

CANADA - ALBERTA

MEMORANDUM OF AGREEMENT

FOR

WATER QUANTITY SURVEYS

ANNUAL REPORT 1990-91

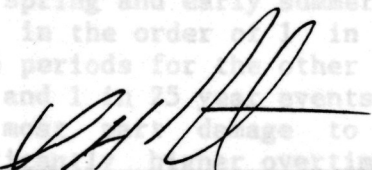
TO: R. A. Halliday
Administrator for Canada

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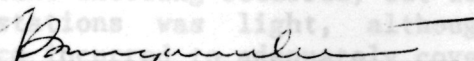
We hereby submit an annual report for fiscal year 1990-91 covering activities under the Memorandum of Agreement for Water Quantity Surveys for the Province of Alberta.

Government of Canada

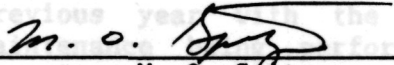
Province of Alberta



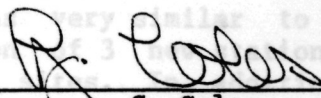
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EXECUTIVE SUMMARY

The Canada-Alberta Co-ordinating Committee only met once during the year but that meeting also involved the Administrators of the agreement. This meeting dealt with; program costs for the present and future, the network changes, the upcoming pilot project for modernizing hydrometric instrumentation, equipment and procedures, the Peace/Athabasca/Slave study implications as well as the implications of the Federal Government Green Plan. An informal mini Co-ordinating Committee Meeting was held among some of the members as a follow up to the actual meeting and as a prelude to the next formal meeting in 1991/92. This mini meeting was held to discuss scenarios for network and program adjustments to enable Water Survey of Canada (WSC) to operate the program in 1991/92 with the imposition of staff reductions.

The 1990/91 year was an exceptional year hydrologically speaking in that four separate and major flood events were recorded during the late spring and early summer. Two of the events generated streamflow peaks in the order of 1 in 100 year recurrence intervals while the return periods for the other two events were in the neighbourhood of 1 in 9 and 1 in 25 year events. Significant flooding occurred, but for the most part damage to gauging stations was light, although significantly higher overtime costs were incurred to adequately cover these runoff events. This was the first year in quite some time that annual runoff in the major basins in Alberta was near or exceeded the long term averages. The only exception to this was the recorded runoff in the Beaver River Basin where annual runoff volume was only 37% of normal.

The 1990/91 construction program was very similar to that of the previous year with the construction of 3 new stations and major maintenance being performed at 35 sites. In addition power was installed at 18 gauging stations which will further reduce the incidence of record loss due to well and intake freezing and will lessen the manual labour requirements of the hydrometric technologist.

During 1990/91, Alberta paid the Schedule "D" amount of \$1,008,350. Actual provincial costs, excluding costs for power installations, were \$1,002,759 resulting in an overpayment of \$5,591 or 0.55 percent of the estimated Schedule "D" amount. Due to the nature in which Schedule "D" is estimated and administered, this deviation in payment must be considered insignificant but with the overpayment the deficit in payments by Alberta over the period of the agreement has been reduced to 0.28% of the actual cost.

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1.0 INTRODUCTION

This is the sixteenth annual report summarizing the activities of the Alberta Co-ordinating Committee established by the Memorandum of Agreement in 1973. The report, which is essentially the same as the National Report, is contained in the Annual National Cost Sharing Report.

Table 15: Water Quantity Surveys Comparison - Schedule "D" Costs with Actual Costs & Payments - 1990-91 30

Table B-I: Hydrometric and Sediment Costings for 1990-91 (Stations Operated by Water Survey of Canada, Alberta) B-4

The agreement establishes a cooperative water quantity survey network which are shareable and the costs borne solely by the party operating the network. It requires that the Administrators of the agreement establish a Co-ordinating 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, indicates the designation of each station for cost sharing purpose, and shows the agency which operates the station. Schedule "D" (Appendix C) gives the annual cost-sharing payment to be paid by Alberta to Canada.

When the Memorandum of Agreement was signed on March 31, 1973 the existing network 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 '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'. In 1977 a formal set of guidelines was developed for the three categories. This set of guidelines was reviewed and discussed at several National Co-ordinating Committee meetings. During 1982-83 the guidelines were reviewed and rewritten by both Administrators and Co-ordinating Committees. At the end of 1982-83 agreement was reached on the new set of guidelines which were utilized commencing in 1984-85. A copy of the approved guidelines is contained in the National Report.

In Alberta, the demand for surface water quantity data and information has largely been driven by a growing population, economic decisions and resource management. Today, additional needs associated with environmental concerns and the growing public involvement in decision-making are becoming evident. Meanwhile, because of

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

1.0 INTRODUCTION

This is the sixteenth 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 essentially the same for all provinces and the territories, is contained in the Annual National Cost Sharing Report.¹

The agreement establishes the basis on which co-operative 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 Co-ordinating 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, indicates the designation of each station for cost sharing purpose, and shows the agency which operates the station. Schedule "D" (Appendix C) gives the annual cost-sharing payment to be paid by Alberta to Canada.

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2.0 ALBERTA SURFACE WATER

2.1 OVERVIEW OF RESOURCE

governmental fiscal constraints and, particularly in the case of the Federal Government, changes in policy and program support, resources to meet these needs have been reduced. The hydrometric network in Alberta is on the decline.

It is clear that over the next decade, technological and operational changes must be made to respond to these dual pressures of limited resources and increasing demand for new, improved and changing services. With these changes federal-provincial cooperation at all levels will be even more important than in the past.

Section 2.0 of this report addresses Alberta's surface water. An overview of the resource, trends and extremes of streamflow and sediment, and 1990 runoff conditions are addressed.

Section 3.0 summarizes the hydrometric network. Network changes for 1990-91 are itemized and Tables 4 to 6 summarize the designation of hydrometric stations. Historical network changes are addressed and figures are provided to indicate the evolution of the hydrometric network. Financial responsibility for the network and changes that have occurred from 1975 to 1991 are also described. A brief summary of network planning activities is provided and histograms of gauging station maturity are presented.

Operational considerations of the 1990-91 water quantity program are addressed in Section 4.0. Significant issues discussed at Co-ordinating Committee meetings are outlined; operational achievements are addressed including training, and the construction and maintenance program; the cost of operation is addressed in a detailed manner.

Section 5.0 presents scenarios of what may occur in the foreseeable future. The basic program is addressed and the chapter concludes with future advances in technology.

In the late 1980's emphasis on economic development within the province shifted with the significant expansion of the pulp mill industry within the Slave River basin. This has made the flow data for the effluent receiving streams, the Peace, Athabasca and Wapiti Rivers, particularly important.

A Canada Water Act Agreement will be signed between the governments of Canada and Alberta to study the Slave River basin. One major component of this study will be the development of methods to improve the accuracy of winter streamflow data under ice conditions. To this end a pilot project has been initiated on the Athabasca River to model river flows under ice conditions on a selected reach. In order to accurately define input and output flows from this pilot project reach, the use of acoustic flow meters (AFFRA) is being investigated.

2.0 ALBERTA SURFACE WATER

2.1 OVERVIEW OF RESOURCE

The uneven distribution of surface water runoff in the province of Alberta results in unique water management problems. Eighty-seven percent of the surface water outflow from Alberta goes to the Northwest Territories whereas less than 6 percent of the outflow comes from the low precipitation, high population, area of the South Saskatchewan River basin.

Management of the water resource in the low precipitation and high population area of southern Alberta has always been challenging. As a result the hydrometric network in southern Alberta is most dense. Sufficient water to satisfy irrigation requirements and to meet the demands of instream needs was particularly challenging throughout the low flow decade of the 1980's. Although some of the southern portion has to some extent been drought-proofed, there will always continue to be conflicting demands for this scarce resource.

Problems or concerns with northern water resources didn't surface until the mid-1960's. The first event of concern was the construction of the Bennett Dam on the Peace River in B.C., which was evaluated as having detrimental effects on the Peace-Athabasca Delta. As a mitigating measure, weirs were constructed on two of the rivers outflowing from Lake Athabasca, and a hydrometric network put in place to analyze the effects of the weirs. Development of the oil sands in the Fort McMurray area during the 1970's prompted joint federal-provincial funding for cooperative studies in the area. These studies provided the impetus for establishing a more comprehensive hydrometric network in this area. The hydrometric network in this area has since been reduced because of the economic downturn and hence the slowed development of the oil sands resource.

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2.2 1990 RUNOFF CONDITIONS

2.2.1 General Streamflow Conditions

Southern Alberta experienced very mild conditions in late January and early February which initiated spring runoff and eliminated the snow cover. Spring runoff volumes for southern and central Alberta were below normal while those in northern Alberta were near normal. In the far northern portions of the province spring runoff was above normal. No flooding was experienced in any areas during the spring runoff and break up event. However, during the summer, four major storm events were recorded. These will be reported on in section 2.2.2.

Table 1 presents the accumulated streamflow volumes for selected locations throughout Alberta. This table indicates that there was a significant increase in runoff in all areas of the province over that of 1989 which in turn was significantly improved over that of the dry years of 1988, 1985 and 1984.

TABLE 1
Accumulated Streamflow Volumes
at Selected Points
in Alberta
For the Period January 1 to October 31

Station Number	Station Name	1990 Accumulated Streamflow		Comparative Accumulative Streamflow (1,000 Dam ³)		
		Volume (1000 Dam ³)	% of Long Term Mean	1989	1988	1984
05AA024	Oldman R. nr Brocket	1 408	123	919	583	622
05AE027	St. Mary R. nr Int'l Bdry	555	89	491	309	370
05AJ001	S. Sask.R. @ Medicine Hat	5 437	96	2 840	1 662	1 790
05BC024	Highwood R. nr the Mouth	732	126	320	234	242
05CC002	Red Deer R. @ Red Deer*	2 229	154	1 190	846	609
06AD006	Beaver R.@ Cold L. Reserve	255	37	193	222	320
07BB002	Pembina R. nr Entwistle	1 191	195	1 069	340	375
07GE001	Wapiti R.nr Grande Prairie	3 796	123	3 220	1 550	2 210

*Includes net change in storage in Glennifer Lake.

2.2.2.3 In all major river basins, except for the Beaver River basin, recorded flow volumes were near normal or significantly above normal. There was some improvement in the flow volumes of the Beaver River basin but recorded flows were still only 37% of normal.

The computed natural flow for 1990 for the South Saskatchewan River below the Red Deer River, as prepared for the Prairie Provinces Water Board (PPWB) by the Water Resources Branch (WRB) indicated surplus delivery to Saskatchewan of 3 408 500 dam³. The recorded natural flow was 10 571 000 dam³ or 115% of the long term mean. This delivery and increase in natural flow is a reflection of the wet summer and the first relief in the river system after many low flow years in the 1980s.

2.2.2 Significant Precipitation Events

Four major storm events occurred in Alberta during 1990. Two of these events were extraordinary in that the return flow period for the recorded peaks within the storm affected area had return flow periods in the order of 1:100. The return periods for the other two events were in the order of 1:9 and 1:25.

2.2.2.1 End of May Storm

The first storm event occurred in late May when, over a 54 hour period, upwards of 100 mm of precipitation fell in the headwaters of the Highwood and Elbow River basins. The 50 mm isohyetal for the storm event extended from Pincher Creek to West of Rocky Mountain House. The peak flows recorded in the Highwood and Elbow River basins were the highest recorded since 1967. No major flood damages occurred but sandbagging was carried out at High River and Okotoks. Some basement flooding was experienced in High River and at Redwood Meadows (a community on the Elbow River).

2.2.2.2 Beginning of June Storm

The second major storm event, again a cold low moving up from Montana, occurred at the beginning of June. This event was centred further north than the first event with the most intense precipitation occurring over the northern portion of the Bow River basin, the headwaters of the Red Deer River basin and the southern portion of the North Saskatchewan River basin. The total maximum recorded precipitation was 80 mm. With the combination of this heavy precipitation in the northern headwaters portion of the basin and the high flow conditions due to high elevations snow melt the peak flow recorded on the Bow River at Calgary was the highest since 1953 but a frequency analysis of the peak flow events indicates that this peak had a return flow period of only 1 in 7 years.

2.2.2.3 Mid June Storm

The third event occurred in mid June with a much more extensive areal coverage by the storm. The entire northern portion of the province was affected by the storm as was the west-central region. However the most precipitation was recorded in the area southwest and north of Grande Prairie with the maximum total recorded precipitation in a 30 hour period in these areas of 150 mm. For the same period lesser amounts of 115 mm were recorded in the Buffalo Head Hills, 90 mm east of Peace River, 80 mm north and south of Fort McMurray, and 80 mm north of Rocky Mountain House.

The vast extent of this storm over the Smoky and Peace River basins resulted in record high peaks at Smoky River at Watino and at Peace River at Peace River (inspite of the peak diminishing effects of the Bennett Dam).

The county of Grande Prairie declared the region to be a disaster area with widespread flooding having occurred. Numerous roads were flooded, bridges were awash, and much farm land was inundated with the loss of many outbuildings. The O'Brien Povincial Park on the Wapiti River south of Grande Prairie was again destroyed (also wrecked in 1982 and 1972), mobile homes were flooded in Rycroft, and in Rycroft and Woking basements were flooded. The dyking at the Peace River at Peace River, along with extensive sand bagging and shoring up of existing dykes prevented major flood damage but some basements did experience wetness due to seepage.

Table 2 indicates the peaks recorded at selected gauging stations, the period of record for the stations and the significance of the 1990 peak as compared with other peaks recorded during the period of record

TABLE 2
1990 Peak Discharges in the Peace and Smoky River Basins

Gauging Station	1990 Peak Flow(m3s)	Operated Since	Rank of 1990 Peak Flow
Kakwa River	1200	1975	2nd (2700 in 1982)
Beaverlodge River	123	1968	1st (104 in 1974)
Wapiti River	5500	1960	2nd (6300 in 1982)
Little Smoky R.(Guy)	700	1960	9th (1110 in 1983)
Smoky River (Watino)	10000	1955	1st (9200 in 1972)
Peace R. (Dunvegan)	8000	1960	5th (all others pre Bennett Dam)
Peace R. (Peace R.)	19000	1957	1st (15600 in 1972)

2.2.2.4 Early July Storm

The fourth major storm of the 1990 summer occurred in early July with the storm centre being located southwest of Edmonton in the headwaters of the Medicine, Blindman and Battle River basins. Over 150 mm of rain was recorded in several localities. In Edmonton 100 mm of rain were recorded in a 24 hour period which just fell short of the record 24 hour rainfall of 110 mm.

The highest peak flows for the period of record were recorded at many gauging stations whose streams arose in the area affected by this storm event. Table 3 which follows presents these flows, the period of record of the gauging stations and the ranking of the peak and previous high recorded flow.

TABLE 3
1990 Peak Discharges in Central Alberta

Gauging Station	1990 Peak Flow (m3s)	Operated Since	Rank of 1990 Peak Flow
Battle R. (Ponoka)	270	1966	1st (108 in 1974)
Blindman R.(Bluffton)	300	1965	1st (213 in 1986)
Blindman R.(Blckflds)	410	1962	1st (180 in 1982)
Lloyd Crk. (Bluffton)	89	1965	1st (37 in 1982)
Medicine R.(Eckville)	230	1962	1st (208 in 1986)
Strawberry Crk(Mouth)	270	1967	1st (230 in 1986)

This storm event caused flooding of 400 basements in Edmonton and approximately 85 people were evacuated in Thorsby. In Ponoka several homes were evacuated. Numerous roads and bridges were flooded including Highway 2A and much farmland was inundated.

Table 5 illustrates the changes which have occurred in each of the designation categories from the commencement of the cost sharing agreement in April 1975 to April 1, 1990.

Table 6 provides detailed gauging station data as of April 1, 1990.

3.0 HYDROMETRIC NETWORKS

3.1 HISTORICAL NETWORK CHANGES

Since the hydrometric cost-sharing agreement was signed in 1975-76, there have been significant changes in the composition of the network. These changes have included the following, during the sixteen year period from 1975-76 to 1990-91:

TABLE 4 GAUGING STATION DATA FOR 1990-91					
APR. 1, 1975	APR. 1, 1990	1990/91		FED.	PROV.
340	341	1	- 223 stations established		
			- 172 stations discontinued		
			- 98 station designation changes	21	21

Between designation changes, new station construction and station discontinuance, there has been an apparent change of 94% during the period of the cost-sharing agreement.

The history of the size of the hydrometric network in Alberta, which includes hydrometric stations operated by Water Survey of Canada, Alberta Environment, and TransAlta Utilities, is illustrated in Figure 1. 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 an increase of 19% of the stations in the cost-sharing agreement occurring from April 1, 1975 to the end of 1988-89. The majority of this increase occurred during the few years preceding the Alberta hydrometric enhancement program and during the enhancement program period. Funding problems after this period, first by Alberta and more recently by the Federal Government, have resulted in a reduction in the number of stations operated. There was a particularly large number of stations (17) discontinued at the end of the 1990-91 year.

Table 4 indicates additions and deletions to the hydrometric network during 1990-91 and the station designations effective April 1, 1990.

Table 5 illustrates the changes which have occurred in each of the designation categories from the commencement of the cost sharing agreement in April 1975 to April 1, 1990.

Table 6 provides detailed gauging station data as of April 1, 1990.

