMAN RIVER NEAR BROCKET	05AA024	X		X			X	X
115	PADDLE RIVER AT BARRHEAD	07BB006	X				X		X
116	PADDLE RIVER NEAR ROCHFORD BRIDGE	07BB004	X				X		X
117	PARFLESH CREEK NEAR CHANCELLOR	05BM007	X				X		X
118	PEACE RIVER AT DUNVEGAN BRIDGE	07FD003	X				X		X
119	PEIGAN CREEK NEAR PAKOWKI ROAD	05AH041	X				X		X
120	PEKISKO CREEK NEAR LONGVIEW	05BL023	X				X		X
121	PEMBINA RIVER BELOW PADDY CREEK	07BA001	X				X		X
122	PIGEON LAKE CREEK NEAR USONA	05FA019	X				X		X
123	PINCHER CREEK AT PINCHER CREEK	05AA004	X				X		X
124	PINE CREEK NEAR GRASSLAND	07CA005	X				X		X
125	PIPESTONE CREEK BELOW BIGSTONE CREEK	05FA022	X				X		X
126	PONTON RIVER ABOVE BOYER RIVER	07JF003	X				X		X
127	PRAIRIE BLOOD COULEE NEAR LETHBRIDGE	05AD035	X				X		X
128	PRAIRIE CREEK BELOW LYCK CREEK	05DB005	X				X		X
129	PRAIRIE CREEK NEAR ROCKY MOUNTAIN HOUSE	05DB002	X					X	X
130	RACEHORSE CREEK NEAR THE MOUTH	05AA027	X				X		X
131	RAM RIVER NEAR THE MOUTH	05DC006	X					X	X
132	RAT CREEK NEAR CYNTHIA	07BA002	X				X		X
133	RAVEN RIVER NEAR RAVEN	05CB004	X					X	X
134	RAY CREEK NEAR INNISFAIL	05CE010	X				X		X
135	RED DEER RIVER ABOVE PANTHER RIVER	05CA004	X				X		X
136	RED DEER RIVER AT DRUMHELLER	05CE001	X		X			X	X
137	RED DEER RIVER BELOW BURNT TIMBER CREEK	05CA009	X					X	X
138	REDWATER RIVER NEAR THE MOUTH	05EC005	X				X		X
139	RENWICK CREEK NEAR THREE HILLS	05CE011	X				X		X
140	RIBSTONE CREEK NEAR CZAR	05FD005	X				X		X
141	RIBSTONE CREEK NEAR EDGERTON	05FD001	X				X		X
142	RIBSTONE CREEK TRIBUTARY NEAR CORONATION	05FD006	X				X		X
143	RICHARDSON RIVER NEAR THE MOUTH	07DD002	X					X	X
144	ROSE CREEK NEAR ALDER FLATS	05DE007	X				X		X
145	ROSEBUD RIVER BELOW CARSTAIRS CREEK	05CE006	X				X		X
146	ROSS CREEK NEAR IRVINE	05AH003	X				X		X
147	SADDLE RIVER NEAR WOKING	07FD006	X				X		X
148	SAKWATAMAU RIVER NEAR WHITECOURT	07AH003	X				X		X
149	SAND RIVER NEAR THE MOUTH	06AB001	X				X		X
150	SAULTEAUX RIVER NEAR SPURFIELD	07BK005	X				X		X
151	SAWRIDGE CREEK NEAR SLAVE LAKE	07BK009	X				X		X
152	SHEEP COULEE NEAR CARSTAIRS	05CE019	X				X		X
153	SHEEP RIVER AT TURNER VALLEY	05BL014	X					X	X
154	STIFFLEUR RIVER NEAR THE MOUTH	05DA002	X				X		X
155	SIMONETTE RIVER NEAR GOODWIN	07GF001	X					X	X
156	SMOKY RIVER ABOVE HELLS CREEK	07GA001	X					X	X
157	SOUNDING CREEK NEAR OYEN	05GA008	X				X		X
158	SOUZA CREEK NEAR HIGH LEVEL	07GA001	X				X		X
159	SOUTH SASKATCHEWAN RIVER AT MEDICINE HAT	05AJ001	X					X	X
160	ST. MARY RIVER NEAR LETHBRIDGE	05AE006	X				X		X



MAJOR CLASSIFICATION - FEDERAL-PROVINCIAL
 SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
161	STEEN RIVER AT STEEN RIVER	070B004	X			X			X
162	STEEPBANK RIVER NEAR FORT MCMURRAY	07DA006	X				X	X	X
163	STIMSON CREEK NEAR PEKISKO	05BL007	X			X			X
164	STRAWBERRY CREEK NEAR THE MOUTH	05DF004	X			X			X
165	STREETER CREEK MAIN STEM NEAR NANTON	05AB030	X			X			X
166	STRETTON CREEK NEAR MARWAYNE	05EE005	X			X			X
167	STURGEON RIVER NEAR FORT SASKATCHEWAN	05EA001	X			X			X
168	SUNDANCE CREEK NEAR BICKERDIKE	07AF010	X			X			X
169	SWAN RIVER NEAR KINUSO	07BJ001	X		X		X		X
170	SWAN RIVER NEAR SWAN HILLS	07BJ003	X			X			X
171	THREEHILLS CREEK BELOW RAY CREEK	05CE018	X			X			X
172	THREEHILLS CREEK NEAR CARBON	05CE007	X			X			X
173	THREEPOINT CREEK NEAR MILLARVILLE	05BL013	X			X			X
174	TODD CREEK AT ELTON'S RANCH	05AA006	X			X			X
175	VERMILION RIVER NEAR MARWAYNE	05EE007	X			X			X
176	WABAMUN CREEK NEAR DUFFIELD	05DE003	X			X			X
177	WABASH CREEK NEAR PIBROCH	07BC007	X			X			X
178	WAINSCOTT COULEE NEAR BROWNVALE	07FD014	X			X			X
179	WAIPAROUS CREEK NEAR THE MOUTH	05BG006	X				X		X
180	WANDERING RIVER NEAR WANDERING RIVER	07CA006	X				X		X
181	WASKAHIGAN RIVER NEAR THE MOUTH	07GG001	X				X		X
182	WASKATENAU CREEK NEAR WASKATENAU	05EC002	X			X			X
183	WELCH CREEK TRIBUTARY NEAR LEEDALE	05CC010	X			X			X
184	WEST ARROWWOOD CREEK NEAR ARROWWOOD	05BM014	X			X			X
185	WEST PRAIRIE RIVER NEAR HIGH PRAIRIE	07BF002	X				X		X
186	WHISKEYJACK CREEK NEAR HINTON	07AD004	X			X			X
187	WHITEMUD CREEK NEAR ELLERSLIE	05DF006	X			X			X
188	WHITEMUD CREEK (WEST BRANCH) NEAR IRETON	05DF007	X			X			X
189	WHITEMUD RIVER NEAR DIXONVILLE	07HA005	X				X		X
190	WILDHAY RIVER NEAR HINTON	07AC001	X			X			X
191	WILLOW CREEK ABOVE CHAIN LAKES	05AB028	X				X		X
192	WILLOW CREEK NEAR NOLAN	05AB002	X			X			X
193	WOLF CREEK AT HIGHWAY NO. 16	07AG003	X				X		X
194	WOLF RIVER AT OUTLET OF WOLF LAKE	06AB002	X				X		X
OPERATED BY - ALBERTA GOVERNMENT									
1	ATHABASCA RIVER ABOVE EMBARRAS CHANNEL		X				X		X
2	ATHABASCA RIVER ABOVE FLETCHER CHANNEL	07DD010	X				X		X
3	ATHABASCA RIVER ABOVE RICHARDSON RIVER		X				X		X
4	SPRING CREEK NEAR VALLEYVIEW	07GF002	X		X		X		X