Gauging Stations Operated In Alberta

TABLE 4
WATER QUANTITY SURVEYS
GAUGING STATION DATA FOR 1990-91

No. of Stations (i)		No. of Stations Added 1990/91 (ii)	No. of Stations Discontinued 1990/91 (ii)	NET	Stn. Designation April 1, 1990			
Apr.1/89	Apr.1/90				FED.	FED. PROV.	PROV.	CONTRI-BUTED
546	541	1	3	-2	121 (1)	209 (2)	190 (2)	21

- (i) INCLUDES CONTRIBUTED DATA STATIONS
- (ii) STATIONS OPERATED BY WSC
- () BRACKETED NUMBERS ARE FOR SEDIMENT STATIONS

TABLE 5
WATER QUANTITY SURVEYS
COMPARATIVE GAUGING STATION DATA, APRIL 1/75 TO APRIL 1/90

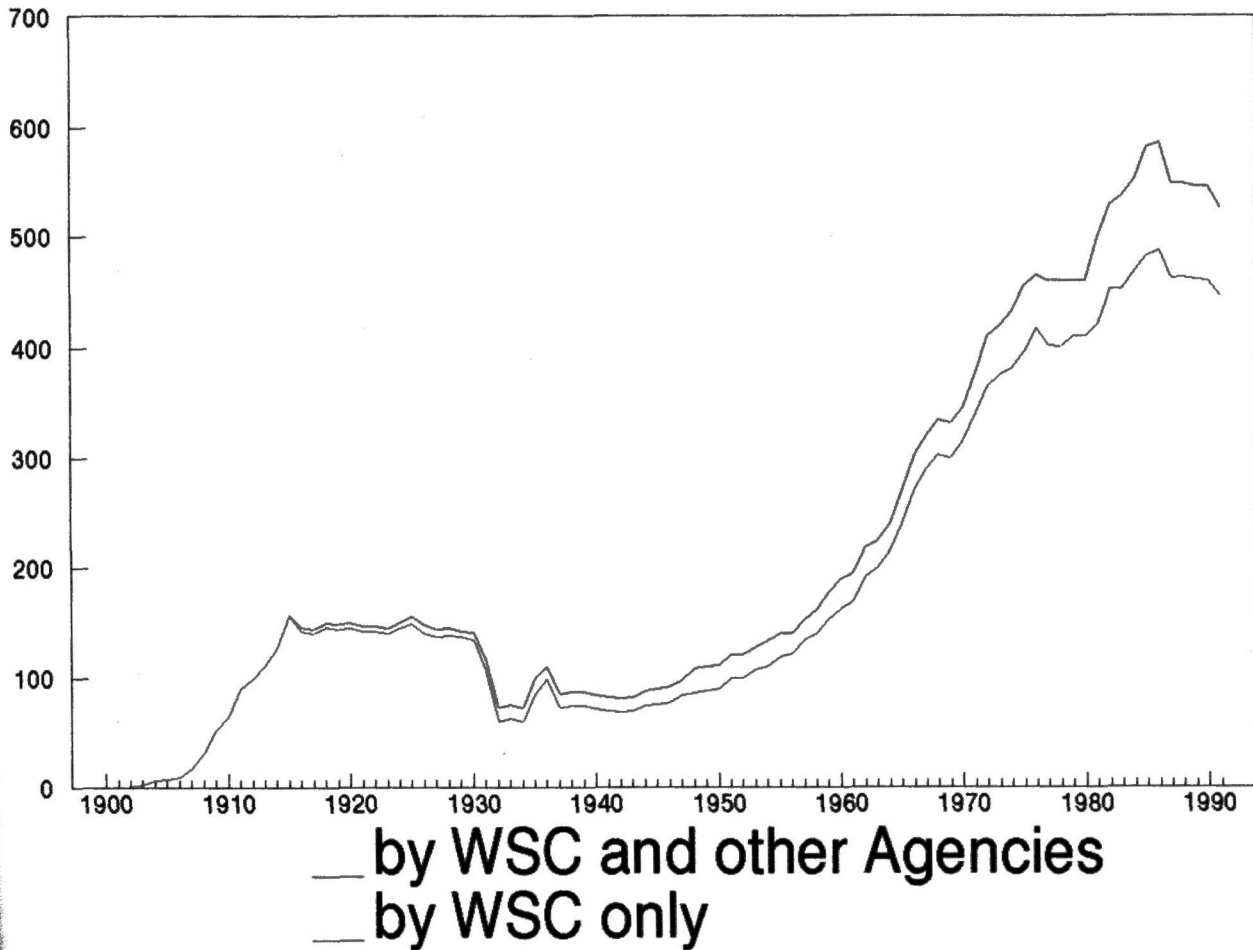
Federal Stations			Federal-Provincial Stations			Provincial Stations			Total Stations		
Apr.1/75	Apr.1/90	Change	Apr.1/75	Apr.1/90	Change	Apr.1/75	Apr.1/90	Change	Apr.1/75	Apr. 1/90	Change
157	121	-36	221	209	-12	46	190	+144	424	520	+96

TABLE 6
WATER QUANTITY SURVEYS
DETAILED GAUGING STATION DATA, APRIL 1, 1990

F1	F2	F3	F4	TOTAL F	FF1	FF2	FF3	TOTAL FF	P1	P2	TOTAL P	CONTRI-BUTED	TOTAL ALL
25 (0)	56 (0)	30 (0)	19 (1)	121 (1)	16 (0)	24 (0)	169 (2)	209 (2)	190 (1)	0 (1)	190 (2)	21 (0)	541 (3)

() BRACKETED NUMBERS ARE FOR SEDIMENT STATIONS

Gauging Stations Operated In Alberta

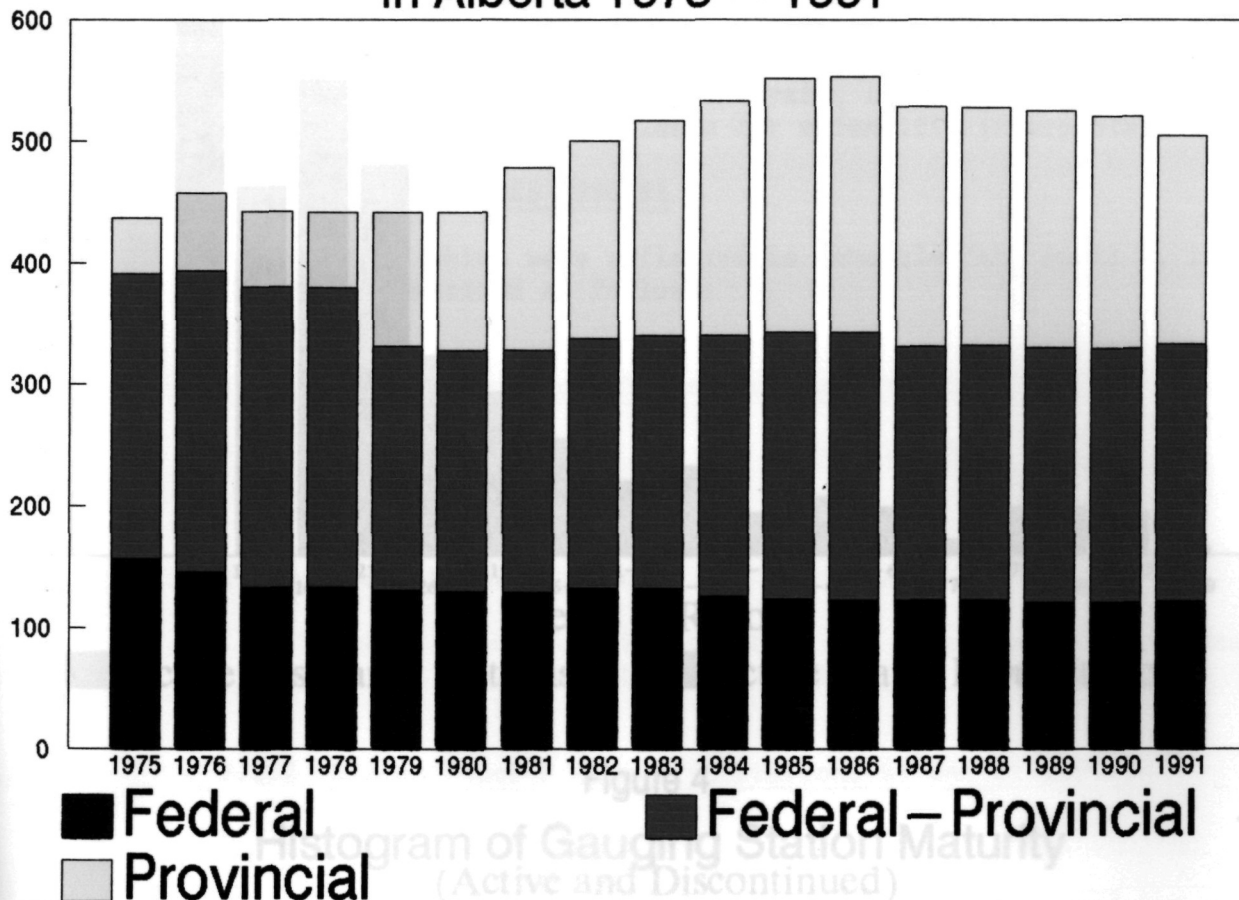


The changing nature for financial responsibility of the hydrometric network since the inception of the cost-sharing agreement is illustrated in Figure 2. This figure includes stations in Schedule "A" operated by the province. It is readily apparent from this graph that there has been a decrease in the percentage of the federal financial contribution to the network and a significant increase in the percentage of the provincial contribution since the inception of the agreement. This is because the requirements for additional stations have mainly been of a provincial nature for regional water resource inventory and analysis, water allocation and management and flow forecasting purposes.

Figure 2

Financial Responsibility and Network Changes

In Alberta 1975 - 1991



Network as of April 1 of Corresponding Year

NOTE: This graph includes stations operated by Alberta Environment. Prior to 1981, only the stations operated by Alberta Environment in the Peace-Athabasca Delta and Spring Creek Basin are shown in the bar graph.

Figure 3
Histogram of Active Gauging Stations

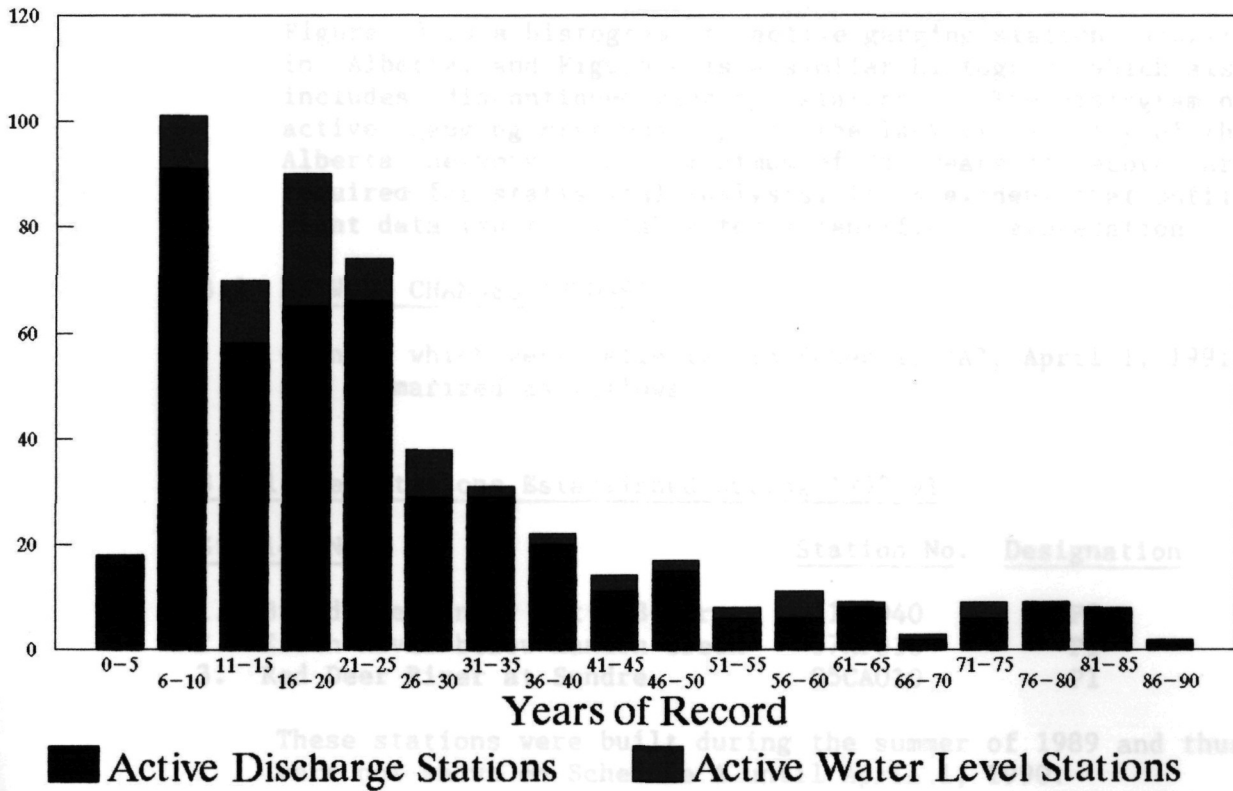
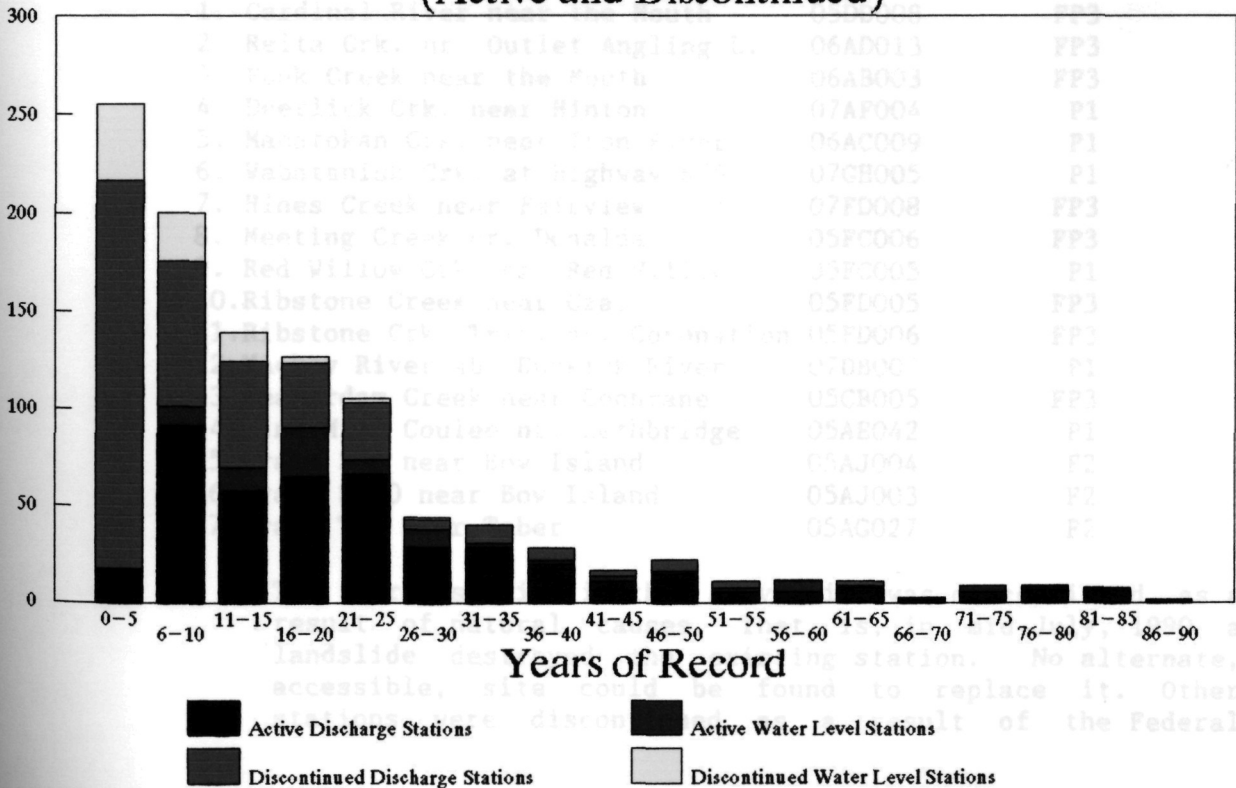


Figure 4
Histogram of Gauging Station Maturity
(Active and Discontinued)



Government reduction in salary dollars and hence the
Figure 3 is a histogram of active gauging station maturity in Alberta, and Figure 4 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 a minimum of 25 years of record are required for statistical analysis, it is evident that sufficient data isn't available for scientific interpretation.

3.2 NETWORK CHANGES 1990-91

Changes which were reflected in Schedule "A", April 1, 1991 are summarized as follows:

3.2.1 New Stations Established During 1990-91

<u>Station Name</u>	<u>Station No.</u>	<u>Designation</u>
1. Breed Creek near Int'l B'ndry	11AA040	F3
2. Erith River below Hanlon Creek	07AF016	P1
3. Red Deer River at Sundre	05CA010	P1

These stations were built during the summer of 1989 and thus were not shown on Schedule A until April 1, 1990.

3.2.2 Discontinued Hydrometric Stations at End of 1990-91

<u>Station Name</u>	<u>Station No.</u>	<u>Designation</u>
1. Cardinal River near the Mouth	05DD008	FP3
2. Reita Crk. nr. Outlet Angling L.	06AD013	FP3
3. Punk Creek near the Mouth	06AB003	FP3
4. Deerlick Crk. near Hinton	07AF004	P1
5. Manatokan Crk. near Iron River	06AC009	P1
6. Wabatanisk Crk. at Highway 676	07GH005	P1
7. Hines Creek near Fairview	07FD008	FP3
8. Meeting Creek nr. Donalds	05FC006	FP3
9. Red Willow Crk. nr. Red Willow	05FC005	P1
10. Ribstone Creek near Czar	05FD005	FP3
11. Ribstone Crk. Trib. nr. Coronation	05FD006	FP3
12. Mackay River ab. Dunkirk River	07DB007	P1
13. Beaverdam Creek near Cochrane	05CB005	FP3
14. Nine Mile Coulee nr. Lethbridge	05AE042	P1
15. Drain S-6 near Bow Island	05AJ004	F2
16. Drain S-10 near Bow Island	05AJ003	F2
17. Drain T-1 near Taber	05AG027	F2

The first station in the above list was discontinued as a result of natural causes. That is, in mid-July, 1990 a landslide destroyed the existing station. No alternate, accessible, site could be found to replace it. Other stations were discontinued as a result of the Federal

3.3 Government reduction in salary dollars and hence the inability to fill staff vacancies to operate the existing network. The discontinued stations, numbers 2 to 14, were 3.3.1 discontinued through mutual investigations, both in the field and office, by Alberta Environment and WSC staff of a list of operational problem stations prepared by WSC. The last three stations were unilaterally discontinued by WRB as they were determined to be unnecessary to the calculation of return flows for the determination of the South Saskatchewan River natural flows.

3.2.3 Discontinued Sediment Stations at end of 1990-91

<u>Station Name</u>	<u>Station No.</u>	<u>Designation</u>
1. Peace River at Peace River	07HA001	FP3

3.2.4 Designation Changes at the end of 1990-91

<u>Station Name</u>	<u>Station No.</u>	<u>Designation</u>	
		<u>From</u>	<u>To</u>
1. Beaver Lake at Ranger Station	06AA003	P	FP2
2. Berry Creek Res. near Sunnynook	05CH014	P	FP2
3. Cooking Lake near Ranger Station	05EB012	P	FP2
4. Forster Reservoir near Cessford	05CH013	P	FP2
5. Hilda Lake near Cold Lake	06AC003	P	FP2
6. Moore Lake near Cold Lake	06AC002	P	FP2
7. Muriel Lake near Guerneville	06AC007	P	FP2
8. South Wabasca Lake near Desmarais	07JA002	P	FP3
9. Utikama Lake near Nipisi	07JA001	P	FP3
10. Wabamun Lake near Wabamun	05DE002	P	FP2
11. Lesser Slave Lake at Faust	07BJ002	FP2	F4
12. Lac La Biche at Lac La Biche	07CA004	P	F4
13. Peerless Lake near Peerless Lake	07JB001	P	F4

These re-designations of lake gauging stations was initiated by WSC as a result of an investigation into the consistency of designations across the nation. It was found that to be more consistent with the other regions, and with the increased federal involvement in responding to queries and conducting studies on lakes, WSC should indicate more federal interest in lakes within the province of Alberta.

samples, the full program sediment station "Peace River at Peace River" will be discontinued and replaced in 1991/92 with miscellaneous sampling stations at Sucky River at Watino, Peace River at Dunvegan and at Peace River at Peace River. The second phase of this study, concerning the determination of a sediment budget along the Peace River reach from Dunvegan to Slave River near Fitzgerald is planned to be conducted in 1991/92.

3.3 NETWORK PLANNING

3.3.1 Sediment

1990-91 was the first full year of operating the sediment network under the concept of Sediment Station Management Plans which were prepared in March, 1990. This program calls for the review of the data for each active sediment station every year and bases the design of the collection program for the coming year on this review. This first review changed the 1990/91 program significantly in that what was formerly 53 miscellaneous sediment sampling stations became 48 "special event sampling stations". Five sites were found to have sufficient suspended sediment samples throughout the entire range of flows whereas the other 48 required samples at prescribed discharges; most of these above relatively high discharge levels. The sediment management plans will be reviewed each year and programs adjusted accordingly.

A draft of the report entitled "An evaluation of Sediment Transport Data for the Lower Athabasca River Basin" completed by M. Carson and Associates in 1989-90 was printed and distributed in 1990/91. Findings necessitated the collection of additional suspended sediment discharge measurements at the main stem Athabasca River stations during the 1990 open water period.

To help the WRB Calgary District staff in the conducting and interpreting of hydraulic and morphologic (H&M) surveys, Mike Carson of M. A. Carson and Associates had conducted a three day training course in 1989-90. In 1990/91 a contract was issued to Mr. Carson to produce course reference material to further aid staff in the conductance of H&M surveys.

A contract was issued to M. A. Carson and Associates to do a sediment analysis of the sediment data collected in the Peace and Slave Rivers in Alberta. The first phase of this report was the evaluation of the existing sediment data. The report from this phase of the study will be printed in 1991-92 and as a result of the recommendations in the report, combined with the dangerous conditions for taking samples, the full program sediment station "Peace River at Peace River" will be discontinued and replaced in 1991/92 with miscellaneous sampling stations at Smoky River at Watino, Peace River at Dunvegan and at Peace River at Peace River. The second phase of this study, concerning the determination of a sediment budget along the Peace River reach from Dunvegan to Slave River near Fitzgerald is planned to be conducted in 1991/92.

3.3.2 Hydrometric

4.0 WATER QUANTITY SURVEY AGREEMENTS

4.1 CO-OPERATION

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Station profiles have been drafted for all Alberta stations with the final review to be done by senior staff and Alberta Environment staff in 1991/92. Hydrologic profiles for 153 stations describing hydrologic characteristics, such as low and high flows, have also been prepared.

Work was completed on regionalization of low flows in the Oldman, Bow, Red Deer, Battle and North Saskatchewan River basins. This provides an assessment of guaranteed surface water supplies in the gauged as well as the ungauged areas. The first draft of the report was circulated for peer review.

The analytical work for the application of the Generalized Least Square (GLS) technique to low and high flows in the Oldman River study basin pilot study area has been completed. It provides a statistical basis for hydrometric network evaluation in the basin and a means for improving the design of the network for spatial coverage. The draft report is being prepared for review in 1991/92.

Hydrologic fact sheets were completed for Lee Creek at Cardston, Waterton River at Waterton Park, Pincher Creek at Pincher Creek and Crowsnest River at Frank. Some 50 copies of each were distributed in October, 1990.

Water level data were analyzed and a report was prepared for some 27 lakes in Alberta. Background information and a qualitative interpretation of the data are provided for each lake along with seasonal water level "percentile" hydrographs.

Operating problem gauging stations were identified and a priority listing of these stations ranging from worst to somewhat better were provided to Alberta Environment for their review and assessment of the need for hydrometric data from these sites. Network adjustments partially based on the stations listed were made prior to the 1991/92 season.

Contacts were made with a number of educational institutions in Alberta with the intent of publicizing the CDROM HYDAT data base. Several discs were distributed and arrangements were made to conduct information sessions with the University of Calgary, Civil Engineering Department, the Olds Community College and the Lethbridge Community College.

4.1.1.4 Finalization of 1989/90 Cost Share Report

Because of the detail of this review this was deferred to after the meeting but Mr. Halliday did indicate that the annual report should make it clear that it was the intent of

both parties to the agreement that the books should be balanced on an annual basis.

4.0 WATER QUANTITY SURVEY AGREEMENTS

4.1 CO-ORDINATING COMMITTEE MEETINGS

Only one Co-ordinating Meeting was held in 1990-91 (December 17, 1990) but this involved Administrators as well as Committee members. In addition an information meeting (mini-Coordinating Committee Meeting) was held on January 29, 1991 between some committee members as a preparatory meeting to the official meeting which was held on May 9, 1991.

4.1.1 Canada-Alberta Administrator and Co-ordinating Committee Meeting, December 17, 1991

4.1.1.1 Gauging Station Operations

WSC presented results of preliminary reconnaissances conducted to locate a station to replace the station Ghost River above Waiporous Creek which had proven to be very unstable during high flow periods. Slides were also shown regarding the destruction of the gauging station, Cardinal River near the Mouth by a massive landslide. It was also indicated that the station Red Deer River at Sundre was constructed. Alberta Environment (AE) indicated that they would be operating this station with a stand alone Handar unit.

4.1.1.2 Project 2000 Pilot Project Plans for 1991-92

WSC presented a progress report concerning the pilot modernization project which is to begin in Alberta in 1990-91. A rundown of the types of instruments to be used in the project was presented and plans for 1991-92 installations were given. In addition a report on the acoustic flow meter (AFFRA) installed at Athabasca River at Hinton was given.

4.1.1.3 Data Problems at PAD Weirs

In a letter from Water Planning and Management Branch (WPM) of Environment Canada concern had been expressed regarding the quality of data collected by Alberta Environment in the Peace-Athabasca Delta area (PAD). Alberta Environment explained that they had thought the matter had been cleared up in earlier enquiries from WPM but that indeed Alberta Environment was running levels to ascertain if there was a problem in bench mark elevations. Results from these levels were not available yet.

4.1.1.4 Finalization of 1989/90 Cost Share Report

Because of the detail of this review this was deferred to after the meeting but Mr. Halliday did indicate that the annual report should make it clear that it was the intent of

both parties to the agreement that the books should be balanced on an annual basis.

4.1.1.5 Expenditure Forecasts

WSC indicated they were anticipating a fairly large deficit in Alberta payments for 1990/91 because of the new settlement for technologists' wages and the many high water events experienced during the year. Mr. Valentine asked that an estimate of final costs be prepared before the end of the budget year.

4.1.2 Mini Coordinating Committee Meeting

With the new pay structure, if the operations remained the same it was estimated by WSC that Schedule D for 1991/92 would increase by \$125K for a new total of \$ 1 095K. ADOE indicated that their funding would likely not be increased sufficiently to meet this shortfall. WSC indicated they would prepare options and cost estimates for reducing costs.

4.1.1.6 Review of 1990/91 Construction Activities

Three new stations were built; two to be included in the network and to be operated by WSC while the third, the "Red Deer River at Sundre" was constructed for, and is to be operated by, AE for their flow forecasting network.

The provincial share of the program was \$57,125 while the federal share was \$ 75,746.

4.2 OPERATIONAL AGREEMENTS

4.1.1.7 Athabasca Study

Mr. Halliday described the water quantity component of the water quality/fisheries studies and indicated that some of this work could be carried out in house. It was also indicated that the possibility of funding existing hydrometric stations in the basin should be investigated.

4.1.1.8 Electrical Installations

Eighteen stations were enhanced with electrical power in 1990/91 at a total cost of \$40K. These were to be cost shared only if available funds exceeded those required for Schedule D. This has not occurred over the past few years and hence total electrical upgrading costs have been borne by WSC.

4.1.1.9 Green Plan Implications

Mr. Halliday indicated that the only item he had noted that would impact the hydrometric program was the potential for involvement by the federal government in flood forecasting and thought that this involvement would be limited to network upgrading.

4.1.1.10 Winter Monitoring-Highwood/Little Bow

The problems associated with insufficient water supply of the Highwood River and Little Bow Canals at High River were outlined by AE. Because the water management decisions are so delicate at this site many more measurements than normal are required. Most of the extra measurements were made by AE staff but the contributions by WSC staff was acknowledged.

4.1.2 Mini Coordinating Committee Meeting

This was an informal meeting held in January, 1991 among G. H. Morton, M. O. Spitzer and P. Valentine. Because of the informality of the meeting no notes were kept but the main topic was the investigation by WSC of options for changing the program so that the funds available to AE would meet the network operation costs. Options discussed included the elimination of the Ft. McMurray network, the re-designation of lake gauging stations, the elimination of operational problem stations and changes to operation procedures in the Ft. McMurray area. In addition discussions revolved around staff shortages being experienced by WSC.

These discussions formed the basis for the formal Coordinating Committee Meeting held on May 9, 1991.

4.2 OPERATIONAL ACHIEVEMENTS

4.2.1 Training Program

The major training presented to all hydrometric staff was a week long electronics training course designed and presented by the Southern Alberta Institute of Technology. Because of the changing nature of hydrometric instrumentation and equipment it was felt that it was essential that staff have some familiarity with electronics and trouble shooting techniques of electrical and electronic equipment.

A three day workshop on the Career Development Program training packages was presented by the headquarters staff of WRB to Alberta District Hydrometric Supervisors.

A one day workshop on the safe use of chain saws was designed and presented by a WSC Calgary hydrometric technician to all hydrometric field staff in the Alberta District.

A half day workshop on back care and injury prevention was presented to the WRB staff.

One hydrometric supervisor was sent to a two day United States Geological Survey conducted workshop in Denver

Colorado on cableway construction and safety.

4.2.2 Construction and Maintenance Program

The program consisted of construction of three new stations, maintenance of 26 stations, and major reconstruction at 9 stations. In addition electric power was installed at 18 sites. Localities where maintenance, construction and electric power upgrading were carried out are shown in Table 7 and Figure 5. Additional details regarding this program are provided in the annual report, "Alberta Gauging Station Construction and Maintenance, 1990-91".

An environmental prescreening of each construction and maintenance project is carried out at the beginning of the construction season. Conditions pertaining to the 'Review Criteria' are listed in Table 8. The 'Prescreening Form' for each station is presented in Table 9. It must be noted the 'Prescreening Form' is submitted in late April, and at this time of the year all maintenance requirements have not been identified. Therefore, the maintenance stations in Table 7 are greater than those shown in the 'Prescreening Form'.

4.2.3 Cost of Operations

The Summary of Financial Considerations 1990-91-Table 10 is largely based upon information contained in Appendix "B", which provides detailed information on the respective federal and provincial shares 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 1990-91, Alberta paid the amount of \$1,008,350 to the hydrometric agreement, whereas the Alberta net share was \$1,002,759.

A summary of hydrometric units per staff indicates a steady increase from the inception of the hydrometric agreement in 1975-76 to 1980-81 with the first decrease occurring in 1981-82. During 1986-87, hydrometric units per staff rose above thirteen and have remained there, or above, the past three years. These changes are shown in Table 12.

C = Construction
M = Maintenance

CONSTRUCTION COSTS AT EACH SITE

1990 - 1991

Station	Construction Cost	Instrumentation		Share	
		Provincial	Federal	Provincial	Federal
<u>Federal-Provincial</u>					
M-1 Battle River near Ponoka (05FA001)	\$ 9,965.83				
M-2 Beaver River near Goodridge (06AA001)	842.65				
M-3 Blindman River nr. Blackfalds (05CC001)	1,613.44				
M-4 Bow River below Ghost Dam (05BE006)	1,913.75				
M-5 Dutch Creek near the Mouth (05AA026)	6,061.99				
M-6 East Prairie River near Enilda (07BF016)	2,639.43	2,136.50	4,636.50		
M-7 James River near Sundre (05CA002)	1,689.47				
M-8 Marmot Creek Main Stem (05BF016)	847.00				
M-9 MacKay Creek at Walsh (05AH002)	979.08				
M-10 Muskeg River near Grande Cache (07GA002)	5,440.29		2,500.00		
M-11 Peigan Creek near Pakowki Road (05AH041)	2,934.82				
M-12 Pipestone Creek near Wetaskiwin (05FA012)	6,061.98				
M-13 Prairie Blood Coulee near Lethbridge (05AD035)	4,703.13				
M-14 Racehorse Creek near the Mouth (05AA027)	6,907.73				
M-15 Rat Creek near Cynthia (06BA002)	2,150.82				
M-16 Simonette River near Goodwin (07GF001)	1,120.38				
M-17 South Sask. River at Medicine Hat (05AJ001)	1,712.75				
M-18 Waiparous Creek near the Mouth (05BG006)	397.85				
M-19 Whitemud Creek near Ellerslie (05DF006)	1,873.85				
TOTAL F/P MAINTENANCE COSTS	\$59,856.24	\$2,136.50	\$7,136.50	\$32,064.62	\$37,064.62
<u>Federal</u>					
C-1 Breed Creek nr. International Boundary (11AA040)	\$ 6,436.29		\$2,500.00		
TOTAL F NEW CONSTRUCT COSTS	\$ 6,436.29		\$2,500.00		\$ 8,936.29
M-20 Athabasca River at Hinton (07AD002)	\$ 7,238.44				
M-21 Boxelder Creek near Walsh (05AH001)	1,625.68				
M-22 E.I.D. East Br. Canal near Lathom (05CJ003)	3,449.09				
M-23 Milk River at Western Crossing (11AA025)	1,500.60				
M-24 Milk River Evapotranspiration Station at Pinhorn Reserve	2,031.56				
M-25 Peace River at Dunvegan Bridge (07FD003)	1,047.10				
M-26 Red Deer River at Red Deer (05CC002)	692.15				
M-27 Sage Creek at Q Ranch (11AA026)	1,610.62				
M-28 Smoky River at Watino (07GJ001)	1,194.92				
M-29 Snake Indian River near the Mouth (07AB002)	1,056.96				
M-30 U.I.D. Canal near Hillspring (05AD013)	3,941.01				
TOTAL F MAINTENANCE COSTS	\$25,388.13				\$25,388.13
<u>Provincial</u>					
C-2 Erith River below Hanlan Creek (07AF016)	\$ 1,993.98	\$ 4,273.00	\$2,500.00		
C-3 Red Deer River at Sundre (05CA010)	5,799.02				
TOTAL P NEW CONSTRUCTION COSTS	\$ 7,793.00	\$ 4,273.00	\$2,500.00	\$12,066.00	\$ 2,500.00
M-31 Cavan Lake near Dunmore (05AH044)	\$ 698.40				
M-32 Chip Lake at Outlet to Lobstick River (07BB008)	3,745.12	\$ 4,273.00	\$2,500.00		
M-33 Killarney Lake Trib. near Chauvin (05GA010)	3,076.86				
M-34 McGregor Travers Canal nr. Champion (05AC025)	515.40				
M-35 Mosquito Creek near the Mouth (05AC031)	1,086.27				
TOTAL P MAINTENANCE COSTS	\$ 9,122.05	\$ 4,273.00	\$2,500.00	\$13,395.05	\$ 2,500.00
TOTAL COST OF CONSTRUCTION AND MAINTENANCE CONDUCTED BY CANADA	\$108,595.71	\$10,682.50	\$14,636.50	\$57,525.67	\$76,389.04

C = Construction
M = Maintenance

TABLE NO. 7

POWER INSTALLATION COSTS AT EACH SITE

REVIEW CRITERIA 1990 - 1991 PRE-SCREENING OF

STATION	POWER COMPANY		SHARE	
	INSTALLATION COSTS	WIRING COSTS	PROVINCIAL	FEDERAL
FEDERAL-PROVINCIAL				
E-1 BLACKMUD CR. NR. ELLERSLIE (05DF003)	\$ 900.00	\$ 780.00		
E-2 BLOCK CREEK NR. LEEDALE (05CC010)	1,806.00	740.00		
E-3 BOYER RIVER NR. FT. VERMILION (07JF002)	846.00	575.00		
E-4 DAP CREEK AT HWY. NO. 44 (076BC006)	0	475.00		
E-5 DRIED MEAT CREEK NEAR THE MOUTH (05FA018)	1,644.00	600.00		
E-6 GRANDE PRAIRIE CREEK NR SEKSMTIH (07GE003)	1,213.00	766.00		
E-7 IOSEGUN RIVER NEAR LITTLE SMOKY (07GG003)	3,828.00	765.04		
E-8 LALBY CREEK NR. GIROUXVILLE (07GJ005)	844.00	619.50		
E-9 MONTAGNEUSE RIVER NR. HINE CREEK (07FD012)	1,881.00	700.00		
E-10 MUSKEG RIVER NR. GRANDE CACHE (07GA002)	988.00	770.40		
E-11 PIDGEON LAKE CREEK NR. USONA (05FA019)	1,700.00	750.00		
E-12 PRAIRIE CREEK NR. LICK CREEK (05DB005)	2,082.00	740.00		
E-13 THREEHILLS CREEK BELOW RAY CREEK (05CE018)	1,709.00	775.00		
E-14 TOMAHAWK CREEK NR. TOMAHAWK (05DE009)	1,557.00	720.00		
E-15 WABAMUN CREEK NR. DUFFIELD (05DE003)	2,039.00	720.00		
TOTAL FEDERAL-PROVINCIAL COSTS	\$23,037.00	\$10,495.94		\$33,532.94
PROVINCIAL				
E-16 LOYALIST CREEK NR. CONSORT (05GA013)	\$ 333.00	\$ 735.00		
E-17 PARLBY CREEK NR. ALIX (05CD007)	1,633.00	800.00		
E-18 STURGEON RIVER NR. VILLENEUVE (05EA005)	2,251.00	780.00		
	\$ 4,217.00	\$ 2,315.00		\$ 6,532.00
TOTALS	\$27,254.00	\$12,810.94		\$40,064.94

NOTE: FEDERAL GOVERNMENT PAID FOR ALL POWER INSTALLATIONS IN 1990/91.

TABLE NO. 9

TABLE NO. 8 REVIEWING FORM

REVIEW CRITERIA FOR PRE-SCREENING
OF
CONSTRUCTION ACTIVITIES

Grounds / District _____ Agency / County / State _____ Fiscal Year 1981/82

PROJECT DETAILS					CONCLUSION		
Location	Author/Date	1. Clearing			Potential Impact Area (A)	Cumulative Impacts (B)	Comments
		1A	Start	End			
Chip Lake	52 25/115 15	2					
Buckle River	53 51/115 15	2					
Boy River	51 13/115 17	3			4*		
Wheat Creek	45 02/111 17	3	2, 10	May	May	2*	
East Prairie P.	54 21/115 19	3		June	June	4*	
South Saskatchewan R.	51 03/115 19	3		June	June	Temporary Shutoff on bank	
Camp Lake	49 27/118 24	3		June	June	4*	
Wapiti Creek	49 28/109 24	3		June	June	4*	
Woolly Creek	49 27/115 24	4					
Wheat Creek	49 05/115 24	4					
Belton Creek	49 15/118 27	3		June	June	4*	
Old Bear Branch Canal	50 41/115 28	3					
McGregor/Chapman Canal	50 16/115 28	3					
Old Canal	49 13/115 28	3		June	June	4*	
Mill River	49 08/115 28	3		June	June	4*	
Mill River	49 09/115 28	3		June	June	4*	
Sturgeon River	49 07/115 28	3		June	June	4*	
Antelope Crossing	50 27/118 28	3		July	July	4*	
Prairie Flood	49 31/115 28	3		July	July	4*	
Castle River	49 24/115 28	3		July	July	4*	
Wheat Creek	49 16/115 28	3		July	July	4*	
Hornbush Creek	49 20/115 28	3		Aug.	Aug.	4*	
Red Deer River	51 48/115 28	3		Aug.	Aug.	4*	
Pipestone Creek	51 02/115 28	3		Aug.	Aug.	4*	
Smith River	51 14/118 34	3	2, 10	Aug.	Aug.	4*	
Whitby River	54 03/118 17	3		Aug.	Aug.	4*	
Wheat River	55 35/115 17	3		Aug.	Aug.	4*	
Wheat River	55 08/115 17	3		Aug.	Aug.	4*	
Wheat River	55 02/117 16	3		Aug.	Aug.	4*	