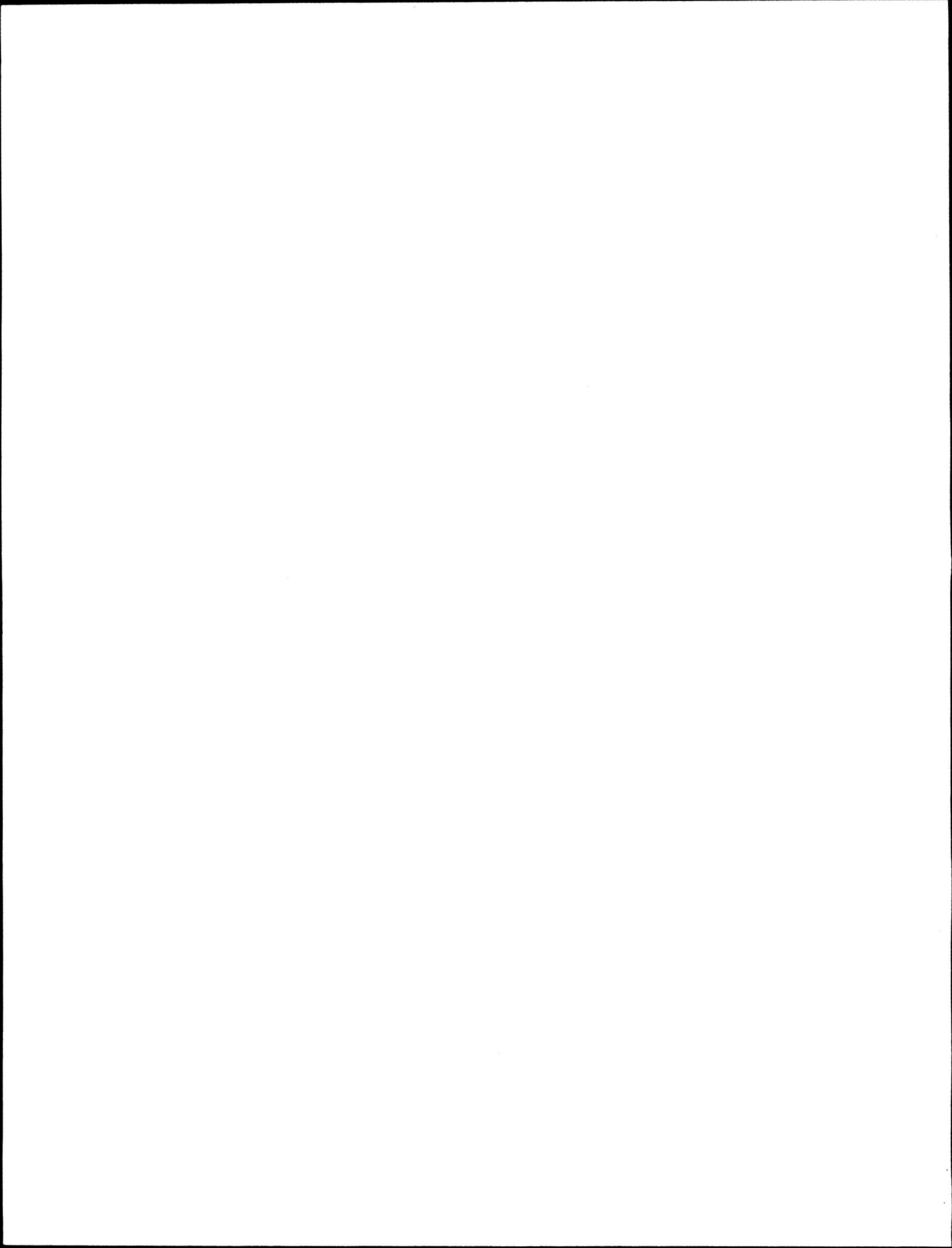
MAJOR CLASSIFICATION - PROVINCIAL

SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8H	12H	REMOTE	NORMAL

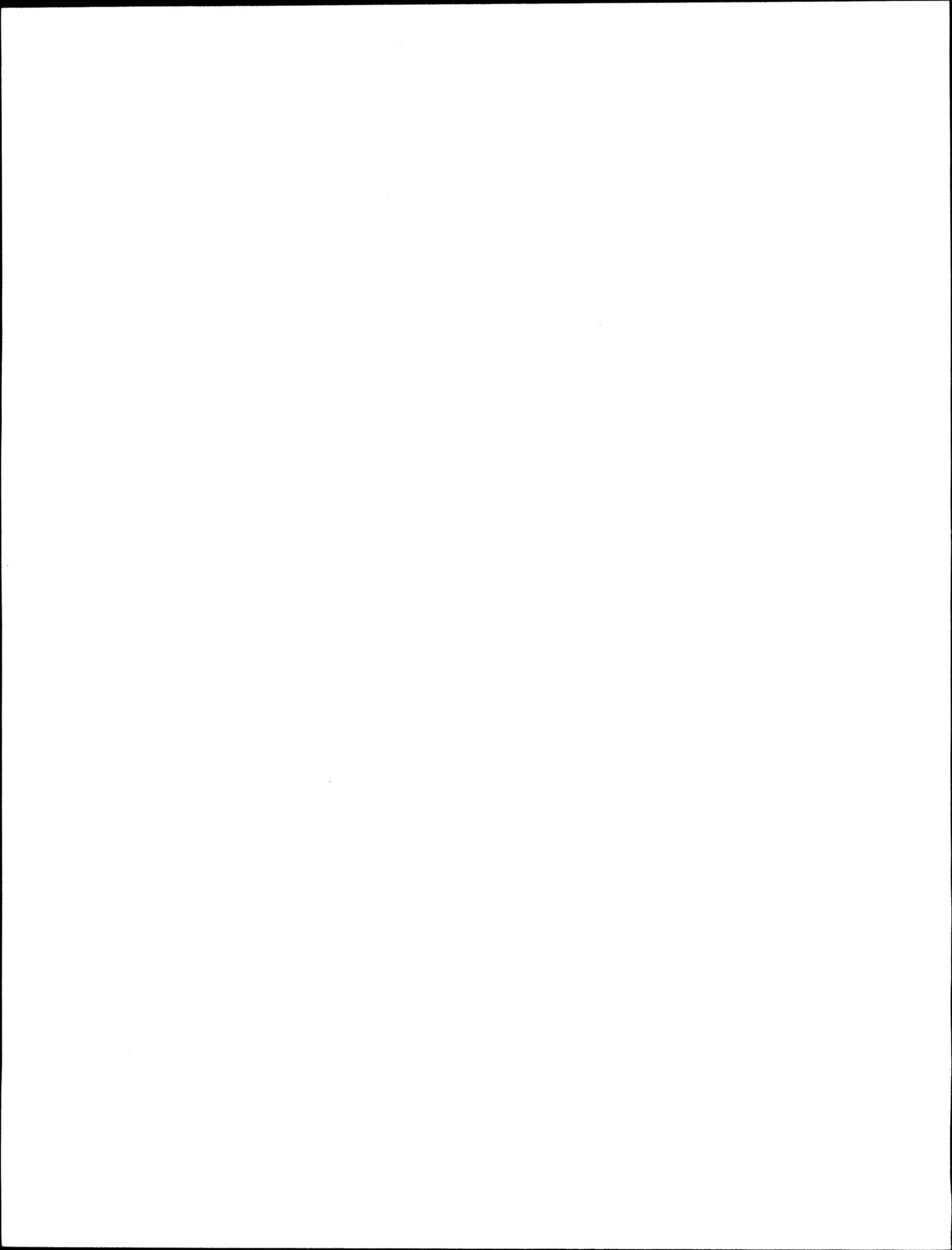
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									

1	ATHABASCA RIVER NEAR WINDFALL	07AE001	X			X			X
2	BAPTISTE LAKE NEAR ATHABASCA	07BE002		X		X			X
3	RATTLE RIVER NEAR FORESTBURG	05FC001	X			X			X
4	BEAR LAKE NEAR CLAIRMONT	07GE004		X		X			X
5	BEAVER LAKE AT RANGER STATION	06AA003		X		X			X
6	BELLY-ST. MARY DIVERSION CANAL	05AD021	X			X			X
7	BERRY CREEK NEAR THE MOUTH	05CH007	X			X			X
8	BLINDMAN RIVER NEAR BLUFFTON	05CC008	X			X			X
9	BLOOD INDIAN CREEK NEAR THE MOUTH	05CX001	X			X			X
10	B.R.D. DRAIN A NEAR HAYS	05AG004	X			X			X
11	B.R.D. DRAIN D NEAR VAUXHALL	05BN008	X			X			X
12	B.R.D. DRAIN E NEAR VAUXHALL	05BN023	X			X			X
13	B.R.D. DRAIN T NEAR HAYS	05AG005	X			X			X
14	BOW RIVER AT CANMORE	05BE008	X				X		X
15	BOYER RIVER NEAR PADDLE PRAIRIE	07JF004	X			X			X
16	BUFFALO LAKE NEAR ERSKINE	05CD005		X		X			X
17	BULLPOUND CREEK NEAR THE MOUTH	05CG003	X			X			X
18	CALLING LAKE AT RANGER STATION	07CB001		X		X			X
19	CANADIAN ST. MARY CANAL AT DROP NO. 1	05AF028	X			X			X
20	CHIP LAKE AT OUTLET TO LOBSTICK RIVER	07BB008		X		X			X
21	COAL CREEK AT BOW CITY	05BN014	X			X			X
22	CONNOR CREEK NEAR SANGUDO	07BB009	X			X			X
23	COOKING LAKE AT COOKING LAKE	05EB012		X		X			X
24	DEERLICK CREEK NEAR HINTON	07AF004	X		X	X			X
25	DRYWOOD CREEK NEAR THE MOUTH	05AD010	X				X		X
26	ELBOW RIVER ABOVE ELBOW FALLS	05BJ006	X			X			X
27	ELBOW RIVER BELOW GLENMORE DAM	05BJ001	X				X		X
28	ELKWATER LAKE	05AH025		X		X			X
29	FAWCETT LAKE NEAR SMITH	07BK008		X		X			X
30	GOLD CREEK NEAR FRANK	05AA030	X			X			X
31	GULL LAKE NEAR ASPEN BEACH	05CC006		X		X			X
32	HAMMER HILL SPILLWAY NEAR GLEICHEN	05BM005	X			X			X
33	HARTLEY CREEK NEAR FORT MACKAY	07DA009	X				X	X	X
34	HASTINGS LAKE NEAR DEVILLE	05EB011		X		X			X
35	HIGHWOOD RIVER NEAR ALDERSYDE	05BL009	X				X		X
36	HINES CREEK NEAR FAIRVIEW	07FD008	X			X			X
37	IRON CREEK NEAR VIKING	05FB003	X			X			X
38	ISLE LAKE AT CAMP HE HO HA	05EA008		X		X			X
39	JOSLYN CREEK NEAR FORT MACKAY	07DA016	X			X		X	X
40	KENNEDY COULEE NEAR ACADIA VALLEY	05CK006	X			X			X
41	KYISKAP CREEK NEAR GRANUM	05AB038	X			X			X
42	LAC LA BICHE AT LAC LA BICHE	07CA004		X		X			X
43	LAC LA NONNE AT LAC LA NONNE	07BB007		X		X			X
44	LAC STE. ANNE AT ALBERTA BEACH	05EA006		X		X			X
45	LATERAL 10 SPILLWAY NEAR CHIN	05AG007	X			X			X
46	LESSER SLAVE LAKE AT SLAVE LAKE	07BJ002		X			X		X
47	LITTLE ELBOW RIVER ABOVE NIHAHI CREEK	05BJ009	X			X			X
48	LITTLE SMOKY RIVER AT LITTLE SMOKY RIVER	07GG002	X			X			X
49	LOMOND LATERAL NEAR HEADGATE	05AC017	X			X			X
50	MACKAY CREEK NEAR GRABURN GAP	05AH042	X			X			X
51	MALPINE CREEK NEAR ELKWATER	05AH043	X			X			X
52	MCGILLIVRAY CREEK NEAR COLEMAN	05AA013	X			X			X
53	MCGREGOR LAKE INFLOW NEAR MILO	05AC024	X			X			X
54	MCGREGOR-TRAVERS CANAL NEAR CHAMPION	05AC025	X			X			X
55	MCLEOD RIVER NEAR WHITECOURT	07AG004	X			X			X
56	MICHICHI CREEK AT DRUMHELLER	05CE020	X			X			X
57	MILK RIVER RIDGE RESERVOIR	05AF030		X		X			X
58	MINISTIK LAKE NEAR NEW SAREPTA	05EB013		X		X			X
59	MIGUELON LAKE AT PROVINCIAL PARK	05EB014		X		X			X
60	MOOSEHILLS CREEK NEAR ELK POINT	05ED003	X			X			X
61	NORTH SASKATCHEWAN RIVER NEAR LODGEPOLE	05DE006		X		X			X
62	NOSE CREEK AT CALGARY	05BH003	X			X			X
63	PADDLE RIVER AT HWY. 764	07BB013		X		X			X
64	PADDLE RIVER NEAR ANSELMO	07BB011	X			X			X
65	PADDLE RIVER NEAR SANGUDO	07BB012		X		X			X
66	PEACE RIVER AT FORT VERMILION	07HF001		X		X			X
67	PEMBINA RIVER NEAR ENTWISTLE	07BB002	X				X		X
68	PIGEON LAKE AT FISHER HOME	05FA013		X		X			X
69	POPLAR CREEK NEAR FORT MCMURRAY	07DA007	X				X	X	X
70	POTHOLE TURNOUT NEAR MAGRATH	05AE038	X			X			X
71	RED DEER RIVER AT SUNDRE	05CA010		X		X			X
72	ROLLING HILLS CANAL NO. 1 SPILL	05BN015	X			X			X
73	ROLLING HILLS CANAL NO. 2 SPILL	05BN019	X			X			X
74	SIX MILE COULEE SPILLWAY NEAR LETHBRIDGE	05AD020	X			X			X
75	SOUTH WABASCA LAKE NEAR DESMARAIS	07JA002		X		X			X
76	SPRAY RIVER AT BANFF	05BC001	X				X		X
77	STEELE LAKE NEAR JARVIE	07BC005		X		X			X
78	STIRLING LAKE OUTFLOW NEAR STIRLING	05AF029	X			X			X
79	STURGEON LAKE AT WILLIAMSON PARK	07GH003		X		X			X
80	STURGEON RIVER AT ST. ALBERT	05EA002	X			X			X



MAJOR CLASSIFICATION - PROVINCIAL
 SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORM
OPERATED BY - WATER SURVEY OF CANADA, CALGARY DISTRICT									
81	STURGEON RIVER NEAR VILLENEUVE	05EA005	X				X		X
82	SYLVAN LAKE AT SYLVAN LAKE	05CC003		X		X			X
83	TRAPP CREEK NEAR LONGVIEW	05BL027	X			X			X
84	TROUT CREEK NEAR GRANUM	05AB005	X			X			X
85	UNNAMED CREEK NEAR FORT MACKAY	07DA011	X			X		X	
86	UTIKUMA LAKE NEAR NIPISI	07JA001		X		X			X
87	VERMILION RIVER NEAR MANNVILLE	05EE001	X			X			X
88	VERMILION RIVER NEAR VEGREVILLE	05EE003	X			X			X
89	VERMILION RIVER TRIBUTARY NEAR BRUCE	05EE006	X			X			X
90	WAIPOROUS CREEK BELOW MEADOW CREEK	05BG009	X			X			X
91	WAMPUS CREEK NEAR HINTON	07AF003	X		X	X			X
92	WATERTON RIVER NEAR GLENWOOD	05AD028	X				X		X
93	WATERTON-BELLY DIVERSION CANAL	05AD027	X			X			X
94	WESTERN IRRIGATION DISTRICT CANAL B NEAR HEADGATE	05BM017	X			X			X
95	WILLOW CREEK BELOW LANE CREEK	05AB039	X			X			X
96	WILLOW CREEK NEAR CLARESHOLM	05AB021	X				X	X	X
97	WINAGAMI LAKE AT SPILLWAY GATES	07BF006		X		X			X
OPERATED BY - ALBERTA GOVERNMENT									
1	BIG POINT CHANNEL BELOW DIVERGENCE	07DD006	MISC	X			X		X
2	BRIDLEBIT CREEK NEAR VALLEYVIEW	07GF005	MISC	X		X	X		X
3	EMBARRAS RIVER BELOW DIVERGENCE	07DD003	MISC	X			X		X
4	FLETCHER CHANNEL BELOW DIVERGENCE	07DD004	MISC	X			X		X
5	GOOSE ISLAND CHANNEL BELOW DIVERGENCE	07DD005	MISC	X			X		X
6	HORSE CREEK NEAR VALLEYVIEW	07GF007	MISC	X		X	X		X
7	JACKFISH CREEK ABOVE ATHABASCA RIVER	07DD009	MISC	X		X			X
8	LAKE ATHABASCA AT BUSTARD ISLAND	07MD002			X		X		X
9	MAMAMI LAKE AT POPLAR ISLAND	07KF003			X		X		X
10	PRAIRIE RIVER NEAR LAKE CLAIRE	07KF014	MISC	X		X			X
11	RICHARDSON LAKE AT THE OUTLET	07DD008			X		X		X
12	RIVIERE DES ROCHERS AB. CONFLUENCE REVILLON COUPE	07NA003			X				X
13	RIVIERE DES ROCHERS AT BEN HOULE'S CABIN	07NA002	MISC	X			X		X
14	ROCKY CREEK NEAR VALLEYVIEW	07GF006			X	X			X
15	SPRING CREEK (UPPER) NEAR VALLEYVIEW	07GF004			X	X			X
16	WOLVERINE CREEK NEAR VALLEYVIEW	07GF003		X		X	X		X

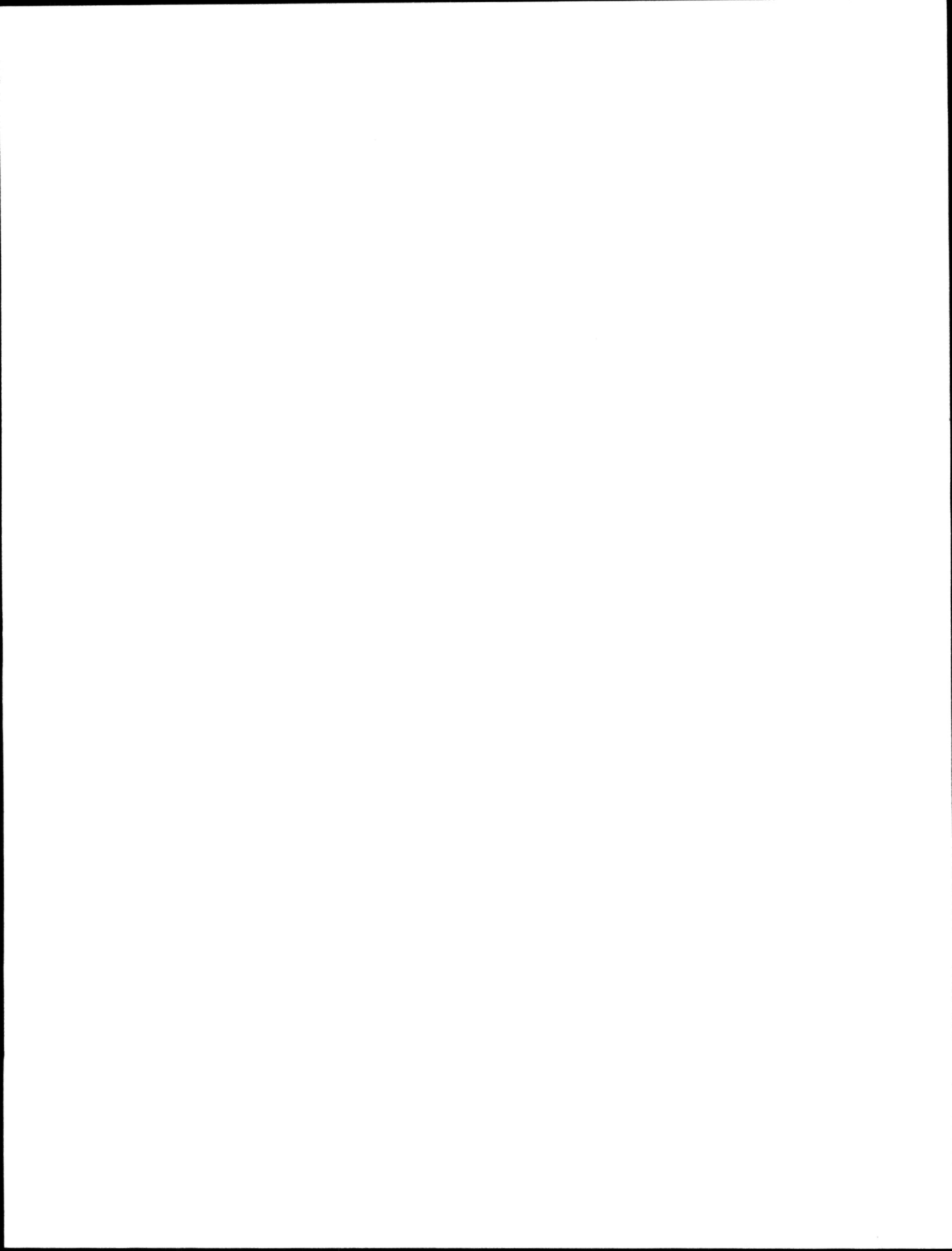


MAJOR CLASSIFICATION - CONTRIBUTED DATA
 SUBCLASSIFICATION -

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL

OPERATED BY - VARIOUS ORGANIZATIONS									

1	BARRIER LAKE NEAR SEEBE	058F024		X			X		X
2	BOW RIVER NEAR SEEBE	058E004		X			X		X
3	BRAZEAU RESERVOIR	05D0006		X			X		X
4	BRAZEAU RIVER BELOW BRAZEAU PLANT	05D0005	X				X		X
5	CASCADE POWER DIVERSION NEAR BANFF	058D004	X				X		X
6	GHOST LAKE NEAR COCHRANE	058E005		X			X		X
7	GHOST RIVER DIVERSION TO LAKE MINNEWANKA	058G003	X				X		X
8	GHOST RIVER NEAR BLACK ROCK MOUNTAIN	058G002	X			X			X
9	GOAT CREEK AT BANFF PARK BOUNDARY	058C008	X				X		X
10	KANANASKIS RIVER BELOW BARRIER DAM	058F025	X				X		X
11	KANANASKIS RIVER ABOVE POCATERRA CREEK	058F003	X				X		X
12	LAKE ABRAHAM NEAR NORDEGG	05D0009		X			X		X
13	LAKE MINNEWANKA NEAR BANFF	058D003		X			X		X
14	LOWER KANANASKIS LAKE AT POCATERRA DAM	058F009		X			X		X
15	MUD LAKE DIVERSION CANAL	058F013	X			X			X
16	NORTH SASKATCHEWAN RIVER BELOW BIGHORN PLANT	05DC010	X				X		X
17	SPRAY POWER DIVERSION AT CANMORE	058E007	X				X		X
18	SPRAY RESERVOIR AT THREE SISTERS DAM	058C006		X			X		X
19	UPPER KANANASKIS LAKE AT MAIN DAM	058F005		X			X		X
20	WABAMUN LAKE AT WABAMUN	05DE002		X			X		X

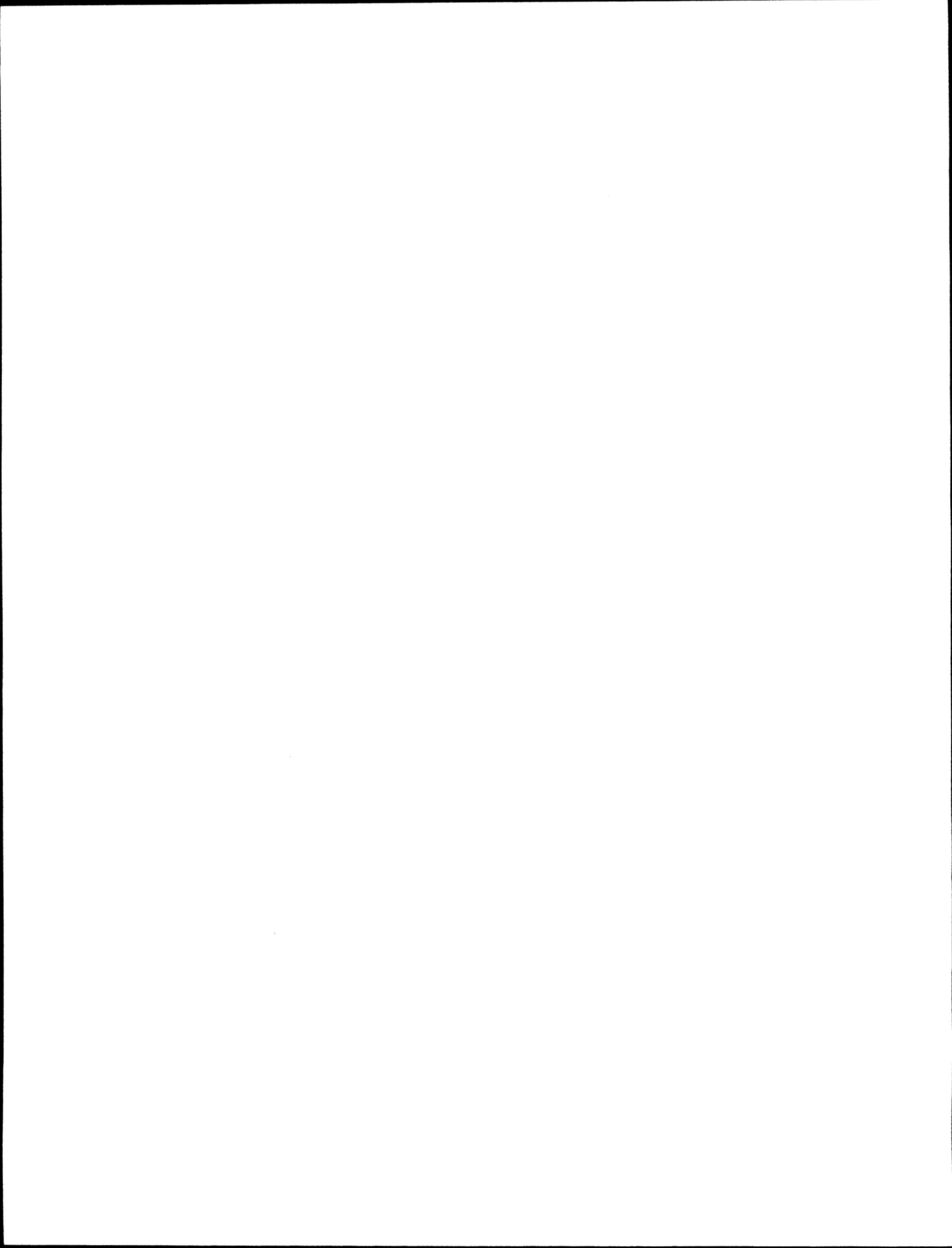


A P P E N D I X "B"

SCHEDULE "B"

COSTING PROCEDURE

COMPUTATION OF ALBERTA SHARE



CALCULATION OF ANNUAL PAYMENTS

A. COSTING PROCEDURE

Schedule "B" of the Memorandum of Agreement (included in the National Report) outlines the items to be included in the computation of the annual payment.