- 13. Drilling and blasting

1. Review 2. Approval 3. See 4. See 5. See 6. See 7. See 8. See 9. See 10. See 11. See 12. See 13. See 14. See 15. See 16. See 17. See 18. See 19. See 20. See 21. See 22. See 23. See 24. See 25. See 26. See 27. See 28. See 29. See 30. See 31. See 32. See 33. See 34. See 35. See 36. See 37. See 38. See 39. See 40. See 41. See 42. See 43. See 44. See 45. See 46. See 47. See 48. See 49. See 50. See 51. See 52. See 53. See 54. See 55. See 56. See 57. See 58. See 59. See 60. See 61. See 62. See 63. See 64. See 65. See 66. See 67. See 68. See 69. See 70. See 71. See 72. See 73. See 74. See 75. See 76. See 77. See 78. See 79. See 80. See 81. See 82. See 83. See 84. See 85. See 86. See 87. See 88. See 89. See 90. See 91. See 92. See 93. See 94. See 95. See 96. See 97. See 98. See 99. See 100. See 101. See 102. See 103. See 104. See 105. See 106. See 107. See 108. See 109. See 110. See 111. See 112. See 113. See 114. See 115. See 116. See 117. See 118. See 119. See 120. See 121. See 122. See 123. See 124. See 125. See 126. See 127. See 128. See 129. See 130. See 131. See 132. See 133. See 134. See 135. See 136. See 137. See 138. See 139. See 140. See 141. See 142. See 143. See 144. See 145. See 146. See 147. See 148. See 149. See 150. See 151. See 152. See 153. See 154. See 155. See 156. See 157. See 158. See 159. See 160. See 161. See 162. See 163. See 164. See 165. See 166. See 167. See 168. See 169. See 170. See 171. See 172. See 173. See 174. See 175. See 176. See 177. See 178. See 179. See 180. See 181. See 182. See 183. See 184. See 185. See 186. See 187. See 188. See 189. See 190. See 191. See 192. See 193. See 194. See 195. See 196. See 197. See 198. See 199. See 200. See 201. See 202. See 203. See 204. See 205. See 206. See 207. See 208. See 209. See 210. See 211. See 212. See 213. See 214. See 215. See 216. See 217. See 218. See 219. See 220. See 221. See 222. See 223. See 224. See 225. See 226. See 227. See 228. See 229. See 230. See 231. See 232. See 233. See 234. See 235. See 236. See 237. See 238. See 239. See 240. See 241. See 242. See 243. See 244. See 245. See 246. See 247. See 248. See 249. See 250. See 251. See 252. See 253. See 254. See 255. See 256. See 257. See 258. See 259. See 260. See 261. See 262. See 263. See 264. See 265. See 266. See 267. See 268. See 269. See 270. See 271. See 272. See 273. See 274. See 275. See 276. See 277. See 278. See 279. See 280. See 281. See 282. See 283. See 284. See 285. See 286. See 287. See 288. See 289. See 290. See 291. See 292. See 293. See 294. See 295. See 296. See 297. See 298. See 299. See 300. See 301. See 302. See 303. See 304. See 305. See 306. See 307. See 308. See 309. See 310. See 311. See 312. See 313. See 314. See 315. See 316. See 317. See 318. See 319. See 320. See 321. See 322. See 323. See 324. See 325. See 326. See 327. See 328. See 329. See 330. See 331. See 332. See 333. See 334. See 335. See 336. See 337. See 338. See 339. See 340. See 341. See 342. See 343. See 344. See 345. See 346. See 347. See 348. See 349. See 350. See 351. See 352. See 353. See 354. See 355. See 356. See 357. See 358. See 359. See 360. See 361. See 362. See 363. See 364. See 365. See 366. See 367. See 368. See 369. See 370. See 371. See 372. See 373. See 374. See 375. See 376. See 377. See 378. See 379. See 380. See 381. See 382. See 383. See 384. See 385. See 386. See 387. See 388. See 389. See 390. See 391. See 392. See 393. See 394. See 395. See 396. See 397. See 398. See 399. See 400. See 401. See 402. See 403. See 404. See 405. See 406. See 407. See 408. See 409. See 410. See 411. See 412. See 413. See 414. See 415. See 416. See 417. See 418. See 419. See 420. See 421. See 422. See 423. See 424. See 425. See 426. See 427. See 428. See 429. See 430. See 431. See 432. See 433. See 434. See 435. See 436. See 437. See 438. See 439. See 440. See 441. See 442. See 443. See 444. See 445. See 446. See 447. See 448. See 449. See 450. See 451. See 452. See 453. See 454. See 455. See 456. See 457. See 458. See 459. See 460. See 461. See 462. See 463. See 464. See 465. See 466. See 467. See 468. See 469. See 470. See 471. See 472. See 473. See 474. See 475. See 476. See 477. See 478. See 479. See 480. See 481. See 482. See 483. See 484. See 485. See 486. See 487. See 488. See 489. See 490. See 491. See 492. See 493. See 494. See 495. See 496. See 497. See 498. See 499. See 500. See 501. See 502. See 503. See 504. See 505. See 506. See 507. See 508. See 509. See 510. See 511. See 512. See 513. See 514. See 515. See 516. See 517. See 518. See 519. See 520. See 521. See 522. See 523. See 524. See 525. See 526. See 527. See 528. See 529. See 530. See 531. See 532. See 533. See 534. See 535. See 536. See 537. See 538. See 539. See 540. See 541. See 542. See 543. See 544. See 545. See 546. See 547. See 548. See 549. See 550. See 551. See 552. See 553. See 554. See 555. See 556. See 557. See 558. See 559. See 560. See 561. See 562. See 563. See 564. See 565. See 566. See 567. See 568. See 569. See 570. See 571. See 572. See 573. See 574. See 575. See 576. See 577. See 578. See 579. See 580. See 581. See 582. See 583. See 584. See 585. See 586. See 587. See 588. See 589. See 590. See 591. See 592. See 593. See 594. See 595. See 596. See 597. See 598. See 599. See 600. See 601. See 602. See 603. See 604. See 605. See 606. See 607. See 608. See 609. See 610. See 611. See 612. See 613. See 614. See 615. See 616. See 617. See 618. See 619. See 620. See 621. See 622. See 623. See 624. See 625. See 626. See 627. See 628. See 629. See 630. See 631. See 632. See 633. See 634. See 635. See 636. See 637. See 638. See 639. See 640. See 641. See 642. See 643. See 644. See 645. See 646. See 647. See 648. See 649. See 650. See 651. See 652. See 653. See 654. See 655. See 656. See 657. See 658. See 659. See 660. See 661. See 662. See 663. See 664. See 665. See 666. See 667. See 668. See 669. See 670. See 671. See 672. See 673. See 674. See 675. See 676. See 677. See 678. See 679. See 680. See 681. See 682. See 683. See 684. See 685. See 686. See 687. See 688. See 689. See 690. See 691. See 692. See 693. See 694. See 695. See 696. See 697. See 698. See 699. See 700. See 701. See 702. See 703. See 704. See 705. See 706. See 707. See 708. See 709. See 710. See 711. See 712. See 713. See 714. See 715. See 716. See 717. See 718. See 719. See 720. See 721. See 722. See 723. See 724. See 725. See 726. See 727. See 728. See 729. See 730. See 731. See 732. See 733. See 734. See 735. See 736. See 737. See 738. See 739. See 740. See 741. See 742. See 743. See 744. See 745. See 746. See 747. See 748. See 749. See 750. See 751. See 752. See 753. See 754. See 755. See 756. See 757. See 758. See 759. See 760. See 761. See 762. See 763. See 764. See 765. See 766. See 767. See 768. See 769. See 770. See 771. See 772. See 773. See 774. See 775. See 776. See 777. See 778. See 779. See 780. See 781. See 782. See 783. See 784. See 785. See 786. See 787. See 788. See 789. See 790. See 791. See 792. See 793. See 794. See 795. See 796. See 797. See 798. See 799. See 800. See 801. See 802. See 803. See 804. See 805. See 806. See 807. See 808. See 809. See 810. See 811. See 812. See 813. See 814. See 815. See 816. See 817. See 818. See 819. See 820. See 821. See 822. See 823. See 824. See 825. See 826. See 827. See 828. See 829. See 830. See 831. See 832. See 833. See 834. See 835. See 836. See 837. See 838. See 839. See 840. See 841. See 842. See 843. See 844. See 845. See 846. See 847. See 848. See 849. See 850. See 851. See 852. See 853. See 854. See 855. See 856. See 857. See 858. See 859. See 860. See 861. See 862. See 863. See 864. See 865. See 866. See 867. See 868. See 869. See 870. See 871. See 872. See 873. See 874. See 875. See 876. See 877. See 878. See 879. See 880. See 881. See 882. See 883. See 884. See 885. See 886. See 887. See 888. See 889. See 890. See 891. See 892. See 893. See 894. See 895. See 896. See 897. See 898. See 899. See 900. See 901. See 902. See 903. See 904. See 905. See 906. See 907. See 908. See 909. See 910. See 911. See 912. See 913. See 914. See 915. See 916. See 917. See 918. See 919. See 920. See 921. See 922. See 923. See 924. See 925. See 926. See 927. See 928. See 929. See 930. See 931. See 932. See 933. See 934. See 935. See 936. See 937. See 938. See 939. See 940. See 941. See 942. See 943. See 944. See 945. See 946. See 947. See 948. See 949. See 950. See 951. See 952. See 953. See 954. See 955. See 956. See 957. See 958. See 959. See 960. See 961. See 962. See 963. See 964. See 965. See 966. See 967. See 968. See 969. See 970. See 971. See 972. See 973. See 974. See 975. See 976. See 977. See 978. See 979. See 980. See 981. See 982. See 983. See 984. See 985. See 986. See 987. See 988. See 989. See 990. See 991. See 992. See 993. See 994. See 995. See 996. See 997. See 998. See 999. See 1000.

TABLE 10
SUMMARY OF FINANCIAL DATA
1980-91

No. of Stations Total Cost Provincial Alberta

448 1,751,388 840,686 17,703

122,700 58,649 64,051

200,670 5,367 5,302

200,670 5,367 5,302

6,104 1,059,528 528

202,759 907,043 1,059,528

LEGEND
C - NEW CONSTRUCTION
M - MAINTENANCE
E - ELECTRIC POWER INSTALLATION

FIGURE 5

STATION LOCATION MAP

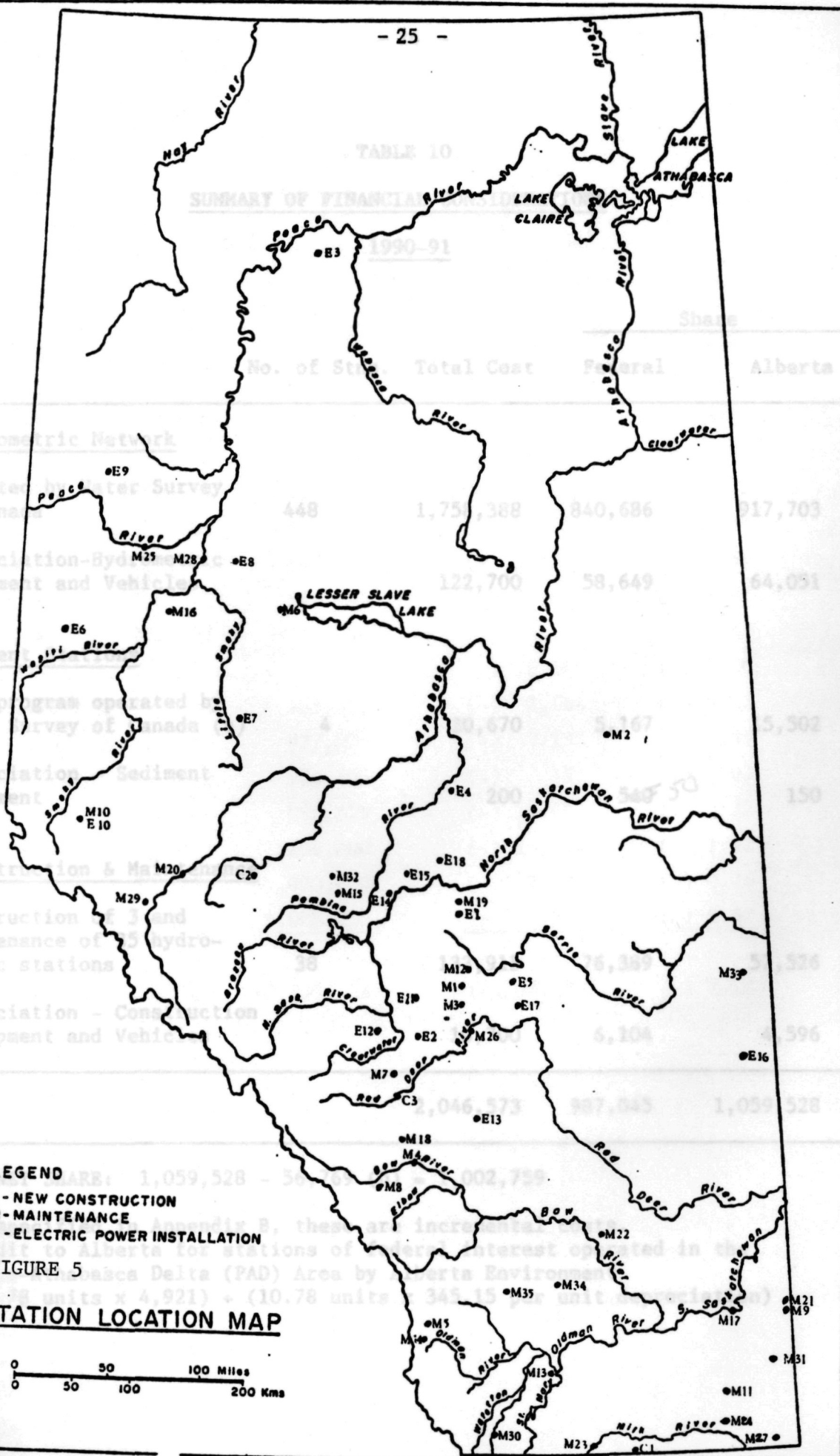
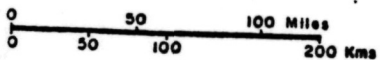


TABLE 10
SUMMARY OF FINANCIAL CONSIDERATIONS
FOR PERIOD OF 1990-91 (DOLLARS)

Year	Actual Cost	Annual Payment	Overpayment (+) Underpayment (-)	Share	
				Federal	Alberta
1975-76	197,852	197,400	(-) 452	(-) 0.23	
1. Hydrometric Network					
1976-77	231,000	231,000	N11	N11	
1977-78	240,430	240,000	(-) 7,430	(-) 3.10	
Operated by Water Survey of Canada	260,000	260,000	(-) 7,055	(-) 2.71	
1979-80	353,768	370,000	(+) 16,232	(+) 4.39	
Depreciation-Hydrometric Equipment and Vehicles	390,000	390,000	(-) 33,900	(-) 8.69	
1981-82	536,741	560,240	(-) 11,499	(-) 2.02	
1982-83	747,352	747,352	N11	N11	
2. Sediment Stations					
1983-84	512,593	796,033	(-) 16,560	(-) 2.08	
Full program operated by Water Survey of Canada (a)	933,500	933,500	(-) 2,164	(-) 0.23	
1985-86	917,865	927,000	(+) 2,135	(+) 0.99	
Depreciation - Sediment Equipment	962,700	962,700	(+) 287	(+) 0.03	
1987-88	819,624	830,579	(+) 10,955	(+) 1.32	
1988-89	868,131	856,000	(-) 12,131	(-) 1.42	
3. Construction & Maintenance					
1989-90	922,430	920,000	(-) 2,430	(-) 0.26	
Construction of 3 and maintenance of 35 hydro-metric stations	1,008,350	1,008,350	(+) 5,591	(+) 0.57	
		38	133,915	76,389	57,526
TOTAL:	10,266,583	10,238,254	(-) 28,329	(-) 0.28	
Depreciation - Construction Equipment and Vehicles			10,700	6,104	4,596
TOTAL:			2,046,573	987,045	1,059,528

ALBERTA NET SHARE: 1,059,528 - 56,769 (b) = 1,002,759

(a) As specified in Appendix B, these are incremental costs.

(b) Credit to Alberta for stations of federal interest operated in the Peace-Athabasca Delta (PAD) Area by Alberta Environment (10.78 units x 4,921) + (10.78 units x 345.15 per unit depreciation)

TABLE 11
HYDROMETRIC STATIONS VERSUS HYDROMETRIC STAFF

**CUMULATIVE PROVINCIAL
OVER OR UNDERPAYMENT
FOR PERIOD OF AGREEMENT (DOLLARS)**

Year	Actual Cost	Annual Payment	Overpayment (+) Underpayment (-)	% of Annual Payment
1975-76	197,852	197,400	(-) 452	(-) 0.23
1976-77	231,000	231,000	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
1981-82	556,741	568,240	(+) 11,499	(+) 2.02
1982-83	747,352	747,352	Nil	Nil
1983-84	812,593	796,033	(-) 16,560	(-) 2.08
1984-85	935,664	933,500	(-) 2,164	(-) 0.23
1985-86	917,865	927,000	(+) 9,135	(+) 0.99
1986-87	962,413	962,700	(+) 287	(+) 0.03
1987-88	819,624	830,579	(+) 10,955	(+) 1.32
1988-89	868,131	856,000	(-) 12,131	(-) 1.42
1989-90	922,430	920,000	(-) 2,430	(-) 0.26
1990-91	<u>1,002,759</u>	<u>1,008,350</u>	<u>(+) 5,591</u>	<u>(+) 0.57</u>
Total:	10,266,583	10,238,254	(-) 28,329	(-) 0.28

Year	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
Actual Cost	197,852	231,000	247,430	267,055	353,768	423,906	556,741	747,352	812,593	935,664	917,865	962,413	819,624	868,131	922,430	1,002,759
Annual Payment	197,400	231,000	240,000	260,000	370,000	390,000	568,240	747,352	796,033	933,500	927,000	962,700	830,579	856,000	920,000	1,008,350
Overpayment (+) Underpayment (-)	(-) 452	Nil	(-) 7,430	(-) 7,055	(+) 16,232	(-) 33,906	(+) 11,499	Nil	(-) 16,560	(-) 2,164	(+) 9,135	(+) 287	(+) 10,955	(-) 12,131	(-) 2,430	(+) 5,591
% of Annual Payment	(-) 0.23	Nil	(-) 3.10	(-) 2.71	(+) 4.39	(-) 8.69	(+) 2.02	Nil	(-) 2.08	(-) 0.23	(+) 0.99	(+) 0.03	(+) 1.32	(-) 1.42	(-) 0.26	(+) 0.57

**TABLE 12
HYDROMETRIC UNITS VERSUS HYDROMETRIC STAFF**

Year	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
Hydrometric Units	289.35	309.00	302.41	326.20	342.95	346.00	351.15	364.35	374.30	382.45	393.40	394.65	365.40	362.85	361.25	359.70
Hydrometric Person-Years	32.4	32.7	28.6	26.5	26.4	26.1	27.9	27.5	29.3	30.4	31.8	28.8	27.2	27.6	25.7	26.5
Hydrometric Units/staff	8.94	9.47	10.57	12.31	12.99	13.26	12.90	13.25	12.77	12.42	12.37	13.70	13.43	13.15	14.06	13.57

A similar type of summary for hydrometric station unit costs, Table 13, indicates a minimal annual increase during the first five years of the agreement. During 1980-81 a significant increase in unit costs occurred and this trend remained to the end of 1982-83. A significant decrease in the percent increase from the previous year occurred in 1983-84 and is a reflection of the federal government's 6 and 5 program. The principal reason for the small increases which occurred during the initial years of the agreement is due to the large increase in each year of the hydrometric units/staff. The decrease which occurred in 1985-86 is unusual, as is the slight increase in 1987-88. The significant increase in 1989-90 is also unusual, and is due to a large salary contract settlement of cost-shareable employees. The large percentage increase in 1990/91 is also attributable to the technologists' salary settlement of 1989/90 which provided for a healthy increase in wages in 1990/91 as well as in 1989/90.

**TABLE 13
UNIT COSTS PER HYDROMETRIC STATION**

Year	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
Unit Cost Per Station	\$2,072	2,137	2,264	2,242	2,250	2,529	2,945	3,285	3,521	3,840	3,823	3,963	3,970	4,173	4,554	4,921
% Increase from Previous Year	-	3.1	5.9	(-1.0)	0.4	12.4	16.4	11.5	7.2	9.1	(-0.4)	3.7	0.2	5.1	9.1	8.1
Hydrometric Units/staff	8.94	9.47	10.57	12.31	12.99	13.26	12.90	13.25	12.77	12.42	12.37	13.70	13.43	13.15	14.06	13.57

The financial information contained in Tables 14 and 15 are a summary for input to the Annual National Cost-Sharing Agreement. The summary of the cost to Alberta and of the actual payments by Alberta for the period of the agreement, Table 11 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 close 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 sixteen year period from 1975-76 to 1990-91, the underpayment by Alberta was 0.28% of the total expected payment from Alberta during this period.

It should be noted that an attempt to balance yearly payments is easier said than done. An example would be 1988-89 when Alberta paid \$6,000 in excess of Schedule "D", based on an estimate of final costs in mid-March 1989. However, in the end Alberta's costs were \$18,131 greater than Schedule "D" resulting in an underpayment. In 1990/91 Alberta was able to get additional funding over and above that indicated in Schedule D (\$37,150) because of flood damages and extra overtime salary dollars incurred to cover the flood events. These additional funds covered these additional costs and the regular program came in slightly lower than estimated with the result that Alberta made an over payment of \$5 591 to reduce their deficit to only 0.28% less than the accumulated cost of the program.

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 1992-93 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 1991-92, depreciation, a cost index factor, and an estimate of construction and maintenance costs are utilized in the preparation of the cost estimate for the forecast year.

Province	Total Program ¹				Shareable Costs			Annual Payment Received	Received Minus Actual
	Sched. "D"	Actual Cost	Sched. "D"	Actual Cost	Sched. "D"	Actual Cost	Difference		
Alberta	967,500	940,637	63,700	62,122	971,200	1,002,759	31,559	1,008,150	(+15,391)

¹ These costs include operating and maintenance costs in Province of Alberta, construction costs in Province of Alberta, and credit to Alberta.

² Because of the floods and hence peering station damages as well as additional overtime requirements Alberta Government sought for, and were successful, for extra funding to defray these costs. They received an additional amount of \$37,150.

5.0 FUTURE PROGRAM PLAN
 5.1 SUMMARY
 Primary
 quality
 However, it must be recognized that future emphasis on integrated monitoring programs and the nil prospects for staff increases will allow for less time for the operation of hydrometric
 frequency of discharge measurements is to be conducted for every active
 efficient field program is conducted at each site. It is planned that recommendations from this study can begin to be implemented in 1992/93.

The financial information contained in Tables 14 and 15 are a summary for input to the Annual National Cost-Sharing Report. The format and required input to Table 14 vary from the determination of the cost-sharing amounts in Alberta, and thus these values should not be compared.

TABLE 14

WATER QUANTITY SURVEYS

TOTAL PROGRAM COSTS & SHAREABLE COSTS FOR 1990-91

(\$1000)

Province	Total Program ¹					Shareable Costs						
	P/Yrs	Salary	Operating	Capital	Total	P/Yrs	Salary	Operating ²	Const. ³	Total	Fed. Share	Prov. Share ⁴
Alberta	44.0	2215.7	986.3	263.3	3465.4	26.5	1134.3	758.8	144.6	2037.7	977.8	1059.9

- NOTE:
- 1 These costs don't include those associated with the FA unit.
 - 2 Operating costs are comprised of \$635.9K as described in Appendix B and \$122.9K for depreciation as shown in Summary of Financial Considerations.
 - 3 Construction costs are comprised of \$133.9K for the program and \$10.7K for depreciation.
 - 4 Credit to Alberta for operation of F and FP stations in the Peace-Athabasca Delta (PAD); FP resulted in an Alberta actual cost of \$1002.8K, as shown in Table 11.

TABLE 15

WATER QUANTITY SURVEYS

COMPARISON - SCHEDULE "D" COSTS WITH ACTUAL COSTS AND PAYMENTS

1990-91 (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	907,500	940,637	63,700	62,122	971,200	1,002,759	31,559	1,008,350	(+)5,591

Because of the floods and hence gauging station damages as well as additional overtime requirements Alberta Environment sought for, and were successful, for extra funding to defray these costs. They received an additional amount of \$37,150.

5.0 FUTURE PROGRAM PLANS

5.1 GENERAL

Primary program plans are to maintain a satisfactory quality of data, and to meet the needs of client agencies. However, it must be recognized that future emphasis on integrated monitoring programs and the nil prospects for staff increases will allow for less time for the operation of hydrometric stations. Therefore an analysis of the frequency of discharge measurements is to be conducted for every active station in Alberta to ensure that the most efficient field program is conducted at each site. It is planned that recommendations from this study can begin to be implemented in 1992/93.

As previously noted, a first draft of hydrometric station management/administrative profiles have been completed for all active stations in Alberta. However, upgrading these to a format suitable for provincial review won't occur until 1991-92. Additionally, network planning and evaluation studies will continue to be conducted by both agencies. However, it must be recognized that in the current era of restraint, the role of network planning may be one of assisting in determining the best choices for network reductions.

The second phase of the Peace/Slave River sediment data analysis study will be conducted in 1991/92. This study is a follow up to the study conducted this year and will focus on the sediment budget in the reach from Peace River at Dunvegan to Slave River near Fitzgerald.

Additional sediment studies will involve the preparation of a sediment analysis report for collected sediment data at the "Oldman River near Lethbridge" in 1991/92. The emphasis of the sediment data collection program in 1992/93 will change somewhat with programs to be initiated (or expanded) at sites along the Peace and Athabasca Rivers. Programs will be conducted on the Athabasca River at Hinton and at Athabasca and as well expanded programs at Smoky River at Watino and at Peace River at Dunvegan are anticipated.

A proposal for a Hydraulic and Geomorphologic Survey on the Oldman River below the Oldman River dam will be prepared. If accepted a significant effort will be required by WSC to deliver this program.

As shown in Appendix D, the estimated cost of Schedule 'D' for 1992-93 for Alberta is \$1,063,000 as compared to \$1,002,759 in 1990/91. This is not a significantly large percentage increase over a two year period but the present economic situation, the changing role of WSC, the cap on salary dollars in the federal government and other factors

indicate that there will be no expansion in the hydrometric program but rather an entrenchment is indicated. Therefore it is likely that the construction program for the next few years will be one of maintenance with little in the way of new station construction.

5.2 NEW TECHNOLOGY

The Pilot Project 2000 will be put into effect in 1991/92 in Alberta with the installation of electronic data acquisition systems at some 20 sites. A number of Electronic Data Acquisition Systems will be tested, pressure transducers will be installed and, where stilling wells exist, encoders will be installed to convert analogue to digital data. Specially designed personal computers for collection and downloading of field data will also be tested and assessed. Alberta Environment is to participate in this project with the installation of Project 2000 (P2K) at one site in the Peace-Athabasca Delta area. A new computerized data computation procedure entitled COMPUMOD is to be developed and testing of the first version of the program will also begin in 1991/92.

The remainder of the pilot project stations (80 of a total of 100, six of which are to be operated by Alberta Environment) are to be instrumented with P2K equipment and instruments in 1992/93 with assessments to be conducted through to the end of 1993/94. Recommendations concerning potential national implementation will follow and if positive the national program will be converted over the years 1994-95 to 2000-01.

An Acoustic Flow Meter for Remote Areas (AFFRA) was installed at the EID Main Canal in 1989 to test the application and to familiarize the WSC, Calgary staff in its operation and installation. This instrument measures the mean velocity of the stream between two transducers located in the water near either bank and has particular application for those sites where conventional stage-discharge relationships do not apply.

It is hoped that this technology can be extended to flow under ice conditions and that the results will be much more precise than conventional flow determination under ice conditions. To this end an AFFRA was installed at the Athabasca River at Hinton in the fall of 1990 with operational bugs being worked out. It is planned that another AFFRA will be installed on the Athabasca River near Obed (about 20 miles downstream of Hinton) in the fall of 1991. If these AFFRAs work and produce reliable winter discharge records at these sites it is planned that a pilot modelling project of river streamflows will be done utilizing the AFFRA generated streamflows as input and output points for the model. This has particular relevance

to the Peace/Athabasca/Slave study.

It is anticipated that the launching of the Federal Government Green Plan and the Water Program Review of 1991/92 will change some of the emphasis of the federal government water programs. How this will affect the hydrometric program in Alberta is unclear at this time but it is likely that less federal resources will be available for conventional water quantity monitoring and it is likely therefore that WSC will be unable to maintain the hydrometric program at its present level.

APPENDIX "A"

SCHEDULE "A"

OF

MEMORANDUM OF AGREEMENT

BETWEEN

GOVERNMENT OF CANADA

AND

GOVERNMENT OF ALBERTA

MAJOR DESIGNATION - FEDERAL

REDesignation - FEDERAL DEPARTMENTAL PROGRAMS 117

NO.	STATION NAME	STATION NUMBER	SEEDS OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	SH	12M	REMOTE	NORMAL

OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT

1	ATHABASCA RIVER NEAR JASPER	07A002	X				X	X
2	BOW RIVER AT BANFF	05B001	X			X		X
3	BOW RIVER AT LAKE LOUISE	05B001	X					X
4	PROBSTER CREEK NEAR BANFF	05B004	X			X		X
5	CASCADE RIVER ABOVE LAKE WINDERMERE	05C002	X			X		X
6	JOHNSTON CREEK NEAR THE MOUTH	05B006	X			X		X
7	LESSER SLAVE RIVER AT SLAVE RIVER	07S001	X				X	X
8	MILNE RIVER NEAR JASPER	07A004	X				X	X
9	MLETTE RIVER NEAR JASPER	07A001	X				X	X
10	MISTAYA RIVER NEAR SASKATCHEWAN CROSSING	05M007	X				X	X

A P P E N D I X "A"

11	NORTH SASKATCHEWAN RIVER AT WHIRLPOOL POINT	05S007	X				X	X
12	PIPESTONE RIVER NEAR LAKE LOUISE	05B002	X				X	X
13	RESEARCH CREEK NEAR THE MOUTH	05B003	X			X		X
14	SILVERHORN CREEK NEAR THE MOUTH	07S010	X			X		X
15	SNAKE INDIAN RIVER NEAR THE MOUTH	07A002	X			X		X
16	SUNWAPT RIVER AT ATHABASCA GLACIER	07A007	X			X		X
17	WHIRLPOOL RIVER NEAR THE MOUTH	07A009	X			X		X

SCHEDULE "A"

OF

MEMORANDUM OF AGREEMENT

OPERATED BY - ALBERTA GOVERNMENT

BETWEEN

1	LAKE ATHABASCA AT BISHARD ISLAND		X				X	X
2	LAKE ATHABASCA AT FORT CHIPWYAN		X				X	X
3	LAKE CLATRE NEAR OUTLET TO PRAIRIE RIVER	07N002	X				X	X
4	HAWANI LAKE CHANNEL AT OLD DOG CAMP	07N003	X				X	X
5	PEACE RIVER BELOW CHEVAL DES GLATRE FOUCHES	07K005	X				X	X
6	RIVIERE DES ROCHERS ABOVE SLAVE		X				X	X
7	RIVIERE DES ROCHERS EAST OF LITTLE RAPIDS	07N007	X				X	X
8	RIVIERE DES ROCHERS WEST OF LITTLE RAPIDS	07N008	X			X		X

GOVERNMENT OF CANADA

AND

GOVERNMENT OF ALBERTA

April 1, 1990

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - FEDERAL DEPARTMENTAL PROGRAMS (1)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW LEVEL SED.	OPERATION		ACCESS	
				BM	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA; ALBERTA DISTRICT							
1	ATHABASCA RIVER NEAR JASPER	07AA002	X		X		X
2	BOW RIVER AT BANFF	05BB001	X		X		X
3	BOW RIVER AT LAKE LOUISE	05BA001	X	X			X
4	BREWSTER CREEK NEAR BANFF	05BB004	X	X			X
5	CASCADE RIVER ABOVE LAKE MINNENANKA	05BD005	X	X			X
6	JOHNSTON CREEK NEAR THE MOUTH	05BA006	X	X			X
7	LESSER SLAVE RIVER AT SLAVE RIVER	07BK001	X		X		X
8	MALIGNE RIVER NEAR JASPER	07AA004	X		X		X
9	MIETTE RIVER NEAR JASPER	07AA001	X		X		X
10	MISTAYA RIVER NEAR SASKATCHEWAN CROSSING	05DA007	X		X		X
11	NORTH SASKATCHEWAN RIVER AT WHIRLPOOL POINT	05DA009	X		X		X
12	PIPESTONE RIVER NEAR LAKE LOUISE	05BA002	X		X		X
13	REDEARTH CREEK NEAR THE MOUTH	05BB005	X	X			X
14	SILVERHORN CREEK NEAR THE MOUTH	05DA010	X		X		X
15	SNAKE INDIAN RIVER NEAR THE MOUTH	07AB002	X	X			X
16	SUNNAPTA RIVER ATHABASCA GLACIER	07AA007	X		X		X
17	WHIRLPOOL RIVER NEAR THE MOUTH	07AA009	X		X		X
OPERATED BY - ALBERTA GOVERNMENT							
1	LAKE ATHABASCA AT BUSTARD ISLAND	07MD002	X		X		X
2	LAKE ATHABASCA AT FORT CHIPEWYAN	07MD001	X		X		X
3	LAKE CLAIRE NEAR OUTLET TO PRAIRIE RIVER	07KF002	X		X		X
4	MAMAWI LAKE CHANNEL AT OLD DOG CAMP	07KF003	X		X		X
5	PEACE RIVER BELOW CHENAL DES QUATRE FOURCHES	07KC005	X		X		X
6	RIVIERE DES ROCHERS ABOVE SLAVE RIVER	07NA001	X		X		X
7	RIVIERE DES ROCHERS EAST OF LITTLE RAPIDS	07NA007	X		X		X
8	RIVIERE DES ROCHERS WEST OF LITTLE RAPIDS	07NA008	X	X			X
31	L.N.S.D. CANAL ABOVE OLDMAN FLUME	05AB019	X		X		X
32	LITTLE BOW CANAL AT HIGH RIVER	05BL013	X		X		X
33	LITTLE BOW RIVER AT CARRABAY	05AC003	X		X		X
34	LITTLE BOW RIVER BELOW TRAVERS DAM	05AC012	X		X		X
35	LITTLE BOW RIVER NEAR THE MOUTH	05AC003	X		X		X
36	N.S.D. CANAL NEAR SPRING COLLEE	05AQ021	X		X		X
37	PATCHWINN CREEK BELOW WARE COLLEE	05CJ012	X		X		X
38	NEW WEST COLLEE NEAR THE MOUTH	05BN006	X		X		X
39	OLDMAN RIVER NEAR LETHBRIDGE	05AB007	X		X		X
40	ONETREE CREEK NEAR PATRICIA	05CJ006	X		X		X
41	PEACE RIVER AT PEACE POINT	07KC001	X		X		X
42	PIHAMI DRAIN NEAR PICTURE BUTTE	05AB037	X		X		X
43	POTHOLE CREEK AT RUSSELL'S RANCH	05AE016	X		X		X
44	RED DEEP RIVER NEAR BINDLOSS	05CX004	X		X		X
45	RUMBAHE WASTWAY NEAR HAYS	05BN007	X	X			X
46	ROCKY RIVER AT REDLAND	05CE005	X		X		X
47	ROSS CREEK AT MEDICINE HAT	05AH049	X		X		X
48	SMITH BRIDGE CREEK AT MEDICINE HAT	05AH005	X		X		X
49	SOUTH SASKATCHEWAN RIVER AT HIGHWAY NO. 41	05H001	X		X		X
50	SLAVE RIVER AT FITZGERALD	07BK001	X		X		X

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERPROVINCIAL WATERS (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
1	BATTERSEA DRAIN NEAR THE MOUTH	05AD038	X			X		X
2	*BATTLE RIVER NEAR THE SASKATCHEWAN BOUNDARY	05FE004	X				X	X
3	BEAVER RIVER AT COLD LAKE RESERVE	06AD006	X				X	X
4	BERRY CREEK NEAR THE MOUTH	05CH007	X			X		X
5	BOUNTIFUL COULEE INFLOW NEAR CRANFORD	05AG026	X			X		X
6	BOW RIVER AT CALGARY	05BH004	X				X	X
7	BOW RIVER NEAR THE MOUTH	05BN012	X				X	X
8	B.R.D. DRAIN A NEAR HAYS	05AG004	X			X		X
9	B.R.D. MAIN CANAL	05AC004	X			X		X
10	-BOXELDER CREEK AT HARGRAVES RANCH	05AH050	X			X		X
11	-BOXELDER CREEK NEAR WALSH	05AH001	X			X		X
12	BULLPOUND CREEK NEAR THE MOUTH	05CG003	X			X		X
13	CANADIAN ST. MARY CANAL NEAR SPRING COULEE	05AE026	X			X		X
14	COAL CREEK AT BOW CITY	05BN014	X			X		X
15	CLEARWATER RIVER ABOVE CHRISTINA RIVER	07CD005	X				X	X
16	COAL LAKE RESERVOIR NEAR WETASKIWIN	05FA016		X			X	X
17	COLD LAKE AT COLD LAKE	06AF002		X			X	X
18	CROWFOOT CREEK NEAR CLUNY	05BM008	X			X		X
19	DICKSON REVERVOIR NEAR DICKSON	05CB006		X			X	X
20	DRAIN L-5 NEAR DIAMOND CITY	05AD040	X			X		X
21	DRAIN S-6 NEAR BOW ISLAND	05AJ004	X			X		X
22	DRAIN S-10 NEAR BOW ISLAND	05AJ003	X			X		X
23	DRAIN T-1 NEAR TABER	05AG027	X			X		X
24	DRY COULEE NEAR MAGRATH	05AE041	X			X		X
25	E.I.D. EAST BRANCH CANAL NEAR LATHOM	05CJ003	X			X		X
26	E.I.D. NORTH BRANCH CANAL NEAR BASSANO	05CJ001	X			X		X
27	E.I.D. SPRINGHILL CANAL NEAR LATHOM	05CJ004	X			X		X
28	EXPANSE COULEE NEAR THE MOUTH	05AG003	X			X		X
29	HAMMERHILL SPILLWAY NEAR GLEICHEN	05BM005	X			X		X
30	HIGHWOOD DIVERSION CANAL NEAR HEADGATES	05BL025	X			X		X
31	L.N.I.D. CANAL ABOVE OLDMAN FLUME	05AB019	X			X		X
32	LITTLE BOW CANAL AT HIGH RIVER	05BL015	X				X	X
33	LITTLE BOW RIVER AT CARMANGAY	05AC003	X				X	X
34	LITTLE BOW RIVER BELOW TRAVERS DAM	05AC012	X			X		X
35	LITTLE BOW RIVER NEAR THE MOUTH	05AC023	X			X		X
36	M.I.D. CANAL NEAR SPRING COULEE	05AE021	X			X		X
37	MATZHIWIN CREEK BELOW WARE COULEE	05CJ012	X			X		X
38	NEW WEST COULEE NEAR THE MOUTH	05BN006	X			X		X
39	OLDMAN RIVER NEAR LETHBRIDGE	05AD007	X	X			X	X
40	ONETREE CREEK NEAR PATRICIA	05CJ006	X			X		X
41	*PEACE RIVER AT PEACE POINT	07KC001	X				X	X
42	PIYAMI DRAIN NEAR PICTURE BUTTE	05AD037	X			X		X
43	POTHOLE CREEK AT RUSSELL'S RANCH	05AE016	X			X		X
44	RED DEER RIVER NEAR BINDLOSS	05CK004	X				X	X
45	RONALANE WASTEWAY NEAR HAYS	05BN007		X		X		X
46	ROSEBUD RIVER AT REDLAND	05CE005	X			X		X
47	ROSS CREEK AT MEDICINE HAT	05AH049	X			X		X
48	SEVEN PERSONS CREEK AT MEDICINE HAT	05AH005	X			X		X
49	SOUTH SASKATCHEWAN RIVER AT HIGHWAY NO. 41	05AK001	X			X		X
50	*SLAVE RIVER AT FITZGERALD	07NB001	X	X			X	X