I. Water Quantity Stations

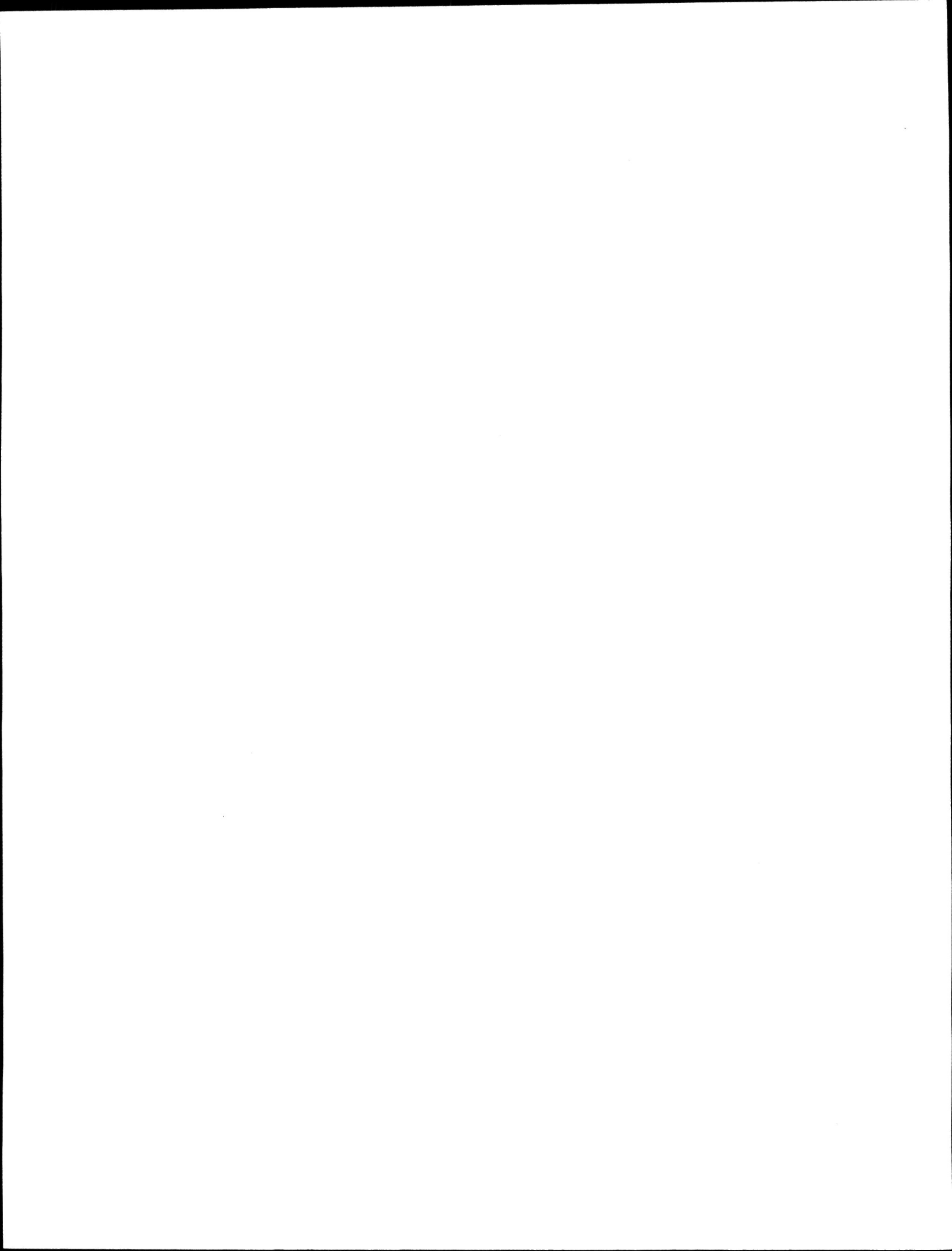
The costs shared include only the salaries and expenses of the staff directly involved in the field and office in the collection and compilation of water quantity data. Depreciation, operation, and maintenance of field transportation and equipment are included costs.

II. Sediment Stations

In the case of sediment stations, the cost of sample analysis is added to the costs outlined in I above.

III. New Construction, Major Maintenance and Reconstruction

Construction costs include both new construction and major maintenance and are shared on the basis of station classification as being 'Federal', 'Federal-Provincial' or 'Provincial'. If a station is classed as 'Federal-Provincial' the cost would be shared fifty-fifty; otherwise 100% to either DOE or Alberta. Water level instrumentation is at the expense of the agency operating the station irrespective of classification; special instrumentation (telemark, data platform) is a cost to the party requiring the service.



B. APPLICATION OF PROCEDURE

The cost of operations varies as to the type and duration of records so standard units have been developed and assigned. The figures used are based on experience over the years and have been adopted as standards in the Western and Northern Region.

I. Normal Access

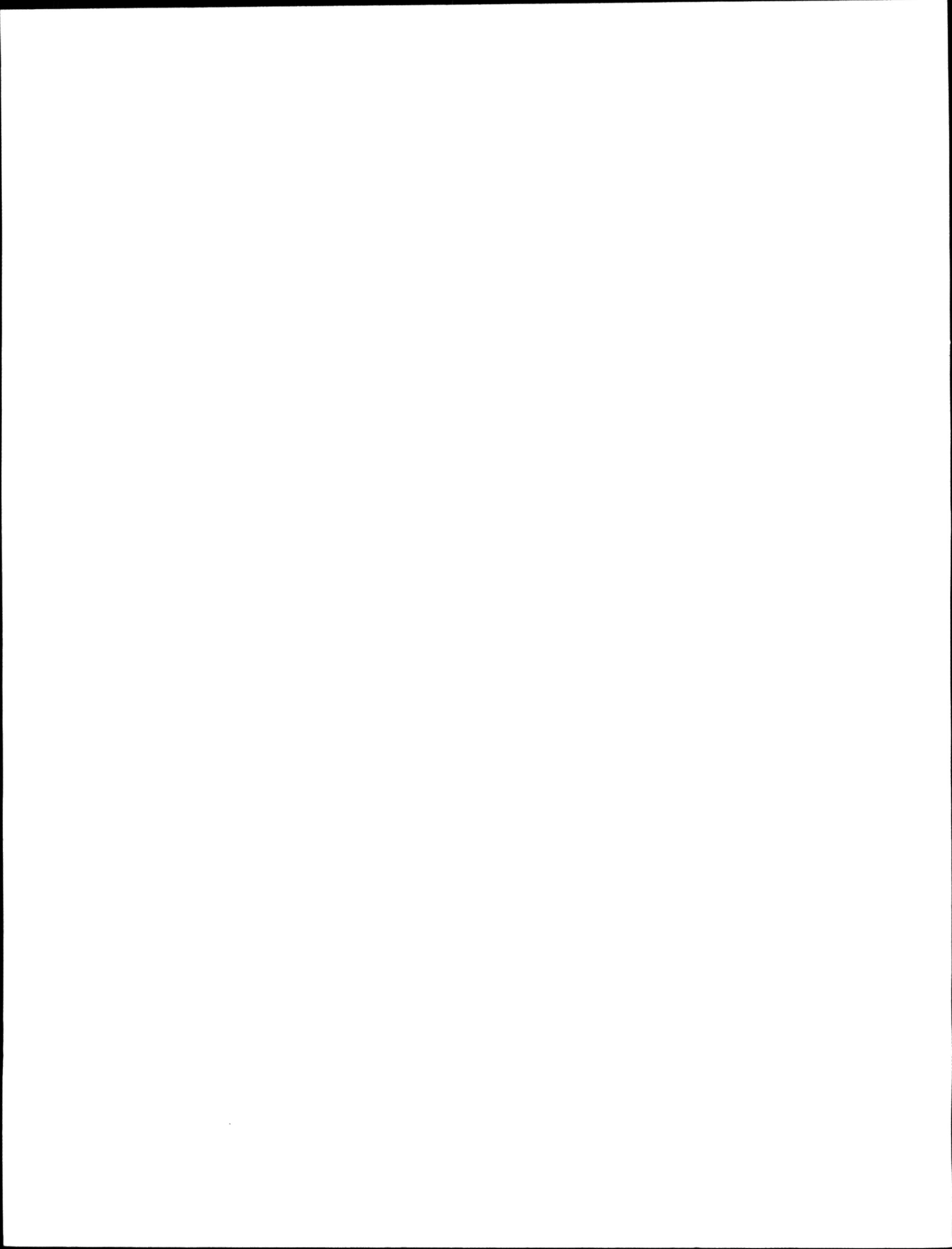
A twelve month discharge station defines the hydrologic regime under both ice cover and open water. The period of operation for an eight month discharge station is normally March 1 to October 31 and is intended to define the period beginning with snowmelt runoff to freezeup in the fall.

<u>Weight Factor</u>	<u>Type of Station</u>
1.00	12 month discharge
0.75	8 month discharge
0.40	12 month water level
0.25	8 month water level

II. Remote Access

Salary and operation costs, excluding aircraft charter for remote areas are 1.15 times those for normal access stations. This is to account for additional preparation and travelling time on a field trip and operational and maintenance problems in a sparse network located in a harsh environment. Weighting factors have, therefore, been assigned as follows:

<u>Weight Factor</u>	<u>Type of Station</u>
1.15	12 month discharge
0.85	8 month discharge
0.45	12 month water level
0.30	8 month water level



III. Sediment Stations

The third category of stations requiring weighting factors is sediment stations. A review of the previous annual cost-sharing reports for Alberta indicated the average cost of a normal access sediment station was 2.4 times that of a hydrometric station. This weighting factor is then applied to the aforementioned weighting factors for normal and remote access stations except research basins, where a lower weighting factor is applied as the sediment program in these small watersheds is not as time consuming as on a major river. The resultant sediment weighting factors are:

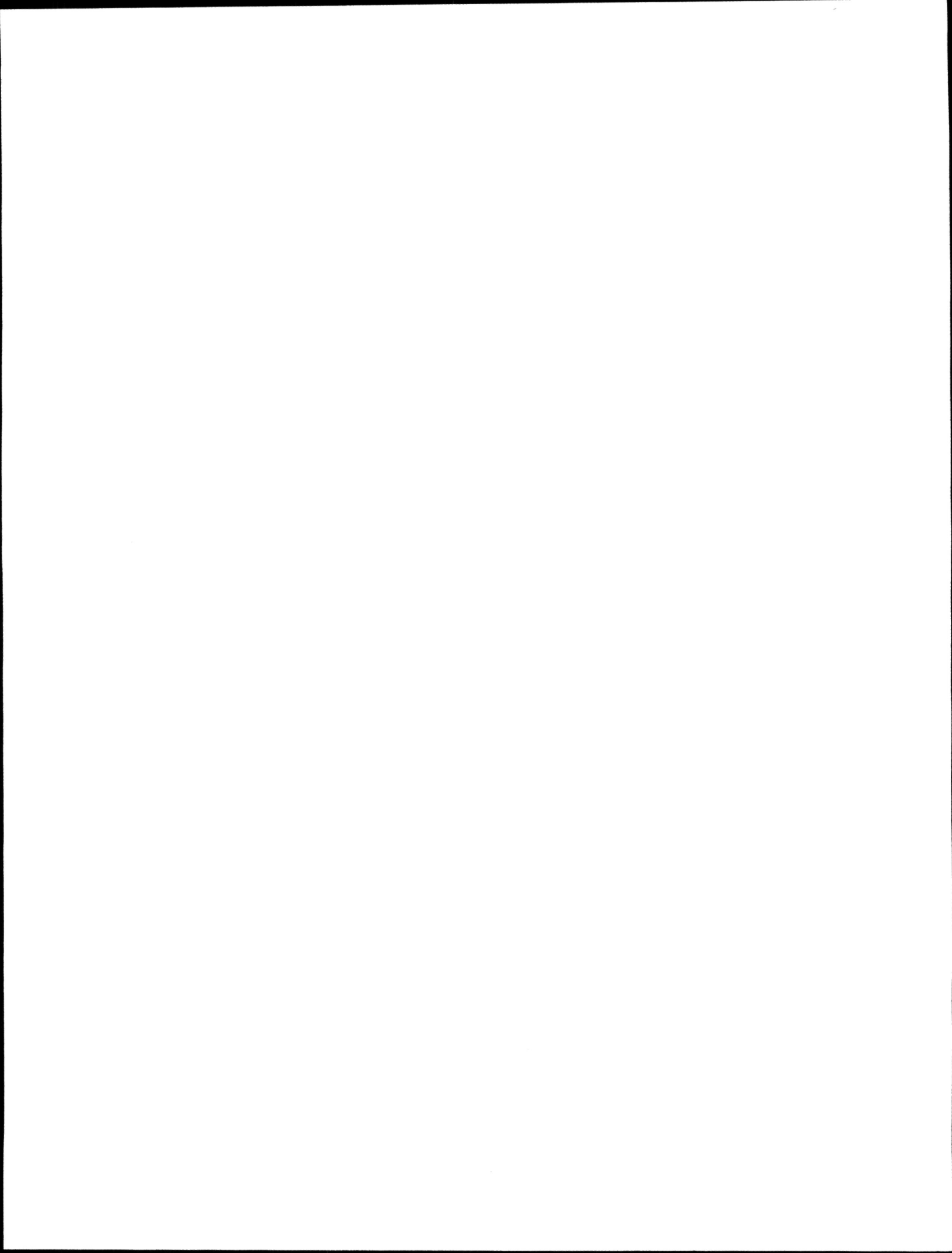
<u>Weight Factor</u>	<u>Type of Station</u>
2.40	12 month normal access
1.80	8 month normal access
2.75	12 month remote access
2.10	8 month remote access
1.30	12 month research
1.20	8 month research

C. SPECIAL CONSIDERATIONS

Due to the complexity of the operation and the requirements for various values and numbers throughout this report, it is necessary to apply a number of practical considerations which are described as follows:

I. Stations Operated by Saskatchewan

Ten F-3 stations in Alberta are operated by the Saskatchewan District. These stations and their operations costs have not been included in Table I of this Appendix as they are of no value in computing the provincial share. The effect of neglecting these stations is that the federal share shown is less than the actual federal share.



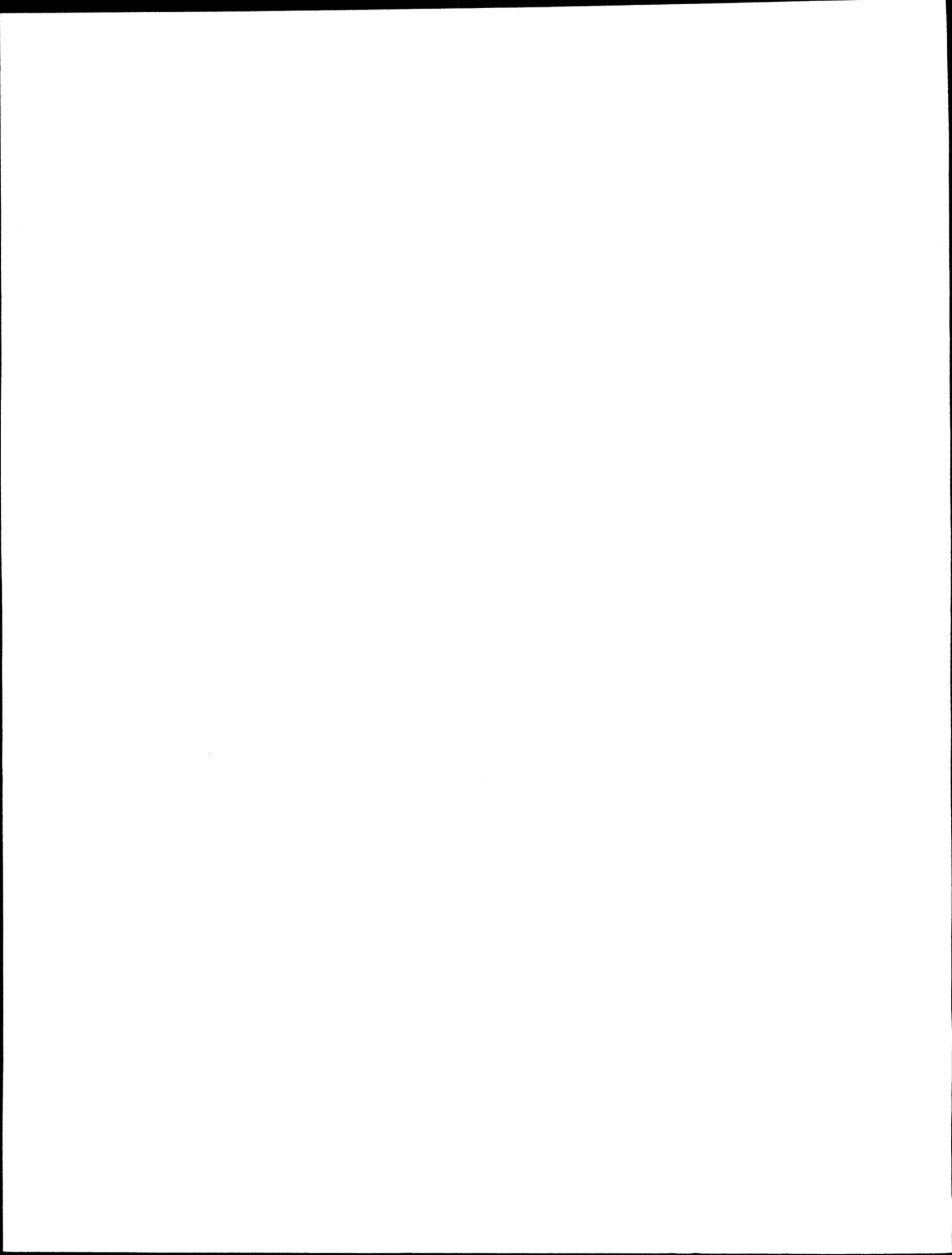
Although these stations have not been utilized in the costing, they are included in Tables 1, 2 and 3 of the main body of this report, which summarizes the hydrometric network in Alberta.

II. Stations Operated in Alberta by Ft. Smith Sub-office

Five stations within Alberta were operated by the Ft. Smith sub-office and as the Ft. Smith salaries and O&M to operate this network are not readily available from accounting statements, it was necessary to determine these costs based on Alberta costs. The five stations operated by Ft. Smith are included in the 346.00 weighted units and comprise 7.35 of these weighted units. The Ft. Smith weighted units were subtracted from the total weighted units and the resultant value of 338.65 weighted units (i.e. $346.00 - 7.35 = 338.65$) was divided into the total Alberta O&M costs of \$308 530 to determine a unit O&M of \$911.05 and total salaries of \$547 802 to determine a unit salary of \$1617.60. These unit values were then multiplied by the 7.35 weighted units to determine the Ft. Smith O&M costs of \$6 696 and salary costs of \$11 889 which were then added to the aforementioned Alberta salary and O&M costs to obtain the total costs shown in Table I.

III. Sediment Stations

The costs of the full program sediment stations shown in the 'Summary of Financial Considerations' in the main body of the report, is the 'incremental' cost of operating a sediment station over a hydrometric station. Therefore, these operational costs were determined by ascertaining the incremental weighted units (i.e. incremental weighted unit of a 12 month normal access sediment station is 1.40) for each



category and multiplying these 'incremental' weighted units by the One Unit amount of \$2 528.65. It was necessary to separately categorize and cost the stations in the Lesser Slave Lake Area and the rationale for this is provided in the 'Summary of Financial Considerations'. Also, sediment laboratory costs for miscellaneous sediment stations have been separately categorized and costed in the 'Summary of Financial Considerations.

IV. Depreciation

Depreciation was determined by utilizing standard accounting and 'national' procedure. At the current time there are some minor differences in the 'national' procedures applied for each province and these are currently being addressed to ensure standardization on a national basis. The total depreciation costs shown in the 'Summary of Financial Considerations' was pro rated, based on the respective Federal and Alberta shares of hydrometric and sediment operations to determine the respective Federal and Alberta share of depreciation.

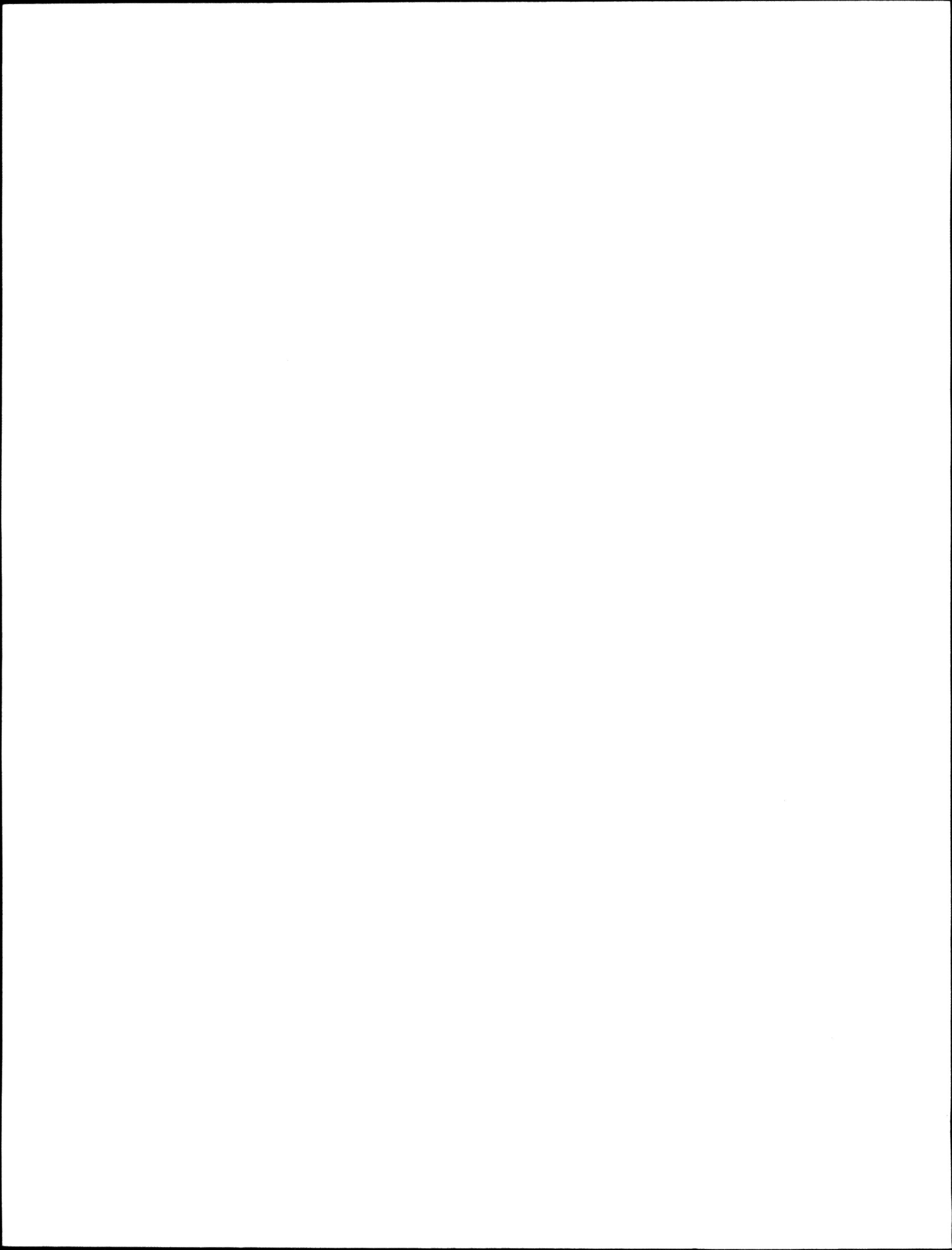


TABLE I
HYDROMETRIC & SEDIMENT COSTINGS FOR 1980-81 (Stations Operated by WSC Only)

Category	Months of Record	Number of Stations	Weight Factor	Weighted Units	Salaries	O & M	TOTAL	Share	
								Federal	Provincial
<u>FEDERAL</u>									
Normal Access Flow	12	25	1.00	25.00					
	8	59	0.75	44.25					
Normal Access W.L.	12	5	0.40	2.00					
Remote Access Flow	12	5	1.15	5.75					
Normal Access Sediment	12	12	2.40	28.80					
Remote Access Sediment	12	1	2.75	2.75					
	8	2	2.10	4.20					
Sub-total		109		112.75	182 384	102 722	285 106	285 106	-
<u>FEDERAL-PROVINCIAL</u>									
Normal Access Flow	12	41	1.00	41.00					
	8	133	0.75	99.75					
Normal Access W.L.	12	2	0.40	0.80					
Remote Access Flow	12	8	1.15	9.20					
Remote Access W.L.	8	1	0.30	0.30					
Normal Access Sediment	12	5	2.40	12.00					
	8	2	1.80	3.60					
Remote Access Sediment	12	2	2.75	5.50					
Sub-total		194		172.15	278 470	156 839	435 309	217 655	217 654
<u>PROVINCIAL</u>									
Normal Access Flow	12	9	1.00	9.00					
	8	50	0.75	37.50					
Normal Access W.L.	12	1	0.40	0.40					
	8	30	0.25	7.50					
Remote Access Flow	12	3	1.15	3.45					
Sediment Research	8	1	0.85	0.85					
	8	2	1.20	2.40					
Sub-total		96		61.10	98 837	55 665	154 502	-	154 502
TOTAL		399		346.00	559 691	315 226	874 917	502 761	372 156