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERPROVINCIAL WATERS (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
51	ST. MARY RESERVOIR NEAR SPRING COULEE	05AE025		X			X		X
52	TWELVE MILE CREEK NEAR CECIL	05BN002	X			X			X
53	U.I.D. CANAL NEAR HILL SPRING	05AD013	X			X			X
54	WAPITI RIVER NEAR GRANDE PRAIRIE	07GE001	X				X		X
55	WATERTON RESERVOIR	05AD026		X			X		X
56	W.I.D. CANAL NEAR CHESTERMERE LAKE	05BM003	X			X			X
7		05AE036		X					X
8	-GAUGING STATION LOCATED ON SASKATCHEWAN SIDE OF	05AE042	X				X		X
9	ALBERTA-SASKATCHEWAN BOUNDARY BUT OPERATED BY THE	11AB104		X			X		X
10	ALBERTA DISTRICT.	11AB091		X			X		X
11	*GAUGING STATIONS LOCATED IN ALBERTA BUT OPERATED	11AB009	X				X		X
12	BY THE REGINA DISTRICT	11AA031	X				X		X
13	CROSSING OF INT'L BOUNDARY	11AA005	X				X		X
14	*GAUGING STATIONS LOCATED IN ALBERTA BUT OPERATED	11AA025	X				X		X
15	BY THE YELLOWKNIFE DISTRICT	11AA029	X				X		X
16	*MITCHELL RESERVOIR NEAR ELKHATER	11AB099		X			X		X
17	MOUNTAIN VIEW IRRIGATION DISTRICT CANAL	05AD017	X				X		X
18	*NORTH FORK MILE RIVER ABOVE ST. MARY CANAL	11AA032	X				X		X
19	NORTH MILE RIVER NEAR INTERNATIONAL BOUNDARY	11AA001	X				X		X
20	*RESERVOIR NEAR ELKHATER	11AB090		X			X		X
21	ROLPH CREEK NEAR KIMBALL	05AE005	X				X		X
22	SAGE CREEK AT G RANCH NEAR WILD HORSE	11AA026	X				X		X
23	*SOUTH FORK MILE RIVER NEAR BARR	11AA033	X				X		X
24	*ST. MARY CANAL AT ST. MARY CROSSING	05AE029	X				X		X
25	ST. MARY RIVER AT INTERNATIONAL BOUNDARY	05AE027	X				X		X
26	*SHIFTCURRENT CREEK AT SHERBURNE	05AE033	X				X		X
27	VERDIGRIS COULEE NEAR THE MOUTH	11AA038	X				X		X
28	*WALBURGER COULEE BELOW DIVERSTONS	11AD006	X				X		X
29	WATERTON LAKE AT WATERTON PARK	05AD025		X			X		X
30	WATERTON RIVER NEAR WATERTON PARK	05AD003	X				X		X

* STATIONS OPERATED BY WATER SURVEY OF CANADA,
REGINA DISTRICT

* STATIONS LOCATED IN MONTANA

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERNATIONAL WATERS (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA 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 THE SASKATCHEWAN 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	MINERS COULEE NEAR INTERNATIONAL BOUNDARY	11AA029	X			X		X
16	*MITCHELL RESERVOIR NEAR ELKWATER	11AB099		X		X		X
17	MOUNTAIN VIEW IRRIGATION DISTRICT CANAL	05AD017	X			X		X
18	+NORTH FORK MILK RIVER ABOVE ST. MARY CANAL	11AA032	X			X		X
19	NORTH MILK RIVER NEAR INTERNATIONAL BOUNDARY	11AA001	X			X		X
20	*REESOR RESERVOIR NEAR ELKWATER	11AB090		X		X		X
21	ROLPH CREEK NEAR KIMBALL	05AE005	X			X		X
22	SAGE CREEK AT Q RANCH NEAR WILD HORSE	11AA026	X			X		X
23	+SOUTH FORK MILK RIVER NEAR BABB	11AA033	X			X		X
24	+ST. MARY CANAL AT ST. MARY CROSSING	05AE029	X			X		X
25	ST. MARY RIVER AT INTERNATIONAL BOUNDARY	05AE027	X				X	X
26	+SWIFTCURRENT CREEK AT SHERBURNE	05AE033	X			X		X
27	VERDIGRIS COULEE NEAR THE MOUTH	11AA038	X			X		X
28	*WALBURGER COULEE BELOW DIVERSIONS	11AB086	X			X		X
29	WATERTON LAKE AT WATERTON PARK	05AD025		X			X	X
30	WATERTON RIVER NEAR WATERTON PARK	05AD003	X				X	X

* STATIONS OPERATED BY WATER SURVEY OF CANADA,
REGINA DISTRICT

+ STATIONS LOCATED IN MONTANA

MAJOR DESIGNATION - FEDERAL ~~PROVINCIAL~~

SUBDESIGNATION - NATIONAL WATER QUANTITY INVENTORY (4)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	BM	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
1	ATHABASCA RIVER AT HINTON	07AD002	X				X		X
2	ATHABASCA RIVER BELOW McMURRAY	07DA001	X				X	X	
3	MCLEOD RIVER NEAR ROSEVEAR	07AG007	X				X		X
4	NORTH SASKATCHEWAN RIVER AT EDMONTON	05DF001	X				X		X
5	NOTIKEWIN RIVER AT MANNING	07HC001	X				X		X
6	PEACE RIVER AT DUNVEGAN BRIDGE	07FD003	X				X		X
7	PEMBINA RIVER AT JARVIE	07BC002	X				X		X
8	RED DEER RIVER AT RED DEER	05CC002	X				X		X
9	SMOKY RIVER AT WATINO	07GJ001	X				X		X
10	WABASCA RIVER AT WADLIN LAKE ROAD	07JD002	X				X		X
11	RICHARDSON RIVER NEAR THE MOUTH	07BD002	X						
12	STEEPSHANK RIVER NEAR FORT McMURRAY	07BN006	X						
13	WHISKEY JACK CREEK NEAR HINTON	07BD004	X						

OPERATED BY - ALBERTA GOVERNMENT

1	ATHABASCA RIVER NEAR OLD FORT	07DD011					X		
2	EMBARRAS BREAKTHROUGH TO NARVAH CREEK	07KF013	X				X		X
3	EMBARRAS RIVER BELOW DIVERGENCE	07JD003	X				X		X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - FEDERAL-PROVINCIAL AGREEMENTS (1)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	6M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
1	BEAVER RIVER ABOVE SYNCRUDE	07DA018	X		X		X	
2	BIRCH RIVER BELOW ALICE CREEK	07KE001	X		X		X	
3	CLEARWATER RIVER AT DRAPER	07CD001	X			X	X	
4	EUNICE CREEK NEAR HINTON	07AF005	X		X			X
5	FIREBAG RIVER NEAR THE MOUTH	07DC001	X		X		X	
6	GREGOIRE LAKE NEAR FORT McMURRAY	07CE001		X	X		X	
7	HANGINGSTONE RIVER AT McMURRAY	07CD004	X		X		X	
8	MACKAY RIVER NEAR FORT MACKAY	07DB001	X		X		X	
9	MARMOT CREEK MAIN STEM	05BF016	X		X			X
10	MUSKEG RIVER NEAR FORT MACKAY	07DA008	X		X		X	
11	RICHARDSON RIVER NEAR THE MOUTH	07DD002	X		X		X	
12	STEEP BANK RIVER NEAR FORT McMURRAY	07DA006	X		X		X	
13	WHISKEYJACK CREEK NEAR HINTON	07AD004	X		X			X
OPERATED BY - ALBERTA GOVERNMENT								
1	ATHABASCA RIVER NEAR OLD FORT	07DD011		X		X	X	
2	EMBARRAS BREAKTHROUGH TO MAMAMI CREEK	07KF015	X		X		X	
3	EMBARRAS RIVER BELOW DIVERGENCE	07DD003	X		X		X	
4	SHOXY RIVER ABOVE HELLS CREEK	07DA001	X		X			
5	SOUTH SASKATCHEWAN RIVER AT MEDICINE HAT	05AJ001	X			X		
6	ST. MARY RIVER NEAR LETHBRIDGE	05AE006	X			X		
7	STEEN RIVER AT STEEN RIVER	07DB004	X		X			
8	SWAN RIVER NEAR HINDU	07BJ001	X			X		
9	VERDIERIS LAKE TRIBUTARY NEAR MILK RIVER	11AN037	X			X		

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - RIVER BASIN MANAGEMENT (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
SYMBOL \$ INDICATING STATION LOCATED IN ALBERTA BUT OPERATED BY WSC YELLOWKNIFE DISTRICT									
1	BEAVERLODGE RIVER NEAR BEAVERLODGE	076D001	X				X		X
2	BOW RIVER BELOW BASSANO DAM	05BM004	X				X		X
3	BOW RIVER BELOW CARSELAND DAM	05BM002	X				X		X
4	CASTLE RIVER NEAR BEAVER MINES	05AA022	X					X	X
5	CHAIN LAKES RESERVOIR NEAR NANTON	05AB037		X				X	X
6	\$D06 RIVER NEAR FITZGERALD	07NB008	X					X	X
7	ETHEL LAKE NEAR COLD LAKE	06AC004		X			X		X
8	HAY RIVER NEAR MEANDER RIVER	07DB003	X				X		X
9	HIGHWOOD RIVER NEAR THE MOUTH	05BL024	X					X	X
10	KAKWA RIVER NEAR GRANDE PRAIRIE	076B002	X				X		X
11	KLESKUN HILLS MAIN DRAIN NEAR GRANDE PRAIRIE	07GE002	X				X		X
12	LESSER SLAVE LAKE AT FAUST	07BJ002		X			X		X
13	MARIE LAKE NEAR COLD LAKE	06AC005		X			X		X
14	MARTINEAU RIVER ABOVE COLD LAKE	06AF008	X					X	X
15	NORTH SASKATCHEWAN RIVER NEAR ROCKY MOUNTAIN HOUSE	05DC001	X				X		X
16	OLDMAN RIVER NEAR BROCKET	05AA024	X		X			X	X
17	PEACE RIVER AT PEACE RIVER	07HA001	X		X			X	X
18	RED DEER RIVER AT DRUMHELLER	05CE001	X					X	X
19	SMOKY RIVER ABOVE HELLS CREEK	07GA001	X				X		X
20	SOUTH SASKATCHEWAN RIVER AT MEDICINE HAT	05AJ001	X					X	X
21	ST. MARY RIVER NEAR LETHBRIDGE	05AE006	X					X	X
22	STEEN RIVER AT STEEN RIVER	07DB004	X				X		X
23	SWAN RIVER NEAR KINUSO	07BJ001	X					X	X
24	VERDIGRIS LAKE TRIBUTARY NEAR MILK RIVER	11AA039	X				X		X
25	WATSON RIVER AT WATSON STATION	05AA028							
26	CANADIAN CREEK NEAR FORESTRY ROAD	05BL022	X						
27	CHOCOMA RIVER NEAR HIGH LEVEL	07DC001	X						
28	CHRISTINA RIVER NEAR CHARD	07CE002	X						
29	CHRISTINA CREEK NEAR BLUE RIDGE	07AH002	X						
30	CLEAR RIVER NEAR BEAR CANYON	07FB009	X						
31	CLEARWATER RIVER ABOVE Limestone CREEK	05DB003	X						
32	CLEARWATER RIVER NEAR BOWERCOURT	05DB006	X						
33	DECAWAST RIVER AT FRANK	05AA008	X						
34	OUTBANK RIVER NEAR GRANDE PRAIRIE	076B001	X						
35	DAFF CREEK AT HIGHWAY NO. 44	076C006	X						
36	DEEP VALLEY CREEK NEAR VALLEYVIEW	076F006	X						
37	DEER CREEK MAIN STEP	05DA001	X						
38	DRIEDMEAT CREEK NEAR THE MOUTH	05FA018	X						
39	DRIFTWOOD RIVER NEAR THE MOUTH	076K007	X						
40	DRYWOOD CREEK NEAR THE MOUTH	05AB010	X						
41	DUTCH CREEK NEAR THE MOUTH	05AA026	X						
42	EAST PRAIRIE RIVER NEAR ENLDA	076F001	X						
43	ELEPH RIVER AT DANCE CREEK	056B004	X						
44	ELPEKA RIVER NEAR WORSLEY	076D013	X						
45	FISH CREEK NEAR PRIBBIT	056K001	X						
46	FLOYD CREEK NEAR MOYLE	076A003	X						
47	FRESH RIVER NEAR FORT ASSINIBOINE	076H001	X						
48	GHOST RIVER ABOVE WAPOROUS CREEK	056B010	X						
49	GRANDE PRAIRIE CREEK NEAR SEISNITH	076E003	X						

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NGRMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA 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	ATIMOSWE CREEK NEAR ELK POINT	05ED002	X			X		X
7	BATTLE RIVER NEAR PONOKA	05FA001	X				X	X
8	BEAVER CREEK NEAR BROCKET	05AB013	X			X		X
9	BEAVER RIVER NEAR GOODRIDGE	06AA001	X			X		X
10	BEAVERDAM CREEK NEAR COCHRANE	05CB005	X			X		X
11	BELLY RIVER NEAR GLENWOOD	05AD041	X				X	X
12	BERLAND RIVER NEAR THE MOUTH	07AC007	X			X		X
13	BERRY CREEK NEAR ROSE LYNN	05CH008	X			X		X
14	BIGKNIFE CREEK NEAR GADSBY	05FC002	X			X		X
15	BLACKMUD CREEK NEAR ELLERSLIE	05DF003	X			X		X
16	BLINDMAN RIVER NEAR BLACKFALDS	05CC001	X				X	X
17	BLOCK CREEK NEAR LEEDALE	05CC010	X			X		X
18	BOYER RIVER NEAR FORT VERMILION	07JF002	X			X		X
19	BRAZEAU RIVER BELOW CARDINAL RIVER	05DD007	X			X		X
20	BROWN CREEK AT FORESTRY ROAD	05DD004	X			X		X
21	BUCHANAN CREEK NEAR MANNING	07HC002	X			X		X
22	BUFFALO CREEK AT HIGHWAY NO. 41	05FE002	X			X		X
23	BULLPOUND CREEK NEAR WATTS	05CB004	X			X		X
24	CADOTTE RIVER AT OUTLET CADOTTE LAKE	07HB001	X			X		X
25	CARDINAL RIVER NEAR THE MOUTH	05DD008	X			X		X
26	CASTLE RIVER AT RANGER STATION	05AA028	X			X		X
27	CATARACT CREEK NEAR FORESTRY ROAD	05BL022	X				X	X
28	CHINCHAGA RIVER NEAR HIGH LEVEL LAKE	070C001	X				X	X
29	CHRISTINA RIVER NEAR CHARD	07CE002	X			X		X
30	CHRISTMAS CREEK NEAR BLUE RIDGE	07AH002	X			X		X
31	CLEAR RIVER NEAR BEAR CANYON	07FD009	X			X		X
32	CLEARWATER RIVER ABOVE LIMESTONE CREEK	05DB003	X			X		X
33	CLEARWATER RIVER NEAR DOVERCOURT	05DB006	X				X	X
34	CROWSNEST RIVER AT FRANK	05AA008	X				X	X
35	CUTBANK RIVER NEAR GRANDE PRAIRIE	07GB001	X			X		X
36	DAPP CREEK AT HIGHWAY NO. 44	07BC006	X			X		X
37	DEEP VALLEY CREEK NEAR VALLEYVIEW	07GF008	X			X		X
38	DEER CREEK MAIN STEM	05CA003	X			X		X
39	DRIEDMEAT CREEK NEAR THE MOUTH	05FA018	X			X		X
40	DRIFTWOOD RIVER NEAR THE MOUTH	07BK007	X				X	X
41	DRYWOOD CREEK NEAR THE MOUTH	05AD010	X				X	X
42	DUTCH CREEK NEAR THE MOUTH	05AA026	X			X		X
43	EAST PRAIRIE RIVER NEAR ENILDA	07BF001	X			X		X
44	ELBOW RIVER AT BRAGG CREEK	05BJ004	X				X	X
45	EUREKA RIVER NEAR WORSLEY	07FD013	X			X		X
46	FISH CREEK NEAR PRIDDIS	05BK001	X			X		X
47	FLAT CREEK NEAR BOYLE	07CA003	X			X		X
48	FREEMAN RIVER NEAR FORT ASSINIBOINE	07AH001	X			X		X
49	GHOST RIVER ABOVE WAIPOROUS CREEK	05BG010	X				X	X
50	GRANDE PRAIRIE CREEK NEAR SEXSMITH	07GE003	X			X		X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
51	GROS VENTRE CREEK NEAR DUNMORE	05AH037	X		X			X
52	HAYNES CREEK NEAR HAYNES	05CD006	X		X			X
53	HEART RIVER NEAR NAMPA	07HA003	X			X		X
54	HIGHWOOD RIVER AT DIEBEL'S RANCH	05BL019	X		X			X
55	HINES CREEK ABOVE GERRY LAKE	07FD011	X		X			X
56	HOUSE RIVER AT HIGHWAY NO. 63	07CB002	X		X			X
57	IOSEGUN RIVER NEAR LITTLE SMOKY	07GB003	X		X			X
58	IRON CREEK NEAR HARDISTY	05FB002	X		X			X
59	JACKFISH CREEK NEAR LA COREY	06AC001	X		X			X
60	JACKPINE CREEK AT WADLIN LAKE ROAD	07JD003	X		X			X
61	JAMES RIVER NEAR SUNDRE	05CA002	X		X			X
62	JUMPINGPOUND CREEK NEAR COX HILL	05BH013	X		X			X
63	JUMPINGPOUND CREEK NEAR THE MOUTH	05BH009	X			X		X
64	KEG RIVER AT HIGHWAY NO. 35	07HF002	X		X			X
65	KNEEHILLS CREEK NEAR DRUMHELLER	05CE002	X		X			X
66	LA BICHE RIVER AT HIGHWAY NO. 63	07CA011	X			X		X
67	LAFOND CREEK NEAR RED EARTH CREEK	07JC001	X		X			X
68	LALBY CREEK NEAR GIROUXVILLE	07BJ005	X		X			X
69	LITTLE PADDLE RIVER NEAR MAYERTHORPE	07BB005	X		X			X
70	LITTLE RED DEER RIVER NEAR THE MOUTH	05CB001	X			X		X
71	LITTLE RED DEER RIVER NEAR WATER VALLEY	05CB002	X		X			X
72	LITTLE SMOKY RIVER NEAR GUY	07GH002	X			X		X
73	LLOYD CREEK NEAR BLUFFTON	05CC009	X		X			X
74	LOGAN RIVER NEAR THE MOUTH	07CA012	X		X		X	X
75	LOVETT RIVER NEAR THE MOUTH	07BA003	X		X			X
76	LUTOSE CREEK NEAR STEEN RIVER	070B006	X		X			X
77	MACKAY CREEK AT WALSH	05AH002	X		X			X
78	MANYBERRIES CREEK AT BRODIN'S FARM	05AF010	X		X			X
79	MASKWA CREEK NO. 1 ABOVE BEARHILLS LAKE	05FA014	X		X			X
80	McLEOD RIVER ABOVE EMBARRAS RIVER	07AF002	X			X		X
81	MEADOW CREEK NEAR THE MOUTH	05AB029	X		X			X
82	MEANDER RIVER AT OUTLET HUTCH LAKE	070B005	X		X			X
83	MEDICINE RIVER NEAR ECKVILLE	05CC007	X			X		X
84	MEETING CREEK NEAR DONALDA	05FC006	X		X			X
85	MONITOR CREEK NEAR MONITOR	05GA003	X		X			X
86	MONTAGNEUSE RIVER NEAR HINES CREEK	07FD012	X		X			X
87	MUSKEG RIVER NEAR GRANDE CACHE	07GA002	X		X			X
88	NAMEPI CREEK NEAR THE MOUTH	05EC004	X		X			X
89	NORDEGG RIVER AT SUNCHILD ROAD	05DD009	X			X		X
90	NORTH RAM RIVER AT FORESTRY ROAD	05DC011	X		X			X
91	OLDMAN RIVER NEAR WALDRON'S CORNER	05AA023	X	X		X		X
92	OWL RIVER BELOW PICHE RIVER	07CA013	X		X		X	X
93	PADDLE RIVER AT BARRHEAD	07BB006	X		X			X
94	PADDLE RIVER NEAR ROCHFORD BRIDGE	07BB004	X		X			X
95	PARFLESH CREEK NEAR CHANCELLOR	05BM007	X		X			X
96	PEAVINE CREEK NEAR FALHER	07GH004	X		X			X
97	PEIGAN CREEK NEAR PAKOWKI ROAD	05AH041	X		X			X
98	PEKISKOC CREEK NEAR LONGVIEW	05BL023	X		X			X
99	PEMBINA RIVER BELOW PADDY CREEK	07BA001	X		X			X
100	PIGEON LAKE CREEK NEAR USONA	05FA019	X		X			X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
101	PINCHER CREEK AT PINCHER CREEK	05AA004	X			X			X
102	PINE CREEK NEAR GRASSLAND	07CA005	X			X			X
103	PINTO CREEK NEAR GRANDE PRAIRIE	07GC002	X			X			X
104	PIPESTONE CREEK BELOW BIGSTONE CREEK	05FA022	X			X			X
105	PONTON RIVER ABOVE BOYER RIVER	07JF003	X			X			X
106	PRAIRIE BLOOD COULEE NEAR LETHBRIDGE	05AD035	X			X			X
107	PRAIRIE CREEK BELOW LICK CREEK	05DB005	X			X			X
108	PRAIRIE CREEK NEAR ROCKY MOUNTAIN HOUSE	05DB002	X				X		X
109	PUNK CREEK NEAR THE MOUTH	06AB003	X			X			X
110	RACEHORSE CREEK NEAR THE MOUTH	05AA027	X			X			X
111	RAM RIVER NEAR THE MOUTH	05DC006	X				X		X
112	RAT CREEK NEAR CYNTHIA	07BA002	X			X			X
113	RAVEN RIVER NEAR RAVEN	05CB004	X				X		X
114	RAY CREEK NEAR INNISFAIL	05CE010	X			X			X
115	RED DEER RIVER ABOVE PANTHER RIVER	05CA004	X			X			X
116	RED DEER RIVER BELOW BURNT TIMBER CREEK	05CA009	X				X		X
117	REDEARTH CREEK NEAR RED EARTH	07JC002	X			X			X
118	REDWATER RIVER NEAR THE MOUTH	05EC005	X			X			X
119	REITA CREEK NEAR OUTLET ANGLING LAKE	06AD013	X			X			X
120	RENWICK CREEK NEAR THREE HILLS	05CE011	X			X			X
121	RIBSTONE CREEK NEAR CZAR	05FD005	X			X			X
122	RIBSTONE CREEK NEAR EDGERTON	05FD001	X			X			X
123	RIBSTONE CREEK TRIBUTARY NEAR CORDONATION	05FD006	X			X			X
124	ROSE CREEK NEAR ALDER FLATS	05DE007	X			X			X
125	ROSEBUD RIVER BELOW CARSTAIRS CREEK	05CE006	X			X			X
126	ROSS CREEK NEAR IRVINE	05AH003	X			X			X
127	SADDLE RIVER NEAR WOKING	07FD006	X			X			X
128	SAKWATAMAU RIVER NEAR WHITECOURT	07AH003	X			X			X
129	SAM LAKE TRIBUTARY NEAR SCHULER	05AH047	X			X			X
130	SAND RIVER NEAR THE MOUTH	06AB001	X			X			X
131	SAULTEAUX RIVER NEAR SPURFIELD	07BK005	X			X			X
132	SAWRIDGE CREEK NEAR SLAVE LAKE	07BK009	X			X			X
133	SHEEP COULEE NEAR CARSTAIRS	05CE019	X			X			X
134	SHEEP RIVER AT BLACK DIAMOND	05BL014	X				X		X
135	SIFFLEUR RIVER NEAR THE MOUTH	05DA002	X			X			X
136	SIMONETTE RIVER NEAR GOODWIN	07GF001	X			X			X
137	SOUNDING CREEK NEAR OYEN	05GA008	X			X			X
138	SOUSA CREEK NEAR HIGH LEVEL	07DA001	X			X			X
139	STIMSON CREEK NEAR PEKISKO	05BL007	X			X			X
140	STRAWBERRY CREEK NEAR THE MOUTH	05DF004	X			X			X
141	STRETTON CREEK NEAR MARWAYNE	05EE005	X			X			X
142	STURGEON RIVER NEAR FORT SASKATCHEWAN	05EA001	X			X			X
143	SUNDANCE CREEK NEAR BICKERDIKE	07AF010	X			X			X
144	SWAN RIVER NEAR SWAN HILLS	07BJ003	X			X			X
145	THREEHILLS CREEK BELOW RAY CREEK	05CE018	X			X			X
146	THREEHILLS CREEK NEAR CARBON	05CE007	X			X			X
147	THREEPOINT CREEK NEAR MILLARVILLE	05BL013	X			X			X
148	TODD CREEK AT ELTON'S RANCH	05AA006	X			X			X
149	TOMAHAWK CREEK NEAR TOMAHAWK	05DE009	X			X			X
150	VERMILION RIVER NEAR MARWAYNE	05EE007	X			X			X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
151	WABAMUN CREEK NEAR DUFFIELD	05DE003	X			X			X
152	WABASCA RIVER BELOW TROUT RIVER	07JB002	X				X	X	
153	WABASH CREEK NEAR PIBROCH	07BC007	X			X			X
154	WAINSCOTT COULEE NEAR BROWNVALE	07FD014	X			X			X
155	WAIPAROUS CREEK NEAR THE MOUTH	05BG006	X				X		X
156	WANDERING RIVER NEAR WANDERING RIVER	07CA006	X				X		X
157	WASKAHIGAN RIVER NEAR THE MOUTH	076G001	X				X		X
158	WASKATENAU CREEK NEAR WASKATENAU	05EC002	X			X			X
159	WEST ARROWWOOD CREEK NEAR ARROWWOOD	05BM014	X			X			X
160	WEST PRAIRIE RIVER NEAR HIGH PRAIRIE	07BF002	X				X		X
161	WEST WHITEMUD CREEK NEAR IRETON	05DF 07	X			X			X
162	WHITEMUD CREEK NEAR ELLERSLIE	05DF006	X			X			X
163	WHITEMUD RIVER NEAR DIXONVILLE	07HA005	X			X			X
164	WILDHAY RIVER NEAR HINTON	07AC001	X			X			X
165	WILLOW CREEK ABOVE CHAIN LAKES	05AB028	X				X		X
166	WILLOW CREEK NEAR NOLAN	05AB002	X			X			X
167	WILLOW RIVER NEAR WABASCA	07JA003	X			X			X
168	WOLF CREEK AT HIGHWAY NO. 16A	07AB003	X				X		X
169	WOLF RIVER AT OUTLET OF WOLF LAKE	06AB002	X				X	X	
20	WOVER RIVER NEAR PADDLE PRAIRIE	07JF004							
21	BUFFALO LAKE NEAR ERSKINE	05CB005							
22	CALLING LAKE AT HANSEN STATION	07CB001							
23	CANADIAN ST. MARY CANAL ABOVE RAYMOND CHUTE	05AF032							
24	CAYAN LAKE DIVERSION NEAR DUNDRE	05BH004							
25	CHIP LAKE AT OUTLET TO LOBSTOCK RIVER	078B008							
26	COLUMBIAN CREEK NEAR GRAND PRAIRIE	076E006							
27	COOKING LAKE AT COOKING LAKE	05CB012							
28	COYNE CREEK NEAR CHERWELL	078B014							
29	DEMPSEY INFLOW CANAL NEAR CESSFORD	05CB012							
30	DEERLOX CREEK NEAR HINTON	07AF004							
31	DICKSON DAM TUNNEL OUTLET	05CB007							
32	ELSON RIVER ABOVE ELSON FALLS	05BJ006							
33	ELSON RIVER BELOW GLENPOPE DAM	05BJ001							
34	ELDER CREEK AT HIGHWAY NO. 486	078B002							
35	ELZATER LAKE AT ELZATER	05AH023							
36	EMBARAS RIVER NEAR WEALE	07AF014							
37	FRUETT LAKE NEAR SMITH	078B008							
38	FISH CREEK AT BEN BOTTOM TRAIL	05CB013							
39	FISH CREEK ABOVE LITTLE FISH LAKE	05CB006							
40	FOPSTER RESERVOIR NEAR CESSFORD	05CB013							
41	GOLD CREEK NEAR FRANK	05AM030							
42	GREEN RIVER NEAR THE MOUTH	07AF015							
43	GREAT CREEK NEAR WHEATCART	078B008							
44	GULL LAKE AT ASPEN BEACH	05CT006							
45	HARGRAVES DIVERSION FROM BOWELDER CREEK	05AH031							
46	HARTLEY CREEK NEAR FURT MERRAY	078B009							
47	HOTTING LAKE NEAR BRIDLE	05CB011							
48	HIGHWOOD RIVER BELOW LITTLE BEN CANAL	078B004							
49	HIGHWOOD RIVER NEAR ALPERSYDE	05AH009							
50	HULL LAKE NEAR GOLD LAKE	05AH003							