Unit O&M = \$911.05 Unit Salary = \$1 617.60 One Unit = \$2 528.65

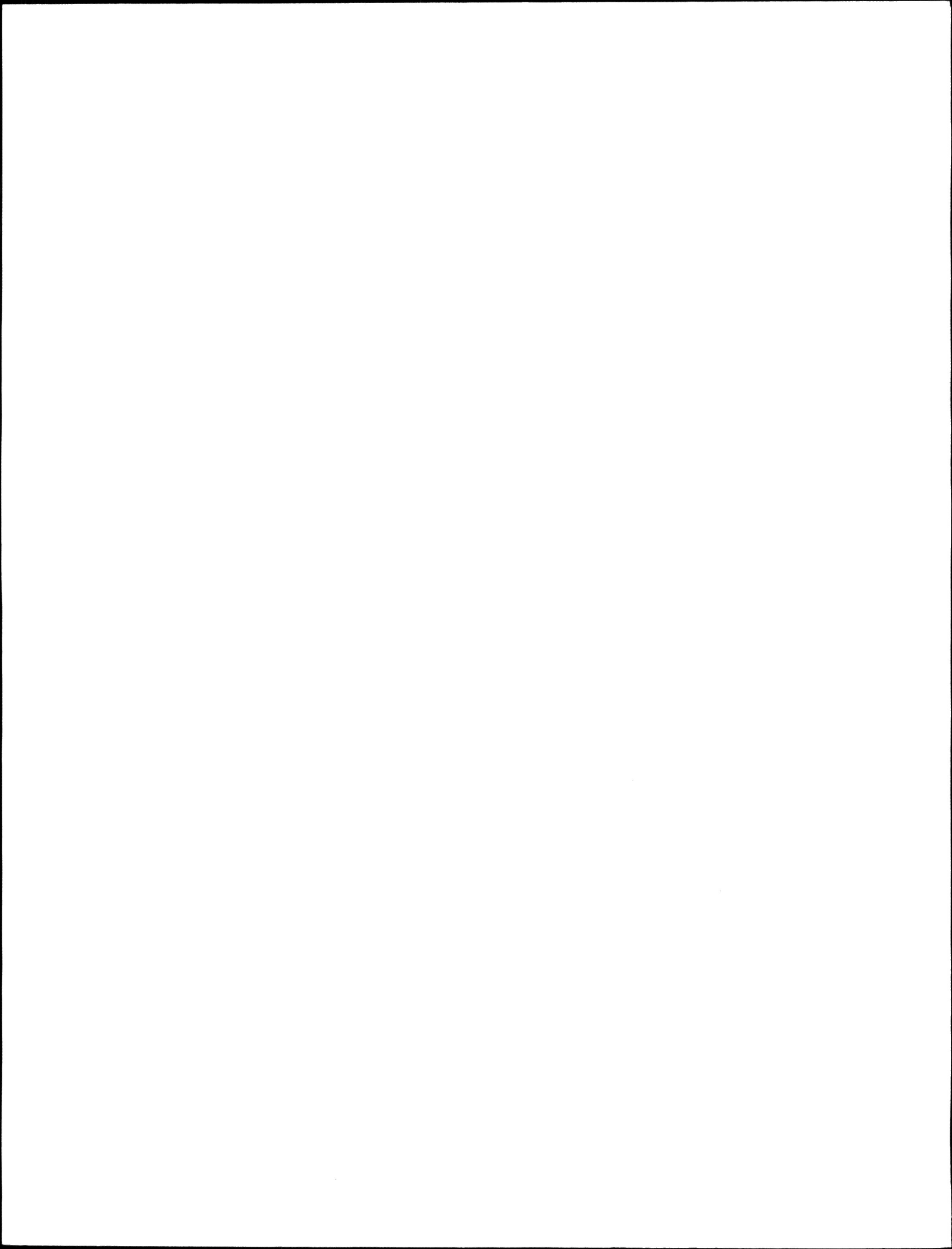
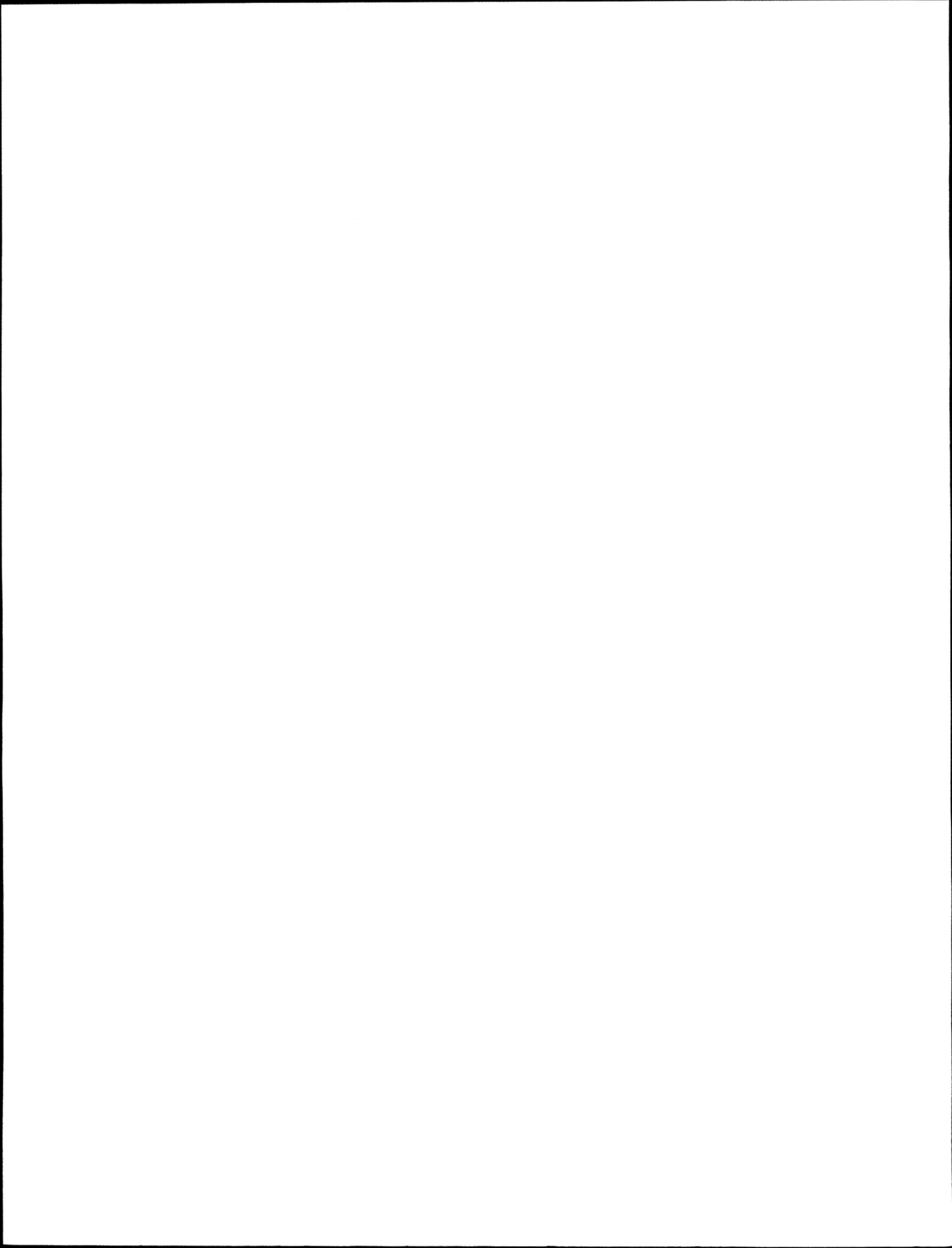


TABLE II
SUMMARY OF CONSTRUCTION COSTS - ALBERTA
1980-81

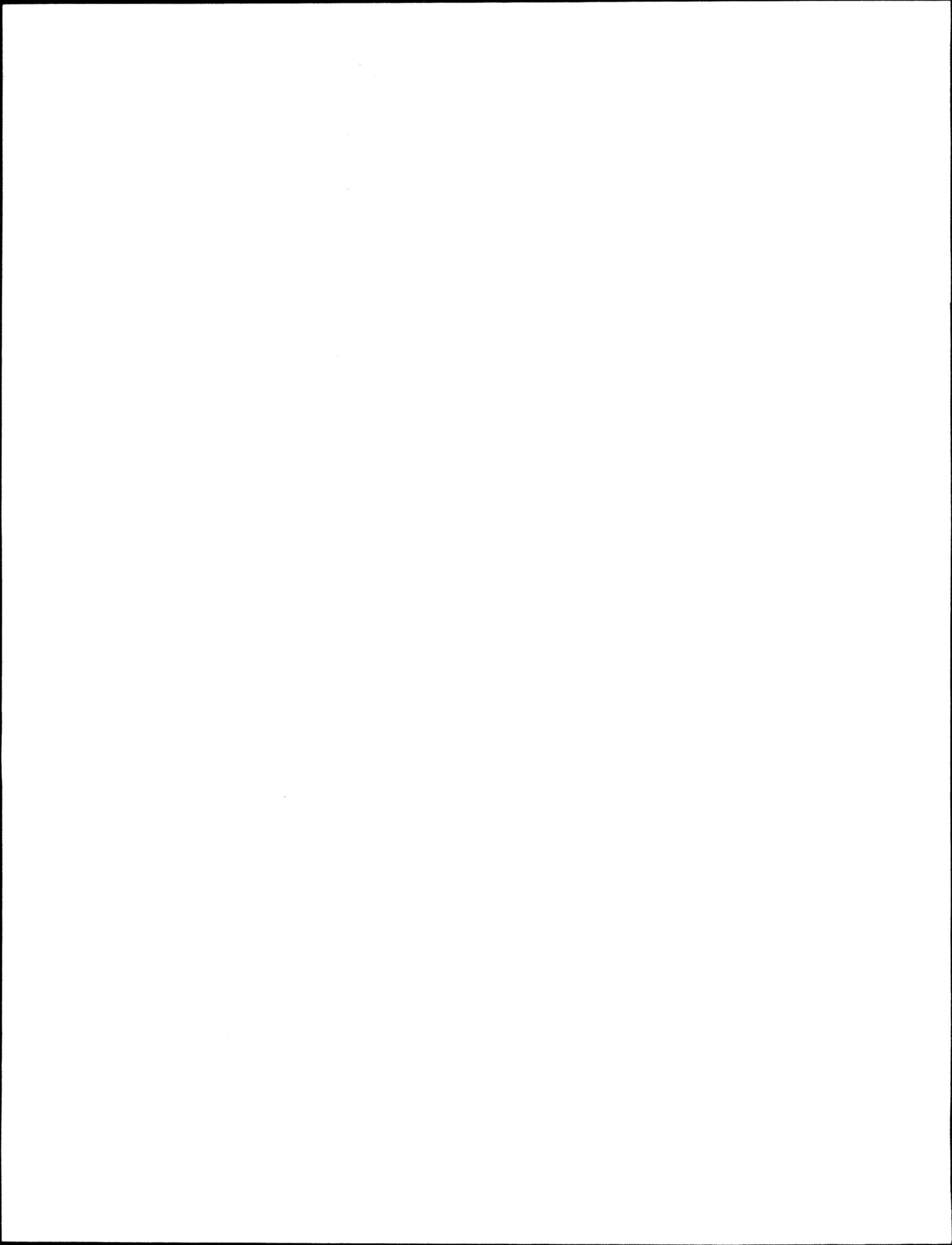
Station	Construction Cost	Instrumentation Federal	Share	
			Provincial	Federal
<u>Federal-Provincial</u>				
C-1 Bullpound Creek near Watts (05CG004)	1 840.36	2 060.00		
C-2 Ethel Lake near Cold Lake (06AC004)	2 257.91	5 030.00		
C-3 Flat Creek near Boyle (07CA003)	4 544.66	2 060.00		
C-4 Marie Lake near Cold Lake (06AC005)	2 577.76	5 030.00		
	\$11 220.69	\$14 180.00	\$ 5 610.34	\$19 790.35
M-1 Brown Creek at Forestry Road (05DD004)	1 309.78			
M-2 Buffalo Creek at Highway 41 (05FE002)	1 335.52			
M-3 Bullpound Creek near Hanna (05CG002)	233.65			
M-4 Castle River at Ranger Station (05AA028)	301.73			
M-5 Clear River near Bear Canyon (07FD009)	1 352.73			
M-6 Elbow River at Bragg Creek (05BJ004)	458.47			
M-7 Jumping Pound Crk. near the Mouth (05BH009)	386.94			
M-8 Keg River at Highway 35 (07HF002)	526.24			
M-9 Lalby Creek near Girouxville (07GJ005)	397.39			
M-10 Lloyd Creek near Bluffton (05CC009)	2 644.29	2 060.00		
M-11 Meadow Creek near the Mouth (05AB029)	634.39			
M-12 Mill Creek near the Mouth (05AA011)	466.90			
M-13 Muskeg River near Grande Cache (07GA002)	941.93			
M-14 Oldman River at Waldron's Corner (05AA023)	432.94			
M-15 Pipestone R. below Bigstone Creek (05FA022)	898.58			
M-16 Red Deer River at Drumheller (05CE001)	735.14			
M-17 Rose Creek near Alder Flats (05DE007)	5 765.30	5 030.00		
M-18 Sheep River at Turner Valley (05BL014)	100.00			
M-19 Sturgeon R. near Fort Saskatchewan (05EA001)	6 549.22	2 060.00		
M-20 Wainscott Coulee near Brownvale (07FD014)	552.19			
M-21 Waskahigan River nr the Mouth (07GG001)	677.00			
M-22 West Prairie R. nr High Prairie (07BF002)	5 906.63	5 030.00		
M-23 Whitemud Creek near Dixonville (07HA005)	1 947.69			
	\$34 554.65	\$14 180.00	\$17 277.32	\$31 457.33
<u>Federal</u>				
C-5 Dry Coulee near Magrath (05AE041)	150.00	2 060.00		
	\$ 150.00	\$ 2 060.00		\$ 2 210.00
M-24 Antelope Coulee Spillway (05BN010)	6 032.15			
M-25 Baker Creek near the Mouth (05BA007)	586.97			
M-26 Bow River Development Main Canal (05AC004)	172.12			
M-27 Bow River below Hector Lake (05BA008)	1 745.86			
M-28 Forty Mile Creek near Banff (05BB003)	802.31			
M-29 Lesser Slave River at Highway 2 (07BK006)	1 151.82			
M-30 McLeod River near Wolf Creek (07AG001)	863.32			
M-31 Milk R. at Writing-on-Stone Park (11AA034)	598.85			
M-32 Milk River at Western Crossing (11AA025)	438.15			
M-33 Milk R. near Pendant D'Orielle (11AA035)	683.05			
M-34 Notikewan River at Manning (07HC001)	676.97			
M-35 Pipestone River at Lake Louise (05BA002)	1 085.37			
M-36 Waterton River at Waterton Park (05AD003)	2 750.00			
	\$17 586.94			\$17 586.94
<u>Provincial</u>				
C-7 Moore Lake near Cold Lake (06AC002)	2 322.20	5 030.00		
C-8 Moose Lake River near Franchere (06AC006)	4 142.67	2 060.00		
C-9 Porter Creek above Baptiste Lake (07BE003)	6 012.38	2 060.00		
C-12 Snake Creek near Vulcan (05AC030)	3 826.22	2 060.00		
C-13 South Heart Reservoir nr McLennan (07BF008)	2 929.61	5 030.00		
C-14 Teepee Creek near LaCrete (07JD004)	4 110.95	2 060.00		
C-15 Western Irrigation District Canal "B" near Headgate (05BM017)	1 979.65			
	\$25 323.68	\$18 300.00	\$25 323.68	\$18 300.00
<u>Ross Creek Basin</u>				
C-6 Cavan Lake Diversion nr Dunmore (05AH044)	2 883.53	2 060.00		
C-10 Ross Creek at Outlet Elkwater Lk. (05AH046)	4 004.95	2 060.00		
C-11 Ross Crk. Diversion Canal nr Irvine (05AH045)	3 838.81	2 060.00		
	\$10 727.29	\$ 6 180.00	\$10 727.29	\$ 6 180.00
M-37 McLeod River near Whitecourt (07AG004)	1 054.90			
M-38 Moosehills Creek near Elk Point (05ED003)	5 236.93	2 060.00		
M-39 Pembina River near Entwistle (07BB002)	774.65			
M-40 Six Mile Coulee Spillway (05AD020)	657.21			
M-41 Vermilion R. Tributary nr Bruce (05EE006)	4 254.73	2 060.00		
M-42 Waterton-Belly Diversion Canal (05AD027)	283.14			
M-43 Wampus Creek near Hinton (07AF003)	504.37			
M-44 Western Irrigation Dist. Canal "A" near Headgate (05BM016)	220.40			
	\$12 986.33	\$ 4 120.00	\$12 986.35	\$ 4 120.00
T O T A L:	\$112 549.58	\$59 020.00	\$71 924.96	\$99 644.62