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
1	ALBERTA POWER LIMITED COOLING POND OUTLET	05CG007	X			X		X
2	ATHABASCA RIVER NEAR WINDFALL	07AE001	X			X		X
3	BABETTE CREEK NEAR COLINTON	07CA008	X			X		X
4	BAPTISTE LAKE NEAR ATHABASCA LAKE	07BE002		X		X		X
5	BAPTISTE RIVER NEAR THE MOUTH	05DC012	X				X	X
6	BATTLE RIVER NEAR FORESTBURG	05FC001	X			X		X
7	BEAR CREEK NEAR VALHALLA CENTRE	07GE007	X			X		X
8	BEAVER LAKE AT RANGER STATION	06AA003		X		X		X
9	BEAVERTAIL CREEK NEAR HYTHE	07GD002	X			X		X
10	SELLY-ST. MARY DIVERSION CANAL	05AD021	X				X	X
11	BERRY CREEK BELOW DEADFISH CREEK	05CH016	X			X		X
12	BERRY CREEK RESERVOIR NEAR SUNNYNOOK	05CH014		X		X		X
13	BERRY CREEK RESERVOIR OUTLET	05CH011	X			X		X
14	BIRCH CREEK NEAR CONKLIN	07CE006	X			X	X	X
15	BLINDMAN RIVER NEAR BLUFFTON	05CC008	X			X		X
16	BLOOD INDIAN CREEK NEAR CABIN LAKE	05CK007	X			X		X
17	BLOOD INDIAN CREEK NEAR THE MOUTH	05CK001	X			X		X
18	B.R.D. DRAIN D NEAR VAUXHALL	05BN008	X			X		X
19	B.R.D. DRAIN T NEAR HAYS	05AG005	X			X		X
20	BOYER RIVER NEAR PADDLE PRAIRIE	07JF004	X			X		X
21	BUFFALO LAKE NEAR ERSKINE	05CD005		X		X		X
22	CALLING LAKE AT RANGER STATION	07CB001		X		X		X
23	CANADIAN ST. MARY CANAL ABOVE RAYMOND CHUTE	05AF032	X			X		X
24	CAVAN LAKE DIVERSION NEAR DUNMORE	05AH044	X			X		X
25	CHIP LAKE AT OUTLET TO LOBSTICK RIVER	07BB008		X		X		X
26	COLQUHOUN CREEK NEAR GRANDE PRAIRIE	07GE006	X			X		X
27	COOKING LAKE AT COOKING LAKE	05EB012		X		X		X
28	COYOTE CREEK NEAR CHERHILL	07BB014	X			X		X
29	DEADFISH INFLOW CANAL NEAR CESSFORD	05CH012	X			X		X
30	DEERLICK CREEK NEAR HINTON	07AF004	X			X		X
31	DICKSON DAM TUNNEL OUTLET	05CB007	X				X	X
32	ELBOW RIVER ABOVE ELBOW FALLS	05BJ006	X			X		X
33	ELBOW RIVER BELOW GLENMORE DAM	05BJ001	X				X	X
34	ELDER CREEK AT HIGHWAY NO. 686	07HB002	X			X		X
35	ELKWATER LAKE AT ELKWATER	05AH025		X		X		X
36	EMBARASS RIVER NEAR WEALD	07AF014	X			X		X
37	FANCETT LAKE NEAR SMITH	07BK008		X		X		X
38	FISH CREEK AT BOW BOTTOM TRAIL	05BK003	X			X		X
39	FISH CREEK ABOVE LITTLE FISH LAKE	05CG006	X			X		X
40	FORSTER RESERVOIR NEAR CESSFORD	05CH013		X		X		X
41	GOLD CREEK NEAR FRANK	05AA030	X			X		X
42	GREGG RIVER NEAR THE MOUTH	07AF015	X			X		X
43	GROAT CREEK NEAR WHITECOURT	07AG008	X			X		X
44	GULL LAKE AT ASPEN BEACH	05CC006		X		X		X
45	HARGRAVES DIVERSION FROM BOXELDER CREEK	05AH051		X		X		X
46	HARTLEY CREEK NEAR FORT MACKAY	07DA009	X			X	X	X
47	HASTINGS LAKE NEAR DEVILLE	05EB011		X		X		X
48	HIGHWOOD RIVER BELOW LITTLE BOW CANAL	05BL004	X				X	X
49	HIGHWOOD RIVER NEAR ALDERSYDE	05BL009	X			X		X
50	HILDA LAKE NEAR COLD LAKE	06AC003		X		X		X

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL SED.	8M	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
51	HINES CREEK NEAR FAIRVIEW	07FD008	X			X		X
52	IRON CREEK NEAR VIKING	05FB003	X			X		X
53	ISLE LAKE AT EUREKA BEACH	05EA008		X		X		X
54	JACKFISH RIVER BELOW CHRISTINA LAKE	07CE005	X			X		X
55	JOSLYN CREEK NEAR FORT MACKAY	07DA016	X			X		X
56	KENNEDY COULEE NEAR ACADIA VALLEY	05CK006	X			X		X
57	KILLARNEY LAKE TRIBUTARY NEAR CHAUVIN	05GA010	X			X		X
58	KYISKAP CREEK NEAR GRANUM	05AB038	X			X		X
59	LAC LA BICHE AT LAC LA BICHE	07CA004		X			X	X
50	LAC LA NONNE AT LAC LA NONNE	07BB007		X		X		X
61	LAC STE. ANNE AT ALBERTA BEACH	05EA006		X		X		X
62	LATERAL 10 SPILLWAY NEAR CHIN	05AG007	X			X		X
63	LESSER SLAVE LAKE AT SLAVE LAKE	07BJ006		X			X	X
64	LILY CREEK NEAR SLAVE LAKE	07BG004	X			X		X
65	LITTLE BERLAND RIVER AT HIGHWAY NO. 40	07AC008	X			X		X
66	LITTLE ELBOW RIVER ABOVE NIHAHI CREEK	05BJ009	X			X		X
67	LITTLE SMOKY RIVER AT LITTLE SMOKY	07GG002	X			X		X
68	LOMOND LATERAL NEAR HEADGATE	05AC017	X			X		X
69	LOYALIST CREEK NEAR CONSORT	05GA013	X			X		X
70	MACKAY CREEK NEAR GRABURN GAP	05AH042	X			X		X
71	MACKAY RIVER ABOVE DUNKIRK RIVER	07DB005	X			X		X
72	MANATOKAN CREEK NEAR IRON RIVER	06AC009	X			X		X
73	McALPINE CREEK (EAST FORK) NEAR ELKWATER	05AH043	X			X		X
74	McGREGOR LAKE INFLOW NEAR MILD	05AC024	X			X		X
75	McGREGOR-TRAVERS CANAL NEAR CHAMPION	05AC025	X			X		X
76	McLEOD RIVER NEAR CADOMIN	07AF013	X			X		X
77	McLEOD RIVER NEAR WHITECOURT	07AG004	X			X		X
78	MICHICHI CREEK AT DRUMHELLER	05CE020	X			X		X
79	MILK RIVER RIDGE RESERVOIR	05AF030		X		X		X
80	MINISTIK LAKE NEAR NEW SAREPTA	05EB013		X		X		X
81	MICHELON LAKE AT PROVINCIAL PARK	05EB014		X		X		X
82	MONITOR CREEK NEAR CONSORT	05GA011	X			X		X
83	MOORE LAKE NEAR COLD LAKE	06AC002		X		X		X
84	MOOSEHILLS CREEK NEAR ELK POINT	05ED003	X			X		X
85	MOOSELAKE RIVER NEAR FRANCHERE	06AC006	X			X		X
86	MOSQUITO CREEK NEAR THE MOUTH	05AC031	X			X		X
87	MURIEL LAKE NEAR GURNEYVILLE	06AC007		X			X	X
88	NINE MILE COULEE NEAR LETHBRIDGE	05AE042	X			X		X
87	NORTH SASKATCHEWAN RIVER NEAR LODGEPOLE	05DE006		X		X		X
90	OLDMAN RIVER NEAR THE MOUTH	05AG006	X				X	X
91	PADDLE RIVER AT HWY. 764	07BB013		X		X		X
92	PADDLE RIVER NEAR ANSELMO	07BB011	X			X		X
93	PADDLE RIVER NEAR SANGUDO	07BB012		X		X		X
94	PAINTEARTH CREEK NEAR HALKIRK	05FC004	X			X		X
95	PARLBY CREEK AT ALIX	05CD007	X			X		X
96	PEACE RIVER AT FORT VERMILION	07HF001		X		X		X
97	PEERLESS LAKE NEAR PEERLESS LAKE	07JB001		X		X		X
98	PEMBINA RIVER NEAR ENTWISTLE	07BB002	X				X	X
97	PIGEON LAKE AT GRANDVIEW	05FA013		X		X		X
100	PONY CREEK NEAR CHARD	07CE003	X			X		X

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED			OPERATION		ACCESS	
			FLOW	LEVEL	SED.	BM	12M	REMOTE	NORMAL
OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT									
101	PORTER CREEK ABOVE BAPTISTE LAKE	07BE003	X			X			X
102	POTHOLE TURNOUT NEAR MAGRATH	05AE038	X			X			X
103	REDWATER RIVER NEAR VIMY	05EC007	X			X			X
104	REDWILLOW CREEK NEAR RED WILLOW	05FC005	X			X			X
105	REDWILLOW RIVER NEAR BEAVERLODGE	076D003	X				X		X
106	ROBERT CREEK NEAR ANZAC	07CE004	X			X		X	
107	RUSH LAKE DRAIN NEAR NEW DAYTON	05AF031	X			X			X
108	SALT CREEK NEAR GROUARD	07BF009	X			X			X
109	SNAKE CREEK NEAR VULCAN	05AC030	X			X			X
110	SOUNDING CREEK NEAR CHINDOK	05GA012	X			X			X
111	SOUTH HEART RESERVOIR NEAR McLENNAN	07BF008				X			X
112	SOUTH WABASCA LAKE NEAR DESMARAIS	07JA002		X		X			X
113	SPRAY RIVER AT BANFF	05BC001	X				X		X
114	STEELE LAKE NEAR JARVIE	07BC005		X		X			X
115	STIRLING LAKE OUTFLOW NEAR STIRLING	05AF029	X			X			X
116	STONY CREEK NEAR TAMATINAW	07BE004	X			X			X
117	STURGEON LAKE AT WILLIAMSON PARK	07GH003		X		X			X
118	STURGEON RIVER NEAR MAGNOLIA BRIDGE	05EA010	X			X			X
119	STURGEON RIVER NEAR VILLENEUVE	05EA005	X				X		X
120	SYLVAN LAKE AT SYLVAN LAKE	05CC003		X		X			X
121	TEEPEE CREEK NEAR LA CRETE	07JD004	X			X			X
122	TINDASTOLL CREEK NEAR MARKERVILLE	05CC012	X			X			X
123	TRAP CREEK NEAR LONGVIEW	05BL027	X			X			X
124	TROUT CREEK NEAR GRANUM	05AB005	X			X			X
125	UNNAMED CREEK NEAR FORT MACKAY	07DA011	X			X		X	
126	UTIKUMA LAKE NEAR NIPISI	07JA001		X		X			X
127	VERMILION PARK LAKE NEAR VERMILION	05EE008		X		X			X
128	VERMILION RIVER AT VEGREVILLE	05EE009	X			X			X
129	VERMILION RIVER TRIBUTARY NEAR BRUCE	05EE006	X			X			X
130	WABAMUN LAKE AT WABAMUN	05DE002		X			X		X
131	WABATANISK RIVER AT HIGHWAY NO. 676	076H005	X			X			X
132	WAMPUS CREEK NEAR HINTON	07AF003	X			X			X
133	WASKASOO CREEK AT RED DEER	05CC011	X			X			X
134	WATERTON RIVER NEAR GLENWOOD	05AD028	X				X		X
135	WATERTON-BELLY DIVERSION CANAL	05AD027	X				X		X
136	WEILLER CREEK NEAR WETASKAWIN	05FA024	X			X			X
137	WEST ARROWWOOD CREEK NEAR ENSIGN	05BM018	X			X			X
138	WHITE EARTH CREEK NEAR SMOKY LAKE	05EC006	X			X			X
139	WILLOW CREEK BELOW LANE CREEK	05AB039	X			X			X
140	WILLOW CREEK NEAR CLARESHOLM	05AB021	X				X		X
141	WINAGAMI LAKE AT PROVINCIAL PARK	07BF006		X		X			X
142	YOUNG CREEK NEAR CASTOR	05FC007	X			X			X