C = Construction
M - Maintenance



A P P E N D I X "C"

SCHEDULE "D"



SCHEDULE "D"

This schedule provides a summary of the annual payment. The details of the calculations for operation and construction are available and have been jointly reviewed by officers of each party.

ANNUAL PAYMENT FOR 1980-81 TO BE PAID TO CANADA BY ALBERTA:

	<u>Operation</u>	<u>Construction</u>	<u>Total</u>
a) Streamflow and water level installations	\$ 279.0K	\$ 88.0K	\$367.0K
b) Sediment installations	23.0K		<u>23.0K</u>
		ANNUAL PAYMENT	<u>\$390.0K</u>

NOTE:

Where either party has more than one agency involved in financing the water quantity survey program, the annual payment may be expanded to reflect each agency's portion of the ANNUAL PAYMENT.

During 1980-81 helicopter expenses in the AOSERP area will be paid directly by AOSERP up to an amount of \$30K. These costs are not included in this schedule.

Administrator for Province

Administrator for Canada

(signature)

(signature)

Assistant Deputy Minister

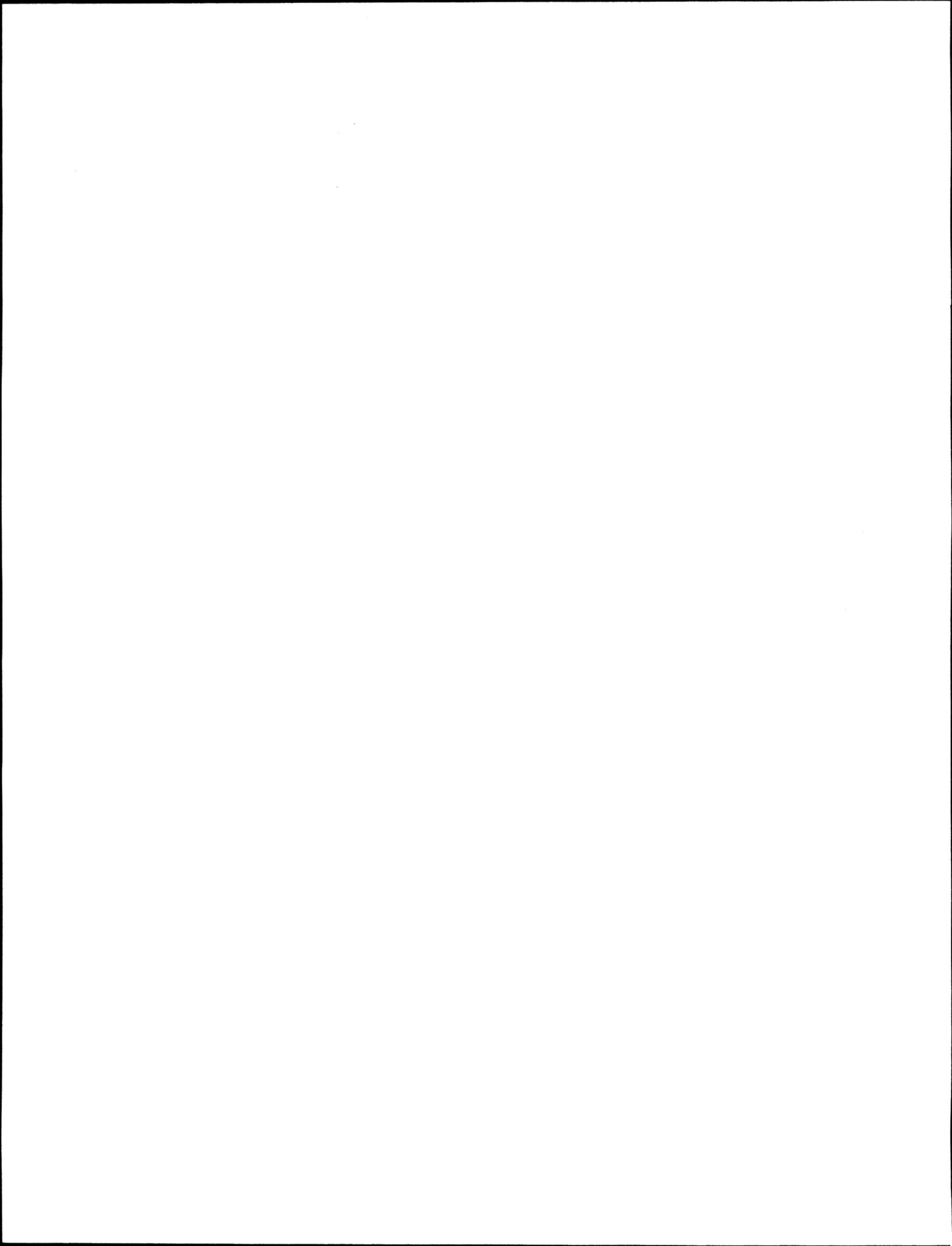
Regional Director

Environmental Engineering
Support Services

Inland Waters Directorate

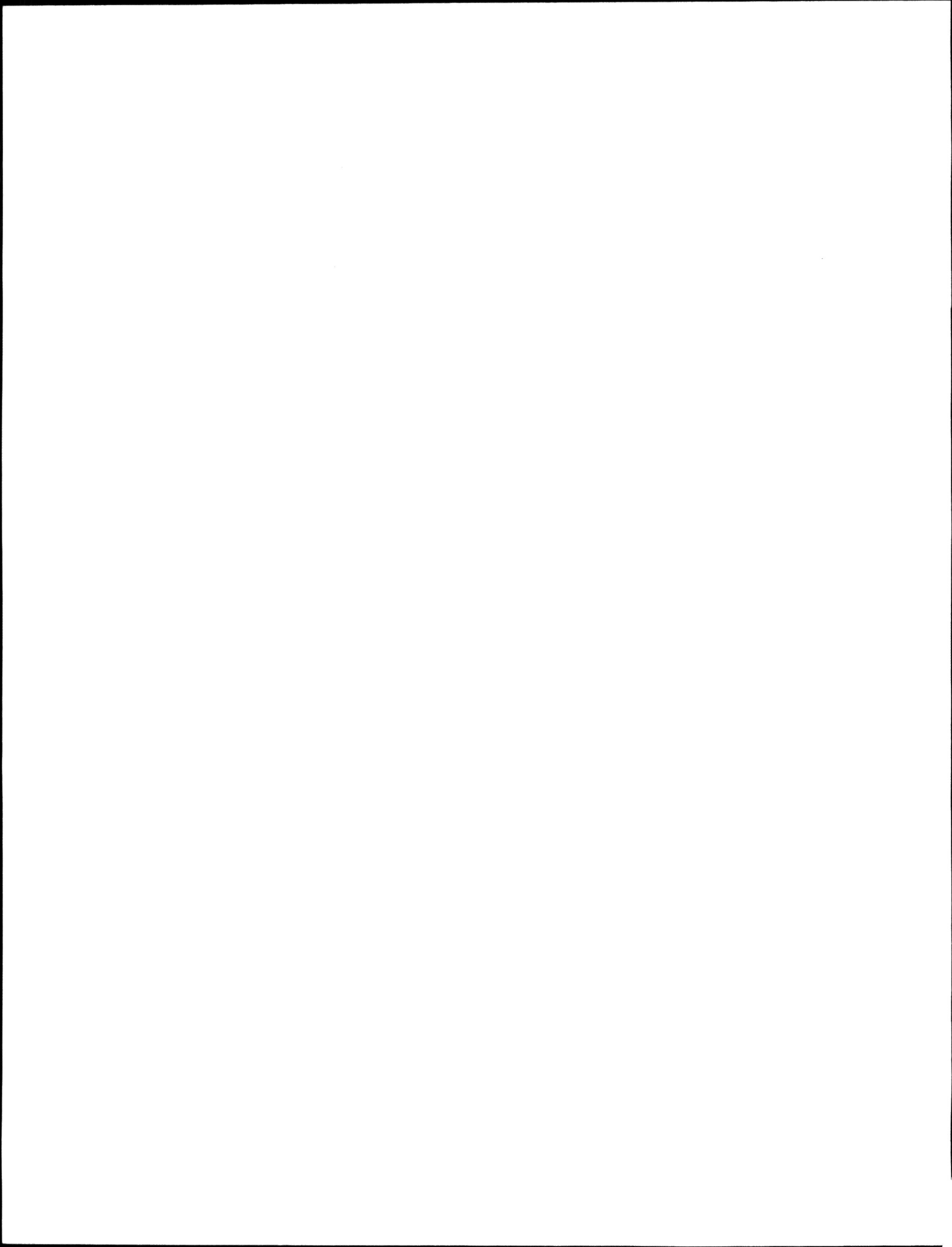
ALBERTA DEPARTMENT OF ENVIRONMENT

ENVIRONMENT CANADA



A P P E N D I X "D"

ESTIMATE OF ALBERTA
ANNUAL PAYMENT FOR 1982-83
BASED ON PROCEDURES
FOR PREPARATION OF
ANNUAL PAYMENTS (SCHEDULE "C").



ESTIMATED COSTS TO ADOE
For Hydrometric and Sediment Operations
in 1982/83

1) Total Operating Costs (includes Sediment & Depreciation) in 1980/81 = \$410 668

Total Estimated Operating Costs (for same network)
in 1981/82 = 10% of \$410 668 = \$41 067 + \$410 668 = \$451 735.
(See p. 29 of 1980/81 cost-sharing report).

Total Estimated Operating Costs (for same network)
in 1982/83 = 10% of \$451 735 = \$45 174 + \$451 735 = \$496 909.

2) Operating Cost Changes for Additional Stations in Network:

Unit Costs in 1980/81 = \$2 528.61

Est. Unit Cost in 1981/82 = 10% of \$2 528.61 + \$2 528.61 = \$2 781.47

Changes for 1981/82

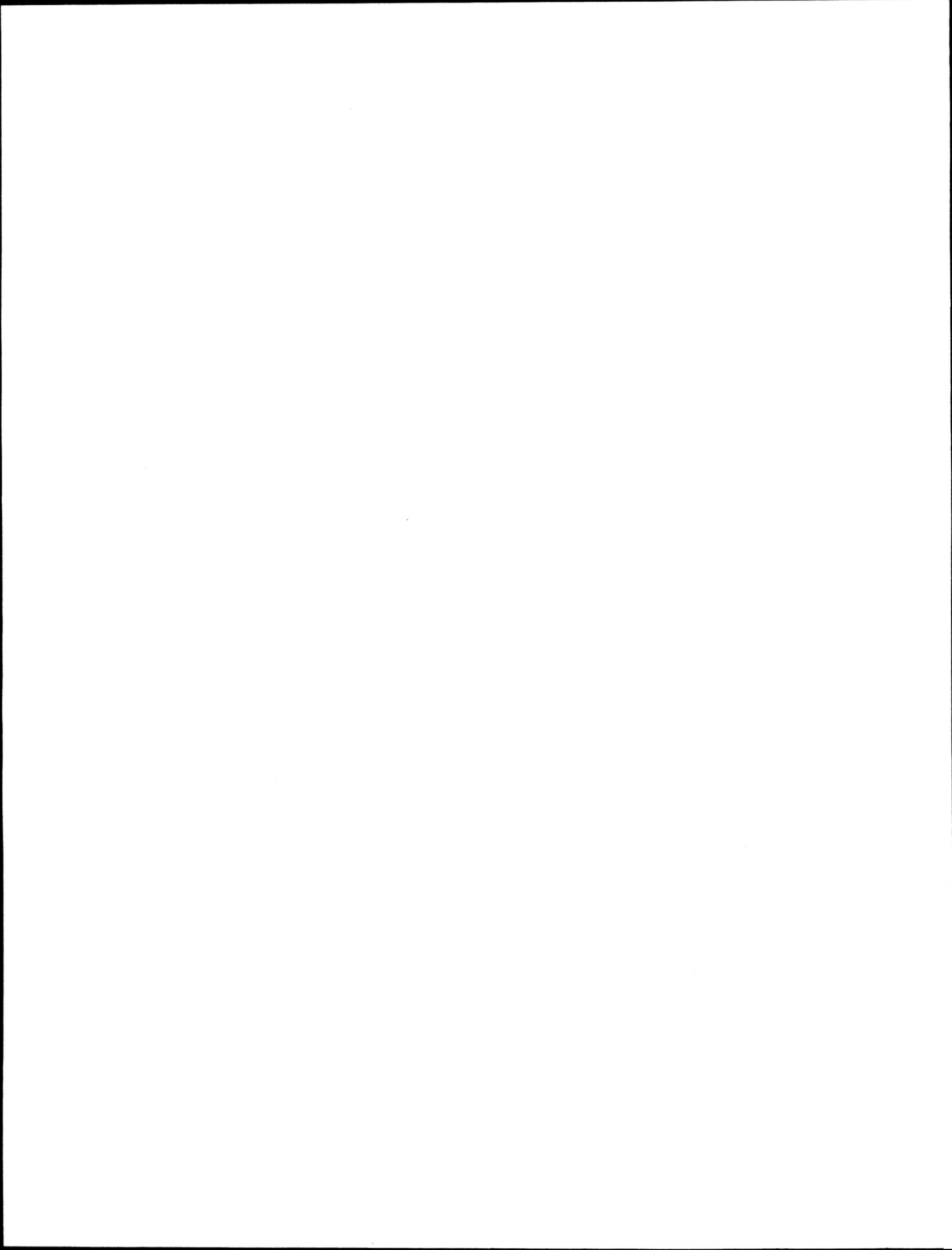
+	2	F-P	-	WL Seasonal	= 2 x 1/2 (0.25 x 2 781.47)		= \$ 695.37
+	5	P	-	Q Seasonal	= 5 (0.75 x 2 781.47)		= \$10 430.51
+	3	P	-	WL Seasonal	= 3 (0.25 x 2 781.47)		= \$ 2 086.10
+	1	P	-	12Q	= 1 (1.00 x 2 781.47)		= \$ 2 781.47
							<u>\$15 993.45</u>

10% inflation rate to operate these in 1982/83
= \$1 599.35 + \$15 993.45 = \$17 592.80

Estimates Unit Cost for 1982/83 = \$2 781.47 + 10% of \$2 781.47 = \$ 3 059.62

Changes for 1982/83

+	2	12-month Q Remote	F-P	= 2(1/2)(1.15)(3 059.62)		= \$ 3 518.56	
				+Helicopter		\$ 5 000.00	
+	3	S-Q	F-P	= 3(1/2)(.75)(3 059.62)		= \$ 3 442.07	
+	8	S-Q	P	= 8(.75)(3 059.62)		= \$18 357.72	
+	1	S-WL	P	= 1(.25)(3 059.62)		= \$ 764.90	
+	1	12-month Q	P	= 1(1)(3 059.62)		= \$ 3 059.62	
+	1	12-month Q	F-P	= 1/2(1)(3 059.62)		= \$ 1 529.81	
							<u>\$35 672.68</u>



3) Increased costs for Sediment Network Reclassification

- In 1981/82 = \$ 9 315
 - In 1982/83 = \$ 9 315 + 10 (9 315) = \$10 250

4) Alberta Share of Milk River Sediment Study

- In 1981/82 = \$4 723
 - In 1982/83 = \$4 723 + 10 (4 723) = \$ 5 195

5) Estimated Alberta Share of Maintenance

- In 1982/83 = \$40 000

6) Total Alberta Share

\$496 909.00
 17 592.80
 35 672.68
 10 250.00
 5 195.00
40 000.00
 \$605 619.48

Less Alberta Credit
 for PAD \$ 35 000.00
 \$570 619.48

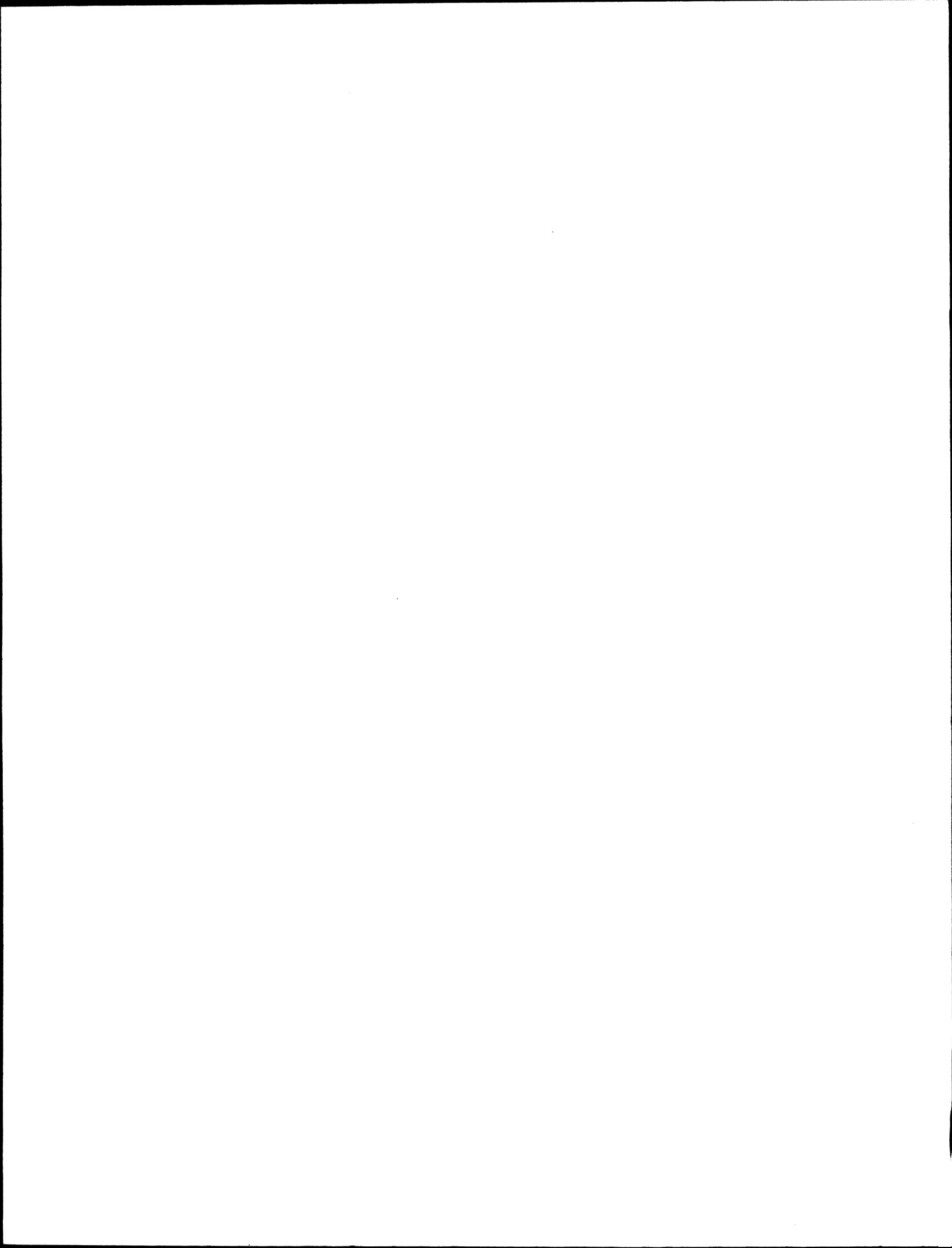
Less Alberta Credit
 for Spring Creek \$ 2 000.00
 Status F-P \$568 619.48

WSC assuring the operation of two
 ADOE stations in 1982/83
 S-P-Q 2 x (.75)(3 059.62) = \$ 4 589.43

Use Alberta Requirement = \$573K

In 1982/83 Alberta share of helicopter will be
 paid directly by WSC, so must be added to these costs:

Use Approximately \$25 000.00
 Total \$598K
 Use \$600K



Agr-ALTA-6

AUTHOR

WSC - Calgary.

TITLE CANADA-ALBERTA MEMORANDUM OF
AGRMT. FOR WATER QUANT. SURVEYS.

DATE DUE

BORROWER'S NAME

Annual Rept. - 1980/81.