OPERATED BY - ALBERTA GOVERNMENT

PAD AREA

1	ATHABASCA RIVER ABOVE JACKFISH CREEK	07DD007		X			X		X
2	BIG POINT CHANNEL BELOW DIVERGENCE	07DD006 MISC	X				X		X
3	CHEVAL DES QUATRE FOURCHES AT QUATRE FOURCHES	07KF001		X		X			X
4	CHEVAL DES QUATRE FOURCHES BELOW FOUR FORKS	07KF006 MISC	X				X		X
5	FLETCHER CHANNEL BELOW DIVERGENCE	07DD004 MISC	X				X		X

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL	SED.	6M	12M	REMOTE
OPERATED BY - ALBERTA GOVERNMENT								
6	GOOSE ISLAND CHANNEL BELOW DIVERGENCE	07DD005	MISC	X			X	X
7	MAMAWI LAKE CHANNEL AT DOG CAMP	07KF010	MISC	X		X		X
8	PRAIRIE RIVER NEAR LAKE CLAIRE	07KF014	MISC	X		X		X
9	REVILLON COUPE BELOW RIVIERE DES ROCHERS	07NA004	MISC	X				X
10	RIVIERE DES ROCHERS AT BEN HOULE'S CABIN	07NA002	MISC	X		X		X
OTHER AREAS OF ALBERTA								
1	AETNA CREEK AT HIGHWAY NO. 501	05AE912		X		X		X
2	ATIM CREEK NEAR SPRUCE GROVE	05EA009		X		X		X
3	BEARBERRY CREEK NEAR SUNDRE	05CA011		X		X		X
4	BEAR LAKE NEAR CLAIRMONT	07GE004		X	X	X		X
5	BEDDINGTON CREEK NEAR CALGARY	05BH904		X		X		X
6	BIGELOW RESERVOIR NEAR WIMBOURNE	05CE901		X		X		X
7	B.R.I.D. WESTERN BLOCK LATERAL A NEAR HEADGATES	05AC013	X			X		X
8	COLUMBINE CREEK NEAR THE MOUTH	06AA004	X			X		X
9	COTTONWOOD CREEK NEAR TWIN BUTTE	05AD903	X			X		X
10	DRIEDMEAT LAKE AT OUTFLOW	05FA020		X		X		X
11	ELBOW RIVER AT SARCEE BRIDGE	05BJ010	X			X		X
12	ERITH RIVER BELOW HANLAN CREEK	07AF907	X			X		X
13	ETZIKOM COULEE NEAR NEMISKAM	05AF905	X			X		X
14	FALLEN TIMBER CREEK NEAR SUNDRE	05CA012	X			X		X
15	FOOTHILLS CREEK NEAR PINCHER CREEK	05AD901	X			X		X
16	GALWEY BROOK NEAR WATERTON PARK	05AD904	X			X		X
17	KRAWCHUK DRAINAGE NEAR McLENNAN	07HA902	X			X		X
18	LEE CREEK BELOW CONFLUENCE OF EAST FORK	05AE904	X			X		X
19	L.N.I.D. CANAL BELOW KEHO OUTFLOW	05AC026	X			X		X
20	L.N.I.D. MONARCH BRANCH CANAL BELOW HEADWORKS	05AC026	X			X		X
21	LODGE CREEK AT HIGHWAY NO. 41	11AB902	X			X		X
22	MUSKEG CREEK NEAR WESTROSE	05FA912	X			X		X
23	NOSE CREEK NEAR THE MOUTH	05BH901	X			X		X
24	PADDLE RIVER RESERVOIR NEAR ROCHFORD BRIDGE	07BB914		X			X	X
25	PARLBY CREEK NEAR MIRROR	05CD902	X			X		X
26	POINTE-AUX-PINS CREEK NEAR ARDROSSAN	05EB902	X			X		X
27	POINTE-AUX-PINS TRIBUTARY 1 NEAR ARDROSSAN	05EB909	X			X		X
28	POINTE-AUX-PINS TRIBUTARY 2 NEAR ARDROSSAN	05EB910	X			X		X
29	POINTE-AUX-PINS TRIBUTARY 3 NEAR ARDROSSAN	05EB911	X			X		X
30	ROMED CREEK ABOVE ROMED LAKE	07BB903	X			X		X
31	RYCROFT SURVEY #3 NEAR RYCROFT	07FD910	X			X		X
32	SQUAW COULEE DIVERSION BELOW SQUAW COULEE DAM	05AC917	X			X		X
33	TODD CREEK NEAR HIGHWAY NO. 22	05AA909	X			X		X
34	TOUGH CREEK NEAR BEAZER	05AE039	X			X		X
35	VERMILION RIVER DRAINAGE NEAR HOLDEN	05EE913	X			X		X
36	VIXEN CREEK NEAR BELLOY	07FD921	X			X		X
37	WHITBURN DRAINAGE PROJECT NEAR SPIRIT RIVER	07FD912	X			X		X
38	YOUNG DRAINAGE PROJECT NEAR SPIRIT RIVER	07FD913	X			X		X

MAJOR DESIGNATION - CONTRIBUTED DATA

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED		OPERATION		ACCESS	
			FLOW	LEVEL	SED.	BM	12M	REMOTE
<u>OPERATED BY - TRANSALTA UTILITIES LTD.</u>								
1	BARRIER LAKE NEAR SEEBE	05BF024		X			X	X
2	BOW RIVER BELOW BEARSPAW DAM	05BH008	X				X	X
3	BOW RIVER NEAR SEEBE	05BE004	X				X	X
4	BRAZEAU RESERVOIR	05DD006		X			X	X
5	BRAZEAU RIVER BELOW BRAZEAU PLANT	05DD005	X				X	X
6	CASCADE POWER DIVERSION NEAR BANFF	05BD004	X				X	X
7	GHOST LAKE NEAR COCHRANE	05BE005		X			X	X
8	GHOST RIVER DIVERSION TO LAKE MINNEWANKA	05BB003	X				X	X
9	GHOST RIVER NEAR BLACK ROCK MOUNTAIN	05BB002	X			X		X
10	GOAT CREEK AT BANFF PARK BOUNDARY	05BC008	X				X	X
11	KANANASKIS RIVER ABOVE POCATERRA CREEK	05BF003	X				X	X
12	KANANASKIS RIVER BELOW BARRIER DAM	05BF025	X				X	X
13	LAKE ABRAHAM NEAR NORDEGG	05DC009		X			X	X
14	LAKE MINNEWANKA NEAR BANFF	05BD003		X			X	X
15	LOWER KANANASKIS LAKE AT POCATERRA DAM	05BF009		X			X	X
16	MUD LAKE DIVERSION CANAL	05BF013	X			X		X
17	NORTH SASKATCHEWAN RIVER BELOW BIGHORN PLANT	05DC010	X				X	X
18	SPRAY POWER DIVERSION AT CANMORE	05BE007	X				X	X
19	SPRAY RESERVOIR AT THREE SISTERS DAM	05BC006		X			X	X
20	UPPER KANANASKIS LAKE AT MAIN DAM	05BF005		X			X	X

OPERATED BY - CITY OF CALGARY

1	GLENMORE RESERVOIR AT CALGARY	05BJ008		X			X	X
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MAJOR DESIGNATION - SEDIMENT PROGRAM

NO.	STATION NAME	STATION NUMBER	HYDROMETRIC DESIGNATION	OPERATION		ACCESS	
				BM	12M	REMOTE	NORMAL
<u>FEDERAL - 4</u>							
1	SLAVE RIVER AT FITZGERALD	07NB001	F-2	X		X	
<u>FEDERAL - PROVINCIAL - 3</u>							
1	OLDMAN RIVER NEAR LETHBRIDGE	03AD007	F-2	X			X
2	PEACE RIVER AT PEACE RIVER	07HA001	FP-2	X			X
<u>PROVINCIAL - 1</u>							
1	OLDMAN RIVER NEAR WALDRONS CORNER	05AA023	FP-3	X			X
<u>PROVINCIAL - 2</u>							
1	OLDMAN RIVER NEAR BROCKET	05AA024	FP-2	X			X

APPENDIX "B"

SCHEDULE "B"

COSTING PROCEDURE

COMPUTATION OF ALBERTA SHARE

CALCULATION OF ANNUAL PAYMENTSA. COSTING PROCEDURE

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

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, maintenance of field transportation and equipment are included costs.

A P P E N D I X "B"II. Sediment Stations**SCHEDULE "B"**

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

COSTING PROCEDUREIII. New Construction, Major Maintenance, and Reconstruction**COMPUTATION OF ALBERTA SHARE**

Construction costs include both new construction and major maintenance and are shared on the basis of station designation as being 'Federal', 'Federal-Provincial' or 'Provincial'. If a station is designated as 'Federal-Provincial' the cost would be shared fifty-fifty; otherwise 100% to either Canada or Alberta. Water level instrumentation is at the expense of the agency operating the station irrespective of designation; 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 as standard units have been developed and assigned. The figures used are based upon experience over the years and have been adopted as standards in the Western and Northern Region.

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 preparation of the annual report.

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 designation as being 'Federal', 'Federal-Provincial' or 'Provincial'. If a station is designated as 'Federal-Provincial' the cost would be shared fifty-fifty; otherwise 100% to either Canada or Alberta. Water level instrumentation is at the expense of the agency operating the station irrespective of designation; 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 upon experience over the years and have been adopted as standards in the Western and Northern Region.

Due to the complexity of the operation it is necessary to apply a number of practical considerations which are described as follows:

HYDROELECTRIC AND SEDIMENT COSTING FOR 1970-71 (Stations Operated by WEC-Alberta)

I. Stations Operated by Regina

Twelve F stations in Alberta were 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 share. Although these stations have not been utilized in the costing, they are included in Tables 4, 5 and 6 of the main body of this report, as are the following stations operated in the NWT.

II. Stations Operated by Yellowknife

Three F stations and one FP station in Alberta are operated by the Northwest Territories District. The federal stations have not been included in Table I of this Appendix as they are of no value in computing the provincial share. As the Yellowknife salaries and O&M to operate the FP station on 'Dog River near Fitzgerald' were not readily available from accounting statements, it was necessary to determine these costs based upon Alberta costs. The one FP station operated by Yellowknife isn't included in Table I, but comprises 1.80 weighted units. Based upon the unit cost of \$4,921.32 the cost of operating 'Dog River near Fitzgerald' is \$8,858.32. One-half of this amount was added to the share of each party in Table B-I to obtain the costs shown in 'Summary of Financial Considerations' and Tables 14 and 15 in the main body of the report.

III. Depreciation

Depreciation was determined by utilizing standard accounting and 'national' procedures. 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.

	Salaries	O & M	TOTAL	Federal	Provincial
I. Stations Operated by Regina					
Twelve F stations in Alberta...					
II. Stations Operated by Yellowknife	1297	144,788	463,957	463,957	-
Three F stations and one FP station...					
III. Depreciation					
Depreciation was determined by...					
Total	179.25	561,789	314,945	476,734	463,957
	447(1)	388.78	1,134,306	426,906	1,770,200
				441,424	928,776

Unit Cost = \$1,767.88 Unit Salary = \$7,103.46 One Unit = \$4,921.32

1. Does not include sediment stations as they are already included in the hydroelectric station numbers.

TABLE B-1

HYDROMETRIC AND SEDIMENT COSTINGS FOR 1990-91 (Stations Operated by WSC-Alberta)

Category	Month	Number of Stations	Weight Factor	Weighted Units	Salaries	O & M	TOTAL	Share	
								Federal	Provincial
FEDERAL									
Normal Access Flow	12	31	1.00	31.00					
	8	59	0.75	44.25					
Normal Access W.L.	12	7	0.40	2.80					
	8	1	0.25	0.25					
Remote Access Flow	12	2	1.80	3.60					
Sub-total				81.90	258,269	144,788	403,057	403,057	-
FEDERAL-PROVINCIAL									
Normal Access Flow	12	40	1.00	40.00					
	8	143	0.75	107.25					
Normal Access W.L.	12	1	0.40	0.40					
	8	3	0.25	0.75					
Remote Access Flow	12	4	1.80	7.20					
	8	13	1.50	19.50					
Remote Access W.L.	8	1	0.95	0.95					
Normal Access Sediment	8	2	1.05	2.10					
Sub-total				178.15	561,789	314,945	876,734	438,367	438,367
PROVINCIAL									
Normal Access Flow	12	13	1.00	13.00					
	8	82	0.75	61.50					
Normal Access W.L.	12	4	0.40	1.60					
	8	34	0.25	8.50					
Remote Access Flow	8	8	1.50	12.00					
Remote Access W.L.	8	1	0.95	0.95					
Normal Access Sediment	8	2	1.05	2.10					
Sub-total				99.65	314,242	176,167	490,409	-	490,409
TOTAL		447(1)		359.70	1,134,300	635,900	1,770,200	841,424	928,776

Unit O&M = \$1,767.86

Unit Salary = \$3,153.46

One Unit = \$4,921.32

(1) Does not include sediment stations as they are already included in the hydrometric station numbers.

SCHEDULE "D"

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

ANNUAL PAYMENT FOR 1990/91 TO BE PAID TO CANADA BY ALBERTA

	<u>Operation</u>	<u>Construction</u>	<u>Total</u>
a) Streamflow and water level installations	\$891.7K	\$63.7K	\$955.4K
b) Sediment installations	\$ 15.8K		\$ 15.8K
			<hr/>
			\$971.2K


A P P E N D I X "C"
ANNUAL PAYMENT

Administrator for Alberta

SCHEDULE "D"

Administrator for Canada

1990-91


(Signature)


(Signature)

Director
Technical Services Division
Water Resources Management Services
ALBERTA ENVIRONMENT

Director
Inland Waters Directorate
Conservation & Protection
ENVIRONMENT CANADA

SCHEDULE "D"

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

ANNUAL PAYMENT FOR 1990/91 TO BE PAID TO CANADA BY ALBERTA

	<u>Operation</u>	<u>Construction</u>	<u>Total</u>
a) Streamflow and water level installations	\$891.7K	\$63.7K	\$955.4K
b) Sediment installations	\$ 15.8K		\$ 15.8K
			<hr/>
	ANNUAL PAYMENT		\$971.2K

Administrator for Alberta



(Signature)

Director
 Technical Services Division
 Water Resources Management Services
 ALBERTA ENVIRONMENT

Administrator for Canada



(Signature)

Director
 Inland Waters Directorate
 Conservation & Protection
 ENVIRONMENT CANADA

A P P E N D I X "D"

ESTIMATE OF

ALBERTA PAYMENT FOR 1992/93

ESTIMATES FOR SCHEDULE "D"

Sept.18/91

1992/93

1. STATION UNIT COSTS

1.1 Unit Salary Costs for 1992/93	(-)	\$ 3,734.02
(Total est. salaries = \$1,300,000 Total Units = 348.15)		
1.2 Unit O&M costs for 1992/93		\$ 1,912.11
1990/91 unit O&M 1,767.86 plus inflation factor of 4% for 1991/92 plus additional 4% inflation for 1991/92		
TOTAL UNIT COST		\$ 5,646.13

2. PROVINCIAL STATION UNITS (Operated by WSC)

Provincial Station Units in 1992/93		
Hydrometric		174.925
Sediment		2.625

3. ALBERTA CREDIT FOR PAD OPERATIONS (1992/93)

10.78 Station Units x \$5,646.13		\$60,865.
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4. ALBERTA SHARE OF MAINTENANCE & REPLACEMENT OF HYDROMETRIC EQUIPMENT AND VEHICLES 1992/93

Total depreciation during 1990/91 was \$122,700 and it is estimated that this amount will remain relatively stable for 1992/93. Total Hydrometric units for 1992/93 are estimated to be 345.00 with Alberta's components of this total being 174.925 units. Alberta's share of Hydrometric depreciation is thus estimated at $174.925/345.00 \times \$122,700$\$62,212

5. ALBERTA SHARE OF DEPRECIATION SEDIMENT EQUIPMENT 1992/93

It is estimated that Alberta's share will remain the same as in 1990/91.....\$ 150

\$ 57,425

**6. ESTIMATED ALBERTA SHARE OF
HYDROMETRIC COSTS IN 1992/93**

6.1 Hydrometric operations conducted by WSC, Alberta $174.925 \times \$5,646.13$	\$	987,649
6.2 Alberta Credits (Item 3).....(-)		60,865
6.3 Dog River near Fitzgerald ($0.9 \times 5,646.13$).....		5,082
6.4 Alberta share of Hydrometric Depreciation (Item 4).....		62,212
6.5 Alberta credit for Hydrometric Depreciation $62,212/174.725 \times 10.78$(-)		3,834
		<hr/>
	\$	990,244

**7. ESTIMATED SHARE OF SEDIMENT
COSTS IN 1992/93**

7.1 Sediment network operations ($2.625 \times \$5,646.13$).....	\$	14,821
7.2 Sediment Equipment Depreciation.....		150
7.3 Analysis Costs for Alberta Sediment operations (Based on 90/91 activities).....		0
		<hr/>
	\$	14,971

8. CONSTRUCTION AND MAINTENANCE PROGRAM

Based on average Alberta Share of Maintenance required in past few years to maintain the network to meet health and safety and operating requirements. It does not provide funds for extraordinary circumstances such as for flood damages, and vandalism, for power installations and for new hydrometric stations.....

.....	\$	52,000
Depreciation		
Construction Equipment Depreciation ($174.925/345.00 \times \$10,700$).....		5,425
		<hr/>
	\$	57,425

9. TOTAL ESTIMATED ALBERTA SHARE FOR 1992/93

EMPLOYEE	CLASSIFICATION	SALARY AS OF APR 1/92	SALARY WHEN INCURRED 1992/93	TOTAL SALARY
Hydrometric (Item 6)			\$ 990,244	
Sediment (Item 7)			14,971	
Construction and Maintenance (Item 8)			57,425	
T O T A L			\$1,062,640	
USE:			\$1,063,000	

Staff - One Vacancy at SA-ESS-3 level	41,300
Overtime for Hydrometric Work	10,000
Reduction for Training/Non-Hydrometric Assignments	-10,000
potentially a 3% wage increase	20,000

TOTAL ESTIMATED SHAREABLE SALARIES: \$1,130,340

USE: \$1,130,340

TOTAL UNITS IN 1992/93 : 348.18

UNIT SALARY : \$3,234.02

FEDERAL UNITS: 176.60

PROVINCIAL UNITS: 171.58

I. Normal Access

A 12 month discharge station defines the hydrology regime under both ice cover and open water. The period of operation for an 8 month discharge station is normally March 1 to October 31 and is intended to define the period beginning with snowmelt runoff to freeze-up 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. Stations Operated by Yellowknife

II. Remote Access

Salary and operation costs exceed those for normal access stations. This is to account for aircraft costs, additional preparation and travelling time on a field trip 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>
1.80	12 month discharge
1.50	8 month discharge
1.10	12 month water level
0.95	8 month water level

III. Sediment Stations

The third category of stations requiring weighting factors are sediment stations. A hydrometric station designated 'Federal' for the collection of streamflow data may be designated either 'Federal', 'Federal-Provincial' or 'Provincial' for sediment data. Therefore, the resultant sediment weighting factors, as listed, are only the incremental sediment costs.

<u>Weight Factor</u>	<u>Type of Station</u>
1.05	12 month normal access Q & 8 month sediment
1.05	8 month normal access
1.25	12 month remote access Q & 8 month sediment
1.25	8 month remote access
0.45	8 month research

SPECIAL CONSIDERATIONS

Due to the complexity of the operation it is necessary to apply a number of practical considerations which are described as follows:

