CANADA - ALBERTA

MEMORANDUM OF AGREEMENT

FOR

WATER QUANTITY SURVEYS

ANNUAL REPORT 1992-93

TO: M. Balshaw
Administrator for Canada

P. Valentine
Administrator for Alberta

We hereby submit an annual report for fiscal year 1992-93 covering activities under the Memorandum of Agreement for Water Quantity Surveys for the Province of Alberta.

Government of Canada	Province of Alberta
R. Boals Environment Canada	for B. Kuhnke Alberta Environmental Protection
M. O. Spitzer Environment Canada	G. Coles Alberta Environmental Protection

Members

Alberta Co-ordinating Committee

January, 1994

EXECUTIVE SUMMARY

Three meetings of the Canada/Alberta Co-ordinating Committee and one National Co-ordinator's Meeting were held in 1992/93. Topics discussed at the provincial meetings included network and program adjustments, the modernization pilot program progress, future directions, the irrigation return flow network, and modelling technology and applications. The major topic of the national meeting was the potential re-direction of Environment Canada's efforts.

The year was ushered in with the threat of a severe drought and it remained dry until mid June when the year's only major storm event occurred in the southern portion of the Bow River basin. Dry conditions prevailed throughout the year in northern Alberta which was exemplified by record low runoff in the Beaver River basin (10% of the long term mean flow). A blizzard and record low temperatures in southern Alberta in late August was a precursor to a cold winter, the first in a number of years.

The change in network from 1991/92 to 1992/93 included two new stations, one discontinued station, and seven designation changes. During 1992/93 one new station was built (for and operated by an outside agency), two were discontinued and there were five designation changes. The construction program during 1992/93 consisted of the building of the aforementioned gauging station, major maintenance work at 41 sites and electrification of six additional stations bringing the total of electrified stations to 134.

Staff training was primarily slanted toward the delivery of the modernization pilot program including a workshop on electronic data acquisition systems, computers and their applications and workshops conducted to familiarize non pilot project staff with the new instruments and procedures. All Water Survey staff were provided with a refresher two day First Aid course and were given the opportunity to attend a number of environmental stewardship seminars.

The modernization pilot project was reduced from 106 localities to 56 and, with the exception of the Peace-Athabasca Delta (PAD) area, instruments were in place by mid November 1992. Insufficient instruments were available to equip the six sites in the PAD area. Operational difficulties continued to plague the pilot program due to late delivery of instruments and equipment and because of malfunctions of the delivered equipment due mostly to power supply design problems.

Alberta Environmental Protection (AEP) paid $1,062,600 for the program in 1992/93. The provinces share was calculated as $1,030,991; resulting in a net overpayment of $30,149. The reasons for delivering the program for less than had been estimated included a reduction in air charter costs, a significant reduction in motor vehicle repairs and the purchase of considerably less hydrometric equipment, material and supplies. Most of the overpayment, $30,149, was refunded to the province as a credit on the second quarterly payment of 1993/94.

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1.0 INTRODUCTION

This is the eighteenth 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.

When the Memorandum of Agreement was signed on March 31, 1975 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 designed '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 governmental fiscal constraints and, particularly in the case of the Federal

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

Government, changes in policy and program support, resources to meet these needs have been reduced. The number of hydrometric stations in Alberta peaked in 1986 and numbers have declined gradually since. It is anticipated that further reductions will occur during the period of governmental deficit reductions.

It is clear that over the next decade, technological and operational changes must be made to increase efficiency 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 1992 runoff conditions are addressed.

Section 3.0 summarizes the hydrometric network. Network changes for 1992-93 are itemized and Tables 2 to 4 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 1993 are also described. A brief summary of network planning activities is provided and histograms of gauging station maturity are presented.

Operational considerations of the 1992-93 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, the construction and maintenance program, the hydrometric operation, and the modernization pilot project. The cost of operation is addressed in a detailed manner.

Section 5.0 presents an overview of planned and potential future projects.

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 flows 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 the south is considerably denser than that in central Alberta and very much denser than in the north. Sufficient water to satisfy irrigation requirements and to meet the demands of instream flow needs is particularly challenging in southern Alberta.

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 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.

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. To this end a Canada Water Act Agreement, the "Northern Rivers Basin Study" between the governments of Canada and Alberta was signed in September, 1991. A major component of this study will be a modelling of the major river reaches requiring accurate flow records at strategic locations. Water Survey of Canada continued to test acoustic flow meters (AFFRA) on the Athabasca River (at Hinton and near Obed) to potentially improve ice-affected streamflow data. To date, results have been disappointing.

2.2 1992/93 RUNOFF CONDITIONS

With the exception of the Bow River basin, surface water runoff in 1992 was below to much below the long term average. In the Bow River basin recorded volumes of flow were slightly above the average recorded during the period of record. Flow volumes in southern Alberta were the lowest since 1988 and a record low was recorded in the Beaver River basin.

Volumes of runoff for January 1 to October 31, 1992 for some of the major basins in Alberta are detailed in Table 1 which follows:

TABLE 1

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

Station Number	Station Name	1992 Accumulated Streamflow		Comparative Accumulative Streamflow (1,000 Dam³)		
		Volume (1000 Dam³)	% of Long Term Mean	1991	1990	1989
05AA024	Oldman R. nr Brocket*	700	62	1 578	1 408	919
05AE027	St. Mary R. nr Int'l Bdry	345	55	771	555	491
05AJ001	S. Sask.R. @ Medicine Hat	2 852	49	6 063	5 437	2 840
05BC024	Highwood R. nr the Mouth	601	116	623	732	320
05CC002	Red Deer R. @ Red Deer**	1 303	90	1 557	2 229	1 160
06AD006	Beaver R.@ Cold L. Reserve	59	10	127	255	193
07BB002	Pembina R. nr Entwistle	302	50	757	1 191	1 070
07GE001	Wapiti R.nr Grande Prairie	1 907	66	3 146	3 796	3 220

* Includes 266,700 dam³ in storage in Oldman Reservoir
** Includes 54,700 dam³ in storage in Glennifer Lake

The computed natural flow for 1992 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 a surplus delivery to Saskatchewan of 1 528 000 dam³. The calculated natural flow was 6 977 000 dam³ or 82% of the mean for the period 1967 to 1992.

Southern Alberta experienced a very dry spring, Lodge and Middle Creeks and other southeastern ephemeral streams experienced virtually no runoff at all, and fears of a significant drought existed through to mid June. This fear was exacerbated by mountain snow pack levels which were much below normal water content equivalents recorded during the snow survey period of record. In addition, the warm temperatures of March and April, 1992 melted away lower level mountain snow packs by the end of April; a month earlier than usual. Indications were that the drought conditions would be the worst since 1977.

However, beginning in mid June, the weather in southern Alberta abruptly switched to relatively wet conditions to remain that way through the rest of the summer. What was to be the only significant rainstorm event broke the drought on June 12 to 15. This storm event centred on the southern portion of the Bow River basin with the centroid of the storm dropping 155mm of rain. Peak flows in Fish Creek were the highest since 1969. At Pincher Creek precipitation for the period April 1 to the end of June was 75% of normal while one month later, for the period April 1 to July 31, the precipitation was 150% of normal.

Major storage reservoirs were generally at normal to above normal levels at the end of October. Dry conditions persisted in the northern two-thirds of the province. This was particularly evident in the Beaver River basin where the volume of flow at the Beaver River at Cold Lake Reserve was only 15% of the long term average; the lowest recorded during the period of record (1956 to date). The levels of lakes in this area continued to recede with all-time lows being recorded for the second year in a row. The levels of Cold Lake also continued to recede negating use of water from the lakes by Esso Resources for their heavy oil production. Flows from Cold Lake (Cold River) were monitored utilizing a relationship between outflow measurements and Lake levels. Outflow from Cold Lake was zero during the period November 24, 1992 to April 14, 1993.

There was no significant rain-induced flood activity in Alberta in 1992.

The cooling effects of the volcanic eruption of Mount Pinatubo significantly impacted on Alberta. In August, record-breaking low temperatures were recorded throughout the province; -3° to -5°C in southern Alberta and minus 10°C temperatures in the Peace River country. Prior to this cold snap, southern Alberta had been basking in 30°C plus temperatures. Snow occurred throughout southern Alberta flattening maturing crops which compounded the damage inflicted by the killing frosts. Up to 20 cm of snow was recorded in southern Alberta over the storm event.

For the second year in a row, extremely cold temperatures were recorded in October which was a precursor to a cold winter; the first experienced in Alberta for a number of years. Considerably below normal temperatures were recorded in December and January. The cold, however, did not translate into snow accumulations in the mountains with recorded snow packs at the end of March, 1993 being much below normal. On the plains, the cold weather had the effect of reducing mid winter snow melt, such that when warm temperatures did arrive in February and March, runoff in plains streams was higher than had been recorded for a number of years. 1993 March runoff in southeastern streams was greater than the total recorded in these streams throughout all of 1992.

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 seventeen year period from 1975-76 to 1992-93:

- 226 stations established
- 175 stations discontinued
- 110 station designation changes

Between designation changes, new station construction and station discontinuance, there has been an apparent change of nearly 100 % 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 size of the network has remained relatively stable 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. Resource 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.

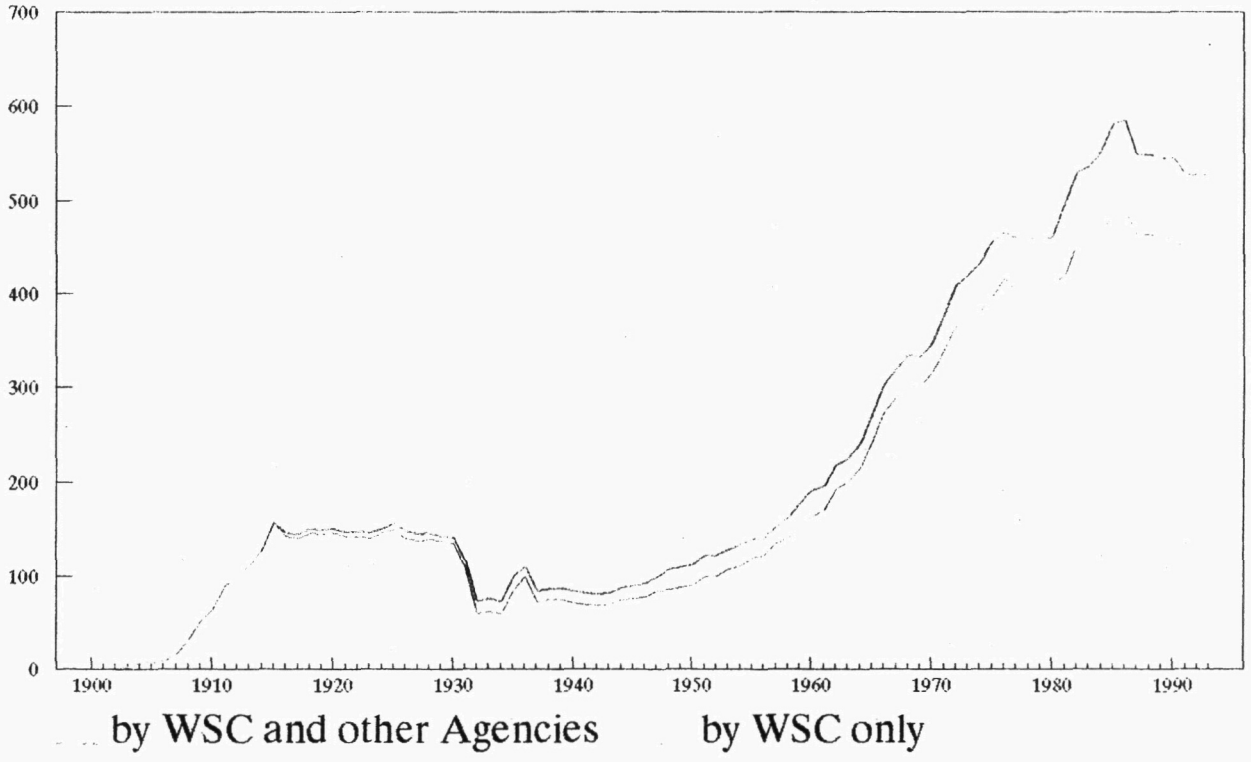
Table 2 indicates additions and deletions to the hydrometric network during 1992-93 and the station designations effective April 1, 1992.

Table 3 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, 1992.

Table 4 provides detailed gauging station data as of April 1, 1992.

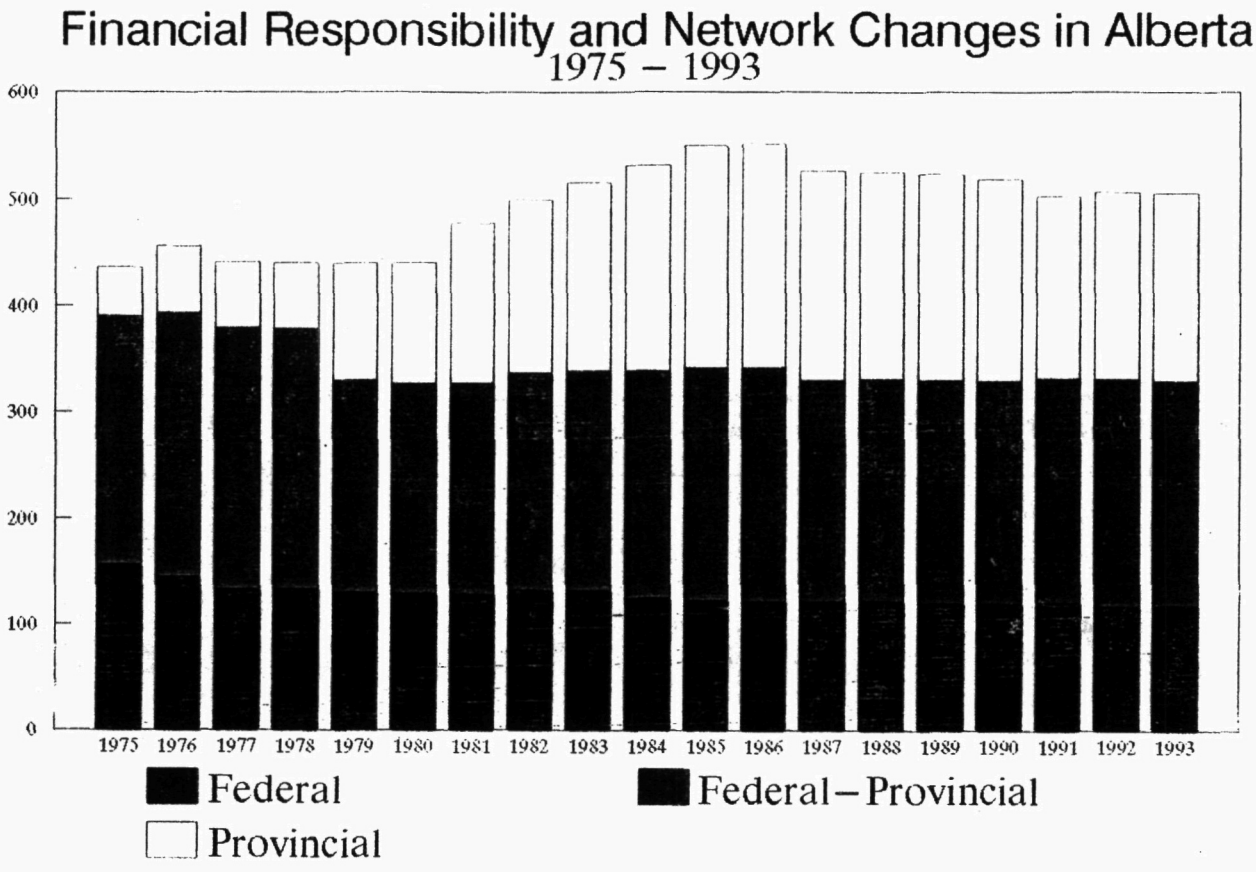
Figure 1

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



Network as of April 1 of Corresponding Year

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

TABLE 2

WATER QUANTITY SURVEYS
GAUGING STATION DATA FOR 1992-93

No. of Stations (i)		No. of Stations Added 1992/93 (ii)	No. of Stations Discontinued 1992/93 (ii)	NET	Stn. Designation April 1, 1992			
Apr.1/91	Apr.1/92				FED.	FED. PROV.	PROV.	CONTRI-BUTED
526	529*	0	-1	-1	118 (1)	214 (1)	176 (2)	21

(i) INCLUDES CONTRIBUTED DATA STATIONS

(ii) STATIONS OPERATED BY WSC

( ) BRACKETED NUMBERS ARE FOR SEDIMENT STATIONS

* - 4 MORE OPERATED BY ALBERTA ENVIRONMENTAL PROTECTION; ONE LESS BY WSC

TABLE 3

WATER QUANTITY SURVEYS
COMPARATIVE GAUGING STATION DATA, APRIL 1/75 TO APRIL 1/92

Federal Stations			Federal-Provincial Stations			Provincial Stations			Total Stations		
Apr.1/75	Apr.1/92	Change	Apr.1/75	Apr.1/92	Change	Apr.1/75	Apr.1/92	Change	Apr.1/75	Apr. 1/92	Change
157	118	-39	221	214	-7	46	176	+130	424	508	+84

TABLE 4

WATER QUANTITY SURVEYS
DETAILED GAUGING STATION DATA, APRIL 1, 1992

F1	F2	F3	F4	TOTAL F	FP1	FP2	FP3	TOTAL FP	P1	P2	TOTAL P	CONTRI-BUTED	TOTAL ALL
25 (0)	49 (0)	31 (0)	13 (1)	118 (1)	16 (0)	36 (0)	162 (1)	214 (1)	176 (1)	0 (1)	176 (2)	21 (0)	529 (4)

( ) BRACKETED NUMBERS ARE FOR SEDIMENT STATIONS

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 rule, a minimum of 25 years of record is required for statistical analysis, it is evident that sufficient data, for the majority of the network, isn't available for scientific interpretation.

3.2 NETWORK CHANGES 1992-93

Changes which were made during the 1991/92 year and which are reflected in the April 1, 1992 Schedule A (contained in Appendix A of this report) are detailed in the 1991/92 report. In summary these changes included the establishment of two new gauging stations, the discontinuance of 1 station, and the redesignation of 7 stations.

Changes which are reflected in Schedule "A", April 1, 1993 are summarized as follows:

3.2.1 New Stations Established During 1992-93

Station Name	Station No.	Designation
Cold River at Outlet Cold Lake	06AF001	F2

3.2.2 Discontinued Hydrometric Stations at End of 1992-93

Station Name	Station No.	Designation
Clearwater River above Limestone Creek	05DB003	FP-3
Eunice Creek near Hinton	07AF005	FP-1

3.2.3 Designation Changes at the end of 1992-93

Station Name	Station No.	Designation From	Designation To
1. Coal Lake Reservoir near Wetaskiwin	05FA016	F-2	P-1
2. Martineau River above Cold Lake	06AF008	FP-2	F-2
3. Mountain View Irrigation District Canal	05AD017	F-3	F-2
4. Waterton Lake at Waterton Park	05AD025	F-3	F-1
5. Waterton River near Waterton Park	05AD003	F-3	F-1

Figure 3

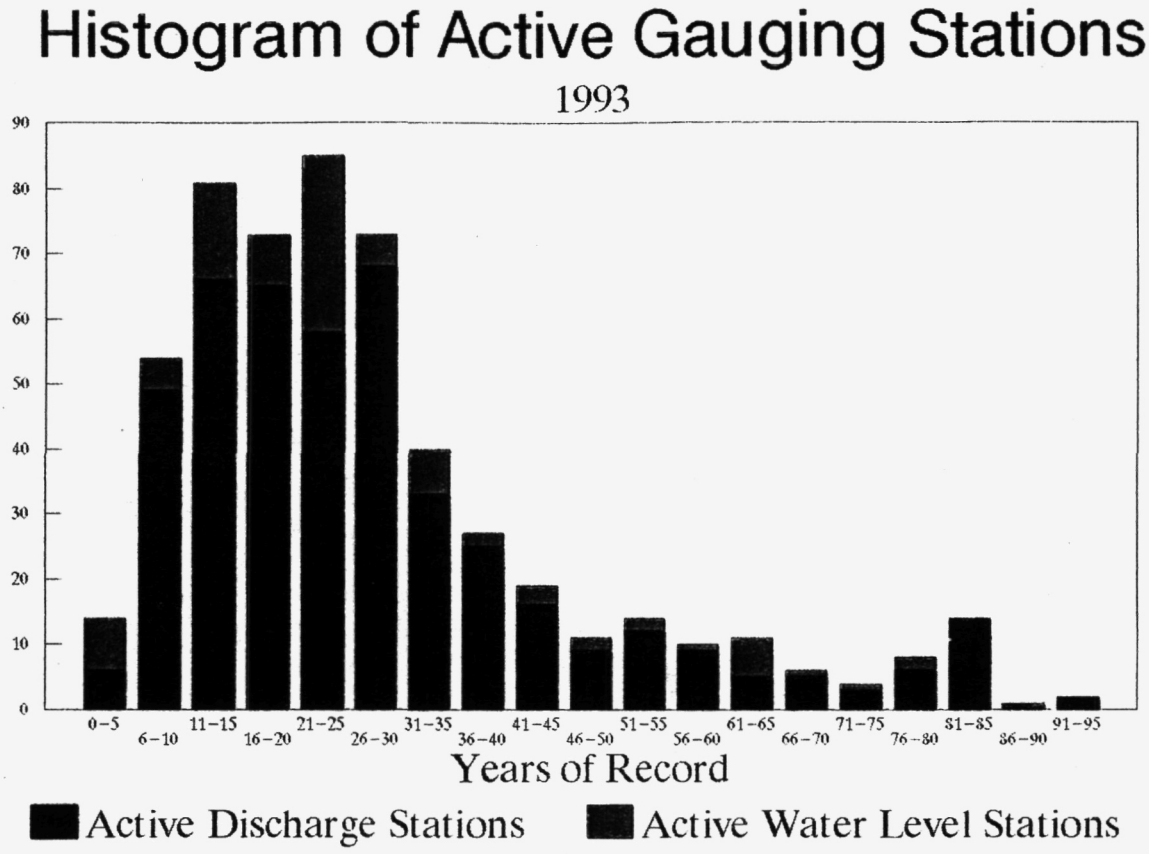
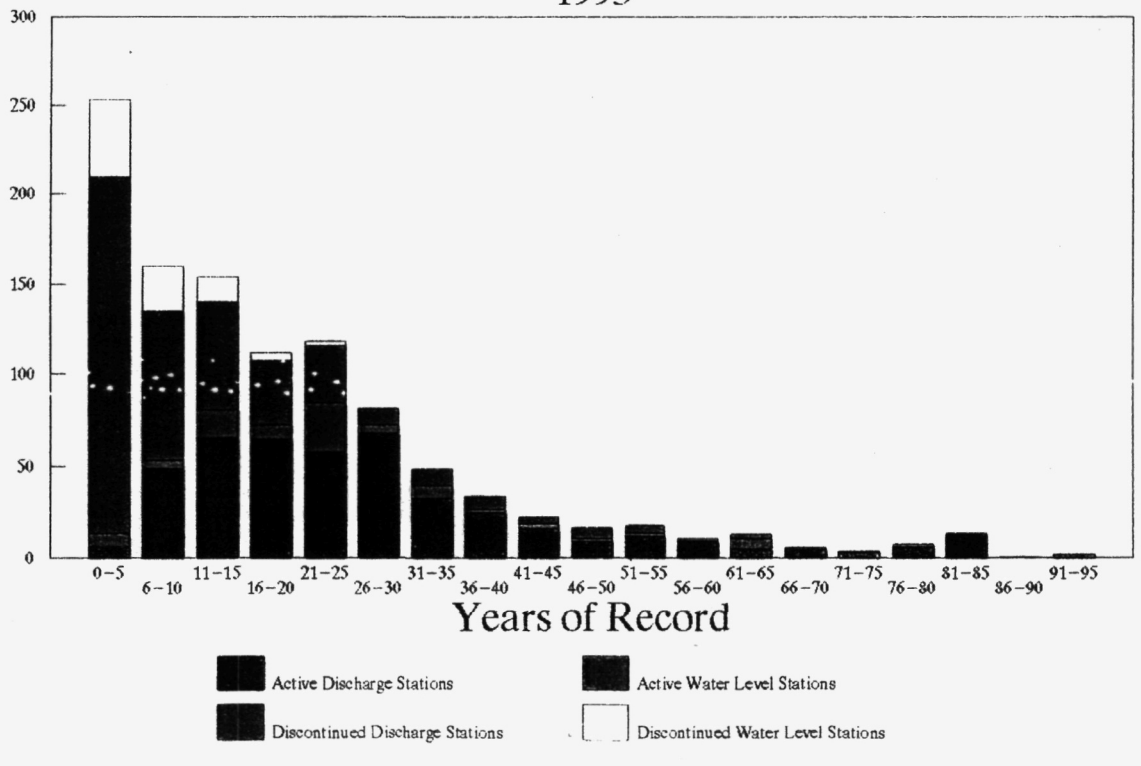


Figure 4



The Cold River station was established to monitor the outflow from Cold Lake (Delivery to Saskatchewan) and as an integral station in the computation of natural flow and use of the waters of the Cold Lake basin. This station was established at the request of the Prairie Provinces Water Board.

The "Clearwater River above Limestone Creek" was discontinued because of operational difficulties at high flows. That is, at a certain stage unmeasurable flow began bypassing the station, thus producing gross inaccuracies in the high flow data. No alternative site could be found nearby. Upon evaluation, AEP determined that the station could be discontinued.

The station "Eunice Creek near Hinton" was discontinued because of basin changes. This station was initially set up as a control station to monitor natural flow in a small basin in an area which was subject to logging. Unfortunately in the winter of 1991/92 a portion of the Eunice Creek basin was logged negating its function as a control station.

The re-designation of the three F-3 (International) stations were done on the basis of a strict interpretation of international stations. That is, these three sites were not required to administer international treaties or for allocation purposes. However, in each case they were required for other federal programs. (Two for National Parks resource inventories and one for Interprovincial purposes.)

The Martineau River station was re-designated to an F-2 (Interprovincial) station as it was required in the production of natural flow data for the Cold Lake Basin.

Coal Lake Reservoir data were no longer required for interprovincial apportionment purposes and, in fact, the federal government had no purpose for these data and hence its re-designation to the provincial category.

In addition, a station was built on Modeste Creek near the Mouth. This station was built on a complete cost-recovery basis and is being operated by AEP for the City of Edmonton. They utilize the data for water quality forecast purposes for efficient operation of their water treatment plant.

3.3 NETWORK PLANNING

3.3.1 Sediment

The second phase of the Peace/Slave River basin sediment budget study was completed by contract to M. A. Carson and Associates. The report, "Assessment of Sediment Transport Data and Sediment Budget Analysis for the Peace/Slave River

System, Phase II; Sediment Loads and Regional Budgets" was printed and distributed.

Two additional reports, "Regionalization of Fluvial Sediment Loads in Alberta", by Henry R. Hudson, Ph.D. and Francien Niekus and "An Evaluation of Suspended and Dissolved Solids Data Bases for the South Saskatchewan River Basin, Alberta" by Henry R. Hudson, Ph.D., were printed and distributed.

Continuing the evaluation of sediment data collected at fall program sediment stations, two contracts were let to conduct sediment station analysis reports. The first was let to M. A. Carson and Associates to analyze the data collected at the Oldman River at Waldron's Corner. The second contract was let to Hardy BBT to perform the sediment station analyses report for the North Saskatchewan River at Whirlpool Point. Both reports will be published in the 1993/94 fiscal year.

In addition, a Hydraulic and Morphologic Survey was conducted on the Oldman River on the reach from the Oldman River down to the Brocket Indian Reservation. A draft report, "Hydrological and Morphological Surveys in the Oldman River Basin" has been prepared and will be finalized in 1993/94. In all, a total of 21 cross-sections were surveyed and defined geomorphologically. This, in essence, is a baseline survey to determine pre-dam conditions. At some date, as yet undetermined, a re-survey can be performed to quantify changes wrought by regime changes due to reservoir operation.

3.3.2 Hydrometric

Much of the Network Planning/Evaluation activities in Alberta in 1992/93 were dictated by operational concerns. With funding at near static levels and needs for existing network data remaining the same, little could be accomplished with regard to network changes. Thus, adjustments were made on the basis of immediate need (Cold River station establishment) and stations were discontinued because of operational difficulties.

A report, "Network Evaluation and Planning for Low and High Flows in the Oldman River Basin, Alberta" was released in March of 1993. This report detailed network reductions, with corresponding sampling errors in low and high flow periods which would be induced by these reductions; should there be a need for network reduction.

Chapter IX of the Prairie Provinces Water Board Handbook on Administration of the Apportionment Agreement was completed. This chapter indicates the criteria/need for the hydrometric networks of small interprovincial streams for the purpose of apportionment monitoring.

4.0 WATER QUANTITY SURVEY AGREEMENTS

4.1 CO-ORDINATING COMMITTEE MEETINGS

Three Co-ordinating Committee Meetings were held in 1992/93; the first on September 21, 1992, the second on November 12, 1992 and the last on January 26, 1993. In addition a National Co-ordinators' Meeting was held in Saskatoon on September 30 and October 1, 1993. While the Alberta representative had felt that this national meeting was one of the better ones, there was absolutely no follow-up to the meeting with the minutes never being released. This report, therefore, does not contain a summary of this meeting's results. Generally the message from the federal representatives at this meeting was that Environment Canada was reviewing all monitoring programs including the hydrometric program.

4.1.1 September 21, 1992 Meeting

4.1.1.1 Carry Overs from Previous Meetings

Discussion centred on the Northern Rivers Study as to what the study entailed and whether either party had been contacted by the study office. WRB had responded to requests for several proposal reviews. AEP was unaware of any requests for similar reviews.

The late delivery of the 1991 CD ROM was discussed and AEP enquired whether they could still obtain data tapes for the hydrometric data. Subsequently they were provided with this tape. In addition WSC indicated that they would provide AEP with the 1991 data in a looseleaf format and in addition would provide several photocopies of the same.

4.1.1.2 1991/92 Annual Report

WSC indicated that the first draft of the annual report would be available by the end of October.

The final 1991/92 program costs had been calculated prior to the meeting and these showed the final Alberta share of $957.2K whereas Schedule D had been signed for $995.6K. This credit applied against a running deficit of $28.3K provided AEP with a surplus in payments of $10.1K. The reasons for the disparity between estimates and final costs were attributable to a reduced construction program due to staff shortage, a decrease in remote travel costs and normal access travel costs and in a reduced purchase of hydrometric supplies.

4.1.1.3 Estimates

Based on the final cost calculations for the 1991/92 year the costs for the 1992/93 program were recalculated as $1,080K as compared to the

originally estimated $1,062.6K. Schedule D was not ammended as the estimates still contained some gross assumptions. For example a 6% increase in operational expenses was assumed.

Estimates for 1993/94 had also been prepared and distributed prior to the meeting. These were preliminary estimates and were to be redone based on up-to-date information in January, 1993 at which time Schedule D would be struck.

4.1.1.4 Data Review

The review of hydrometric data along the reaches of the Red Deer and Bow River had been initiated by WSC at the request of AEP prior to the meeting and the reasons for putting this item on the agenda was to discuss the purpose of the review, to ascertain the progress of the review and to discuss preliminary results. AEP requested the review because of anomalies in the weekly natural flow modelling programs. WSC detailed the progress to date outlining revisions which were made, periods when no revisions were valid and detailed work remaining and how it was to be done. At the end of the reviews WSC was to debrief the modeller regarding revisions made and discuss areas where no revisions could be made.

4.1.1.5 Highwood River Co-operative Measurement Program

The summer co-operative measurement program on the Highwood River and its diversions went very well during the summer because of an improvement in communication between respective field staff of the two agencies.

4.1.1.6 Gauging Station Network

The Oldman River near the Mouth gauging station location was discussed as its present location is unsuitable for the AEP water quality program and because the land owner is seeking access payments. It was agreed that a joint reconnaissance would be conducted to determine whether a site suitable for both water quality and quantity purposes could be located.

WSC reported on a reconnaissance to the Cold River at the Outlet of Cold Lake. A report and photographs had been circulated prior to the meeting. AEP indicated they would be running a series of levels to the existing bench marks at the former gauge site.

The City of Edmonton had requested a gauging station on Modeste Creek near the Mouth as a integral part of their water quality model. A preliminary reconnaissance had been completed and the AEP landman was negotiating an access agreement. Once everything is in place WSC was to construct the station on a total cost recovery basis and would then turn the entire operation over to the City of Edmonton.

4.1.1.7 Peace-Athabasca Delta New Initiatives

AEP detailed a potential water quality monitoring agreement initiated because of the concerns of the Crees and Chipewyans regarding the state of their drinking water in the PAD area. Sampling would be done by AEP staff in Ft. Chipewyan. There are no implications for the water quantity monitoring program.

The potential for an ice dam to re-charge the perched basins in the PAD area was also discussed. The updating of the 1-D model was discussed and it was indicated that Environment Canada was updating the model to include data to 1990.

4.1.1.8 Project 2000

An update was provided on the P2K Pilot Project being conducted by WSC Calgary. Delays in equipment delivery, unfamiliarity with the electronic equipment and equipment problems all have contributed to staff frustrations and to delays in conducting this pilot program. Because of these difficulties the pilot size was restructured from 106 sites to 56 sites. To take up the slack, other WSC districts would be involved in specific applications of modernized equipment; eg. Real time data applications, multi-sensor applications, integration. It was also reported that the P2K team was dedicated to the program and were becoming much more comfortable with the modernized instruments and through formal training and on the job applications.

4.1.1.9 Irrigation Return Flow

Mr. Coles reported on his and Mr. Warner's visit to the Eastern Irrigation District (EID) office in Brooks. He got the impression that the District is interested in getting involved in return flow monitoring. From WRB's perspective this would be advantageous as the present requirement for return flow data for the natural flow calculations of the South Saskatchewan River for apportionment purposes is being re-evaluated. There is certainly the possibility that these data may not be required. Hence the stations would no longer be designated as federal in the agreement.

Mr. Coles also indicated that a contract had been let to Komex International to study the return flow network of the irrigation districts to determine the adequacy of present methods of measuring and estimating return flows for the variety of users of these data.

WRB had discontinued the production of the annual return flow report as there was no requirement for this report from a PPWB aspect. AEP had a continuing need for this report and sources for the required information items had been forwarded to the Hydrology Branch, AEP. If additional information was required AEP was to contact WRB.

4.1.1.10 National Co-ordinators' Meeting

The background package for this meeting had just been received by AEP but had not arrived at WRB as yet. Discussion on this meeting was postponed until September 24. Mr. Coles indicated he was preparing a one page document on PC Stream for presentation at the National Meeting.

4.1.1.11 Spring Creek Basin Re-opening

AEP indicated that an agreement among Alberta Forest Service, Fish and Wildlife, University of Alberta, Daishawa and AEP was nearly in place. Two gauging stations are to be operated by AEP in the basin and clearing was anticipated to begin in 1993/94.

4.1.1.12 Beaver Removal

WSC explained their arrangements with local trappers to remove beavers from gauging station locations at two sites. A report on difficulties was to be prepared by WSC.

4.1.2 November 12, 1992 Meeting

4.1.2.1 Review of National Co-ordinators Meeting

The minutes for this meeting were not available despite promises to the contrary that they would be available by the end of October. A reminder by WRB would be sent to Ottawa. Mssrs. Valentine and Morton, attendees at this meeting, agreed that the general context of the meeting was the review of all monitoring programs by Environment Canada.

4.1.2.2 Finalization of 1991/92 Annual Report

The draft report was reviewed and minor changes were made.

4.1.2.3 Future Directions

AEP reported on their re-organization plans. The Department is to be re-organized into four services rather than three and integrated monitoring is being investigated. The present Technical Services Division is to become Technical Services and Monitoring Division which will include the Environmental Quality Monitoring Branch.

Environment Canada is reviewing all its monitoring activities with a view of shifting its resources to ecological/environmental studies. This shift and across the board budget cuts will have implications on the Agreement but the extent is indeterminable at present.

4.1.2.4 Hydrometric Data Standards

With diminishing resources possibility of establishing multi-tiered standards are being investigated. AEP is concerned this may lower the standards in general.

4.1.2.5 Gauging Station Network

Coal Lake Reservoir is not required for apportionment purposes and hence is to be re-designated from Federal to Provincial.

A permanent station on Cold River at the Outlet of Cold Lake is not required by the PPW3 at the present time.

No co-located site could be found for the Oldman River near the Mouth station and hence the gauging station will remain in its present location. AEP will investigate the possibility of having their people negotiate a land agreement.

A better alternate gauging station site to the Oldman River near Brocket gauge has been located immediately below the dam but the collection of sediment data may be a problem. AEP is to investigate the use of dam personnel.

AEP confirmed the discontinuance of the station Clearwater River above Limestone Creek.

4.1.2.6 Return Flow Investigation

AEP reported that the first draft of the report by Komex has been delayed.

4.1.2.7 Peace-Athabasca Delta

AEP provided a review of the water quality monitoring program.

4.1.2.8 Project 2000 Update

WSC reported that the 50 pilot sites were now equipped with the modernized equipment. Software for computations was being investigated.

4.1.3 <u>January 26, 1993 Meeting</u>

4.1.3.1 Review of November 12 Meeting Items

WRB had contacted Ottawa regarding the provision of the minutes before Christmas and it was promised that they would be sent out within the week. However these still had not arrived.

The 1991/92 Annual Cost Share report was completed.

No further information on changes in AEP nor WRB directions was available for this meeting.

A federal task force on standards review has been struck and has had some preliminary discussions.

Coal Lake Reservoir is being redesignated from F-2 to P-1 on April 1, 1993. AEP will review the period of operation.

A measurement program on Cold River at the Outlet of Cold Lake has been initiated by WSC but so far lake levels are such that no measurements are required as there is no outflow.

The Oldman River near Brocket station has been relocated to the Oldman River below the Dam. The River Engineering Branch still requires sediment data at this site and WSC is to forward 1992 sediment data as soon as it is available for review as to pertinence. Some discrepancies in streamflow measurements, depending on location of measurement cross section, have been found. A further series of measurements will be conducted to determine the measurement cross section which should be used.

A revised draft of the Komex report has been provided to the irrigation committee members for review.

A software directions task force (17 members strong) has met once and held 3 teleconferences to review potential software packages for the modernization of the hydrometric computational process. The field instruments for the P2K program are all in place with the exception of three Valcom units for the PAD area. These have not been received from the supplier yet. The late delivery of instruments for the Pilot project have delayed the assessment of the program and it is hoped that the program might be extended for an additional year to the end of 1994/95.

4.1.3.2 Federal Budget Changes

It was still not clear how budget cuts to monitoring programs would affect the delivery of the cost share program. In addition the management of Environment Canada has switched from a person year basis to salary dollars. On the switch over insufficient funds were provided for the 43 person years on the Alberta WRB role. Subsequently the complement has been reduced to 41 Person Years. WRB is investigating resource transfers from other districts.

4.1.3.3 Reduction in Return Flow Network

A letter to the PPWB (copies provided to Committee Members before this meeting) detailed the need for return flow data for South Saskatchewan River natural flow computations. The letter indicated that there is a potential for eliminating the return flow data (except perhaps in very low

flow years). This letter is to be discussed at the next meeting of the Committee of Hydrology, PPWB.

Conversely the Komex report indicates the existing network is required and that additional return flow stations should also be installed.

In summary there is a need for the existing network not only for return flow monitoring purposes but also for regulatory and liscensing purposes. There is potential for re-designation requirements, or other approaches such as monitoring by the irrigation districts or by improved monitoring procedures.

4.1.3.4 Schedule D for 1993/94

A re-calculation for schedule D was circulated prior to the meeting but this too requires additional revision as salary dollars were incorrectly calculated and network adjustments need to be taken into account. A re-estimate of Schedule D is to be provided by February 8, 1993.

4.1.3.5 Bow River Data Requirements

The Bow River Water Quality Council wishes to produce an annual report and to do such they require the past year's data very soon after the end of the year. WSC indicated that they could supply the requested data by February 28 each year.

4.1.3.6 Application of Modelling Technology

Mr. Warner, Hydrology Division, detailed his plans for application of the hydrodynamic model to a selected reach of the Bow River. With this model Mr. Warner indicated there would no longer be a need for a significant portion of conventional hydrometric data and that this model could provide information anywhere along the reach for application for instream flow needs, for water quality applications, etc. Considerable discussion ensued and the Coordinating Committee felt that there were a large number of unanswered questions. These questions included:

- detailed rationale for model;
- objectives of model;
- clients;
- precision of model;
- Input required, including resources (dollars and PYs).

4.2 OPERATIONAL ACHIEVEMENTS

4.2.1 Training Program

Again considerable effort in the training program was pointed toward the P2K team in an effort to familiarize them with new technologies and computer applications. The P2K pilot project staff training will be dealt with in the section on P2K Programs. However the remaining WSC staff were given a one day workshop on Electronic Data Acquisition Systems (EDAS). This workshop was conducted by the P2K team members.

The Peace River sub-office staff were given a one day workshop on the use and application of power actuated tools.

Several one-half day Management/Benefits workshops were provided to the WSC staff including:

- You and Your Benefits;
- You and the Staffing Process;
- Total Quality Management;
- Performance Appraisal System;
- Public Service 2000;

All WSC staff were given a two day refresher First Aid Training Course.

Two one half day workshops on environmental stewardship and citizenship were presented to all staff. Topics were:

- What is Environmental Stewardship and Citizenship;
- Environmental Partners Fund and other environmental funding projects;
- Ethanol in gasoline;
- Save Planet Earth video.

4.2.2. Construction and Maintenance Program

The 1992/93 construction and maintenance program consisted of the following:

- one new station;
- maintenance at 41 sites;
- electric power at six sites.

The new station was constructed on Modeste Creek below Buck Creek. This station was constructed on a cost recovery basis and is not a part of the WSC hydrometric network. It was constructed for, and is being operated by AEP for the City of Edmonton to assist in their water quality studies.

The maintenance work included:

- removal of 3 discontinued stations;
- relocation of 3 sites;
- upgrading of 3 sites;
- cableway installation at one site;
- cableway maintenance at 16 sites;
- miscellaneous maintenance at 15 sites.

The installation of power at six sites continued the efforts to improve the efficiency of network operations. Power, at stilling well sites in particular, considerably reduces the time and effort field personnel must spend at stations in the spring and winter and also improves data recovery. One hundred and thirty-four gauging stations operated by WSC now have power.

Localities where maintenance, construction and electric power upgrading were carried out are contained in Table 5 and depicted in Figure 5. Additional details on this program are contained in the annual report "Alberta Gauging Station Construction and Maintenance, 1992/93".

An environmental pre-screening of each construction and maintenance project was carried out prior to the construction season. Conditions pertaining to the "Review Criteria" are listed in Table 6. The "Pre-screening form is prepared in late April at which time not all requirements for maintenance have been identified. Hence Table 5, the construction program detail listings includes more stations than does the pre-screening form. However while not all are reported on, each project is pre-screened prior to the start up of the construction.

TABLE 5

CONSTRUCTION COST AT EACH SITE

1992/93

Station			Construction Cost	Instrumentation		Share	
				Provincial	Federal	Provincial	Federal
Federal-Provincial							
M-01	ALKALI CR. NEAR THE MOUTH	05CK005	$ 1,462.21				
M-02	BEAVER RIVER NEAR GOODRIDGE	05AA001	1,965.49				
M-03	BERLAND RIVER NEAR THE MOUTH	07AC007	885.12				
M-04	BRAZEAU RIVER BELOW CARDINAL RIVER	05DD007	1,005.82				
M-05	CATARACT CR. NEAR FORESTRY ROAD	05BL022	492.20				
M-06	CLEARWATER RIVER ABOVE LIMESTONE CR.	05DB003	458.74				
M-07	CROWSNEST RIVER AT FRANK	05AA008	1,806.72				
M-08	DEER CR. MAIN STEM NR SUNDRY	05CA003	1,159.53				
M-09	EUNICE CR. NR HINTON	07AF005	2,011.86				
M-10	FIREBAG RIVER NR THE MOUTH	07DC001	150.00				
M-11	FREEMAN RIVER NR FORT ASSINIBOINE	07AH001	4,596.33		2,500.00		
M-12	JAMES RIVER NR SUNDRE	05CA002	5,980.34				
M-13	JUMPINGPOUND CR. NEAR THE MOUTH	05BH009	118.07				
M-14	KAKWA RIVER NR GRANDE PRAIRIE	07GB002	3,807.17				
M-15	KNEEHILLS CR. NR DRUMHELLER	05CE002	192.21				
M-16	LITTLE SMOKY RIVER NEAR GUY	07GH002	873.12				
M-17	LLOYD CR. NR BLUFTON	05CC009	2,360.61				
M-18	MCLEOD RIVER ABOVE EMBARASS RIVER	07AF002	2,930.91				
M-19	MCGILLVARY CR. AT COLEMAN	05AA013	965.26				
M-20	MUSKEG RIVER NEAR GRANDE CACHE	07GA002	1,081.84				
M-21	NORTH RAM RIVER AT FORESTRY ROAD	05DC011	2,459.33				
M-22	OLDMAN RIVER NR BROCKET	05AA024	7,513.10				
M-23	RAY CR. NEAR INNISFAIL	05CE010	3,491.85				
M-24	RED DEER RIVER AT DRUMHELLER	05CE001	3,767.80				
M-25	REDEARTH CR. NR REDEARTH	07JC002	1,223.47				
M-26	THREEPOINT CR. NR MILLARVILLE	05BL013	8,748.28		2,500.00		
M-27	WAINSCOTT COULEE NR BROWNVALE	07FD014	224.70				
M-28	WHITEMUD RIVER NR DIXONVILLE	07HA005	883.26				
M-29	WILDHAY RR NR HINTON	07AC001	3,107.91				
M-30	WILLOW CR. ABOVE CHAIN LAKES	05AB028	473.43				
	TOTAL F/P MAINTENANCE COSTS		$66,206.68	$ 0.00	$5,000.00	$33,103.34	$38,103.34
Federal							
M-31	E.I.D. MAIN BR. CANAL NR BASSANO	05CJ013	$ 2,575.96				
M-32	E.I.D. NORTH BR. CANAL NR BASSANO	05CJ001	5,621.08				
N-33	W.I.D. CANAL NR CHESTERMERE LAKE	05BM003	893.39				
	TOTAL FEDERAL MAINTENANCE COSTS		$ 9,092.42				$ 9,090.42
Provincial							
N-34	BUFFALO LAKE NR ERSKINE	05CD005	$ 6,170.13		$2,500.00		
M-35	ELBOW RR ABOVE ELBOW FALLS	05BJ006	673.47				
M-36	ELDER CK. AT HIGHWAY 686	07HB002	671.14				
M-37	LITTLE SMOKY RIVER AT LITTLE SMOKY	07GG002	866.12				
M-38	MCLEOD RIVER NR WHITECOURT	07AG004	875.51				
M-39	MINISTIK LAKE NR NEW SAREPTA	05EB013	2,393.73				
M-40	PEMBINA RIVER NR ENTWISTLE	07BB002	1,979.11				
M-41	WILLOW CR. BELOW LANE CREEK	05AB039	373.06				
	TOTAL PROVINCIAL MAINTENANCE COSTS		$ 14,002.27		$2,500.00	$ 14,002.27	$ 2,500.00
Private							
C-1	MODESTE CR. BELOW BUCK LAKE CREEK		$ 2,982.79				
	TOTAL PRIVATE CONSTRUCTION COSTS		$ 2,982.79				
TOTAL COST OF CONSTRUCTION AND MAINTENANCE			$92,282.16		$7,500.00	$ 47,105.61	$49,693.76

C = Construction

M = Maintenance

TABLE NO. 6

POWER INSTALLATION COSTS

1992 - 1993

	STATION		POWER COMPANY INSTALLATION COSTS	WIRING COSTS	SHARE	
					PROVINCIAL	FEDERAL
FEDERAL-PROVINCIAL						
E1	BIGKNIFE CRK. NR GADSBY	05FC002	$ 1,094.61	$ 695.50		
E2	RAY CRK. NR INNISFAIL	05CE010	2,623.64	695.50		
E3	RIBSTONE CRK. NR. EDGERTON	05FD001	1,968.80	807.85		
	SUB TOTAL		$ 5,687.05	$ 2,198.85		$ 7,885.90
FEDERAL						
E4	LESSER SLAVE RIVER AT SLAVE LAKE	07BK001	$ 255.00	$ 450.00		
	SUB TOTAL		$ 255.00	$ 450.00		705.00
PROVINCIAL						
E5	COYOTE CRK. NR CHERHILL	07BB014	$ 0.00	$ 998.31		
E6	KILLARNEY LAKE TRIB. NR CHAUVIN	05GA010	1,647.90	807.85		
	SUB TOTAL		$ 1,647.90	$ 1,806.16		3,454.06
	T O T A L		$ 7,589.95	$ 4,455.01		$12,044.96

Table No. 7

REVIEW CRITERIA FOR PRE-SCREENING
OF
CONSTRUCTION ACTIVITIES

REVIEW CRITERIA

1. Clearing
2. Top soil removal
3. Culverting
4. Channel dredging
5. Weir construction
6. Rip rap placement
7. Herbicide usage
8. Stream infill
9. Chemical preservatives
10. Bank excavation
11. Permafrost disturbance
12. Drainage
13. Drilling and blasting

Table No. 8

PRESCREENING FORM

INLAND WATERS DIRECTORATE
WESTERN & NORTHERN REGION

Branch / District Calgary District Responsibility Centre Manager G. H. Morton Fiscal Year 92-93

PROJECT DETAILS						CONCLUSION		
Location		Type of Work (a)	Components	Schedule		Potential Impact Area (b)	Mitigative Measures (c)	Consultation
River/Lake	latitude/longitude			Start	Finish			
W.I.D. Canal	51 01/113 50	2	10	Apr	Apr	4		
Ray Creek	52 00/113 35	2		Apr	Apr	3		
E.I.D. Main Canal	50 43/112 21	2		Apr	Apr	4		
Threepoint Creek	50 46/114 17	3	10	Apr	Apr	3		
Deer Creek	51 39/115 08	2		May	May	4		
E.I.D. N. Br. Canal	50 45/112 25	3	10	May	May	4		
James River	51 55/114 41	2		May	May	4	4*	
Buffalo Lake	52 27/112 52	3	10	May	May	3		
Oldman R/Waldrons	49 48/114 11	2		Jun	Jun	4		
Sunwapta River	52 13/117 13	2	8	Jun	Jun	3		
Meadow Creek	49 57/113 39	2	2, 10	Jun	Jun	4	4*	
Highwood River	50 24/114 29	2	2, 10	July	July	4	4*	
Pekisko Creek	50 28/114 12	2	2, 10	July	July	4	4*	
Brazeau River	52 52/116 34	2		July	July	4		
Pembina River	53 36/115 00	2		July	July	4		
Pembina River	54 27/113 59	2	2, 10	Aug	Aug	4	4*	
Wolf River	54 42/111 00	2		Aug	Aug	4	4*	
Little Red Deer R.	50 30/114 40	2	2, 10	Aug	Aug	4	4*	
Willow Creek	50 11/114 12	2		Aug	Aug	4		
Cataract Creek	50 17/114 35	2		Sep	Sep	4		
Drywood Creek	49 20/114 00	2	2, 10	Sep	Sep	3	4*	
McGillvary Creek	49 38/114 31	2	10	Sep	Sep	3	4*	
W.I.D. Canal	51 01/113 50	2	10	Sep	Sep	3		
Berland River	54 01/116 57	2		Oct	Oct	4		
Grande Prairie Creek	55 22/118 54	2	4	Oct	Oct	1		
Kakwa River	54 22/118 35	2		Oct	Oct	4		
Lily Creek	55 25/114 44	2	10	Oct	Oct	4	4*	
Little Smoky R.	55 27/117 09	2		Oct	Oct	4		
Red Earth Creek	56 32/115 14	2	10	Oct	Oct	4	4*	

a) 1. Research
2. Maintenance
3. New facility

b) 1. Ecological
2. Social
3. Aesthetic
4. No impact

c) 1. Design change
2. Location change
3. Schedule change
4. Other (specify)

Signature of RCM _____

Date _____

* Site restoration by replacing top soil and seeding grass.

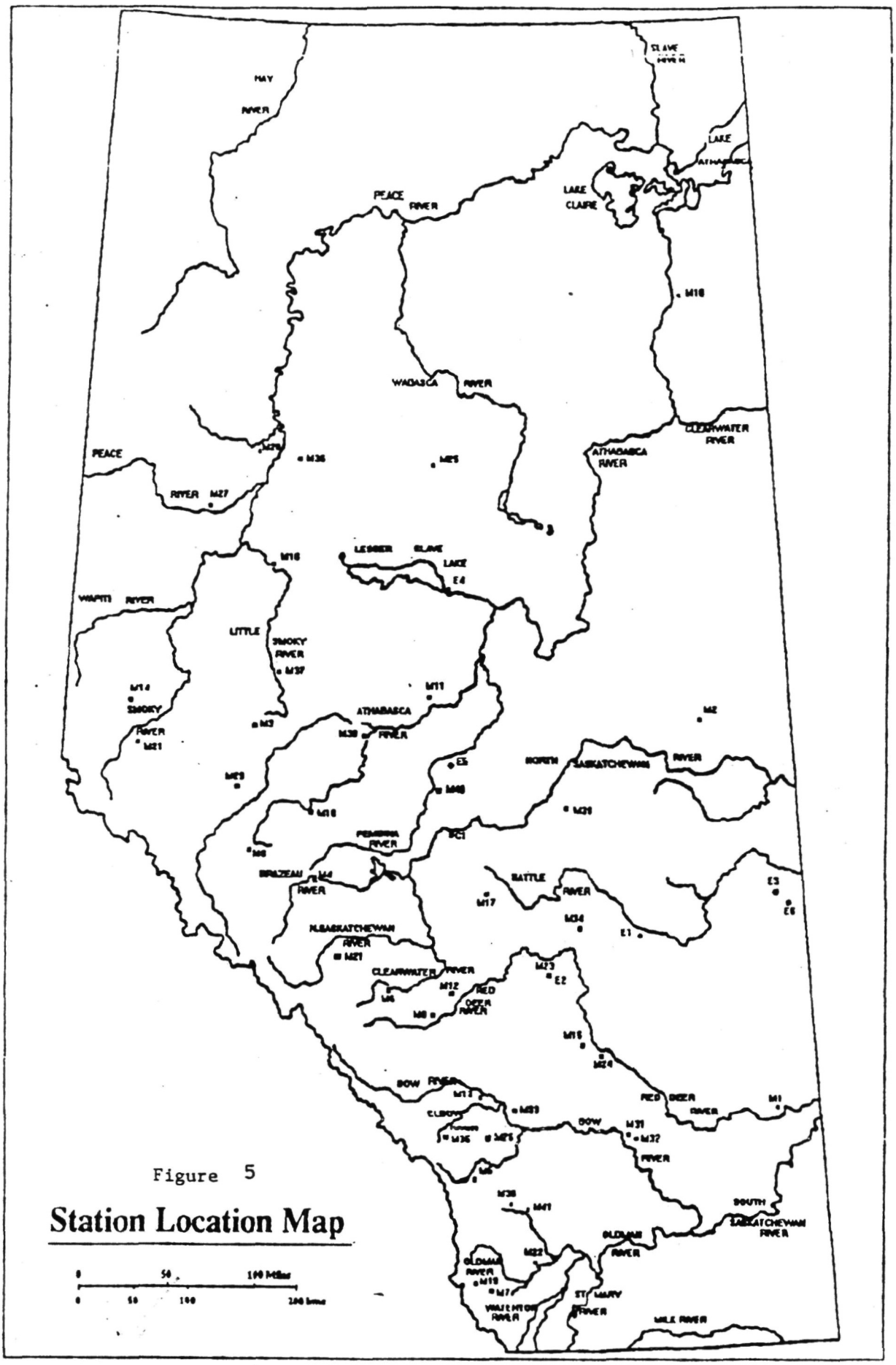


Figure 5

Station Location Map

4.2.3 Hydrometric Program Achievements

The hydrometric data computations for 1991 were completed on June 17, 1992, a month and half past the target date. The computations were late as a result of the extra effort required for the P2K Pilot Project and the staff shortages experienced during the year due to major illness and staffing restrictions. Compounding the late completion of the data computations was the very long delay in getting data back from headquarters for final verification. These data were finally verified on September 25, 1992. A camera ready hard copy of these data were received in Calgary on October 19, 1992. This was photocopied and six copies were provided to AEP. The sediment data for 1991 were completed and submitted to Ottawa on September 28, 1992. Unfortunately the delivery of the CD ROM containing data inclusive of 1991 was not received until February, 1993.

There was no hydrometric data audit conducted in 1992/93 but an audit was conducted in early 1993/94. A draft "Bench Mark and Levelling Policy" was developed and prepared during 1992/93. This policy recognized a tiered requirement for levels for gauging stations. Roughly the highest standard is required for water level stations (lakes, reservoirs, etc.), second highest for water quantity stations where levels are also required for such things as the flood damage reduction program, for forecasting, etc. A third tier would be for those stations for which water levels are relatively unimportant, eg. canals, return flow stations, etc.

The P2K Pilot Project was re-structured with a reduction in the pilot size from 100 stations to 56. These were operated by the same staff complement. The 40 plus stations no longer being run by the pilot team were intergrated back into the normal hydrometric operations program. This added a considerable work load to an already more than full load for the tecnologists. Fortunately the regional IWD office were supportive in recognizing this work load and WSC was able to recruit term help (2 positions) and at the same time a contract was let to digitize the field charts freeing time for the technologists to work on their computations and field program. In spite of early sceptisism this has worked out very well and field staff wonder how they were able to get along without this service in the past. A senior technologist was successful for a CIDA, 26 month assignment to Zambia and his contribution to the program was missed and compounded the work load problems. This however was a great opportunity for Mr. Chomica and at the same time is a feather in the cap of WSC getting international recognition for its excellence in program delivery.

Only one major high flow event was experienced during 1992, that on the southern portion of the Bow River basin. Field coverage was extensive during the this peak flow event and as a result the upper end of a number of stage-discharge relations were well defined.

The end of 1992 also saw the end of an era in the history of WSC with the retirement of the PDP 11 which had been used since the early 1970s for hydrometric data computations. The PDP was replaced with a Microvax 3100.

Major reviews of hydrometric data for reaches along the Bow and Red Deer Rivers as well as for Pigeon Lake water levels were conducted during the year and appropriate revisions were made. The stations along the Red Deer and Bow Rivers were reviewed as a result of inconsistencies in modelling results. In some cases data were incorrectly computed but in others no basis for revisions could be found. Discussion of the review and appropriate revisions were held with the modeller, Mr. Figliuzzi, Hydrology Branch, AEP. Water levels on Pigeon Lake were revised because of a re-levelling program conducted by AEP.

Two programs were initiated to respond to environmental issues; a station was established on the Maligne River and measurements of flows made to assist Parks Canada in a study of breeding Harlequin Ducks and a Hydrolab was installed on the Athabasca River at Hinton in preparation for potential integration of monitoring programs and to provide data for the Northern Rivers Basin Study. A Hydrolab was also installed on the Bow River at Calgary for training purposes.

A demonstration of phase I of an expert system development for stage-discharge relations was conducted by the project student from the University of Manitoba. The demonstration showed it to be a very simplified system with no direct-application at present. Data were provided for development of phase II of this project and it is hoped that this phase will be much more applicable to the hydrometric program.

4.2.4 Pilot Project 2000 Progress

It was recognized in 1991/92 that the modernization equipment for the pilot was far from "install and run" readiness but rather considerable development work and trouble shooting was required to put the parts together to get them to operate satisfactorily. This had not been anticipated when the pilot project was conceptualized. Therefore the work load on the P2K Pilot Team was considerably more than expected. Hence early in 1992/93 the Pilot was re-designed by reducing the network from 106 sites to 56 sites. These 56 sites are located as follows; 6 in the Peace/Athabasca Delta to be run by AEP, 15 in Ft. McMurray area with the remainder in the Calgary area. In all the Calgary P2K team will operate 66 total gauging stations, 16 being normal stations with no P2K involvement. In addition small pilot projects will be conducted across the Country to address specific issues. For example the Saskatchewan District is running a pilot to assess the real time data aspect of modernization, and a multi-parameter, particularly water quality aspects, testing is to be conducted by the Ontario District.

Equipment delivery problems continued to plague the pilot project. The EDAS units, to complete the instrumentation of the pilot, were tendered in late winter of 1991/92. Valcom was the successful bidder and because of other demands for their products and production delays, the last deliveries of EDAS units did not arrive in Calgary until early November, 1992. There was still a shortage of three units and thus it was decided to delay the PAD installations until 1993/94. The majority of the VEDAS units were installed in the late summer of 1992 with the last ones installed in late November. The operation of these units were not without

their difficulties as problems were encountered with power systems and voltage regulation. Several different approaches to solving these problems were proposed and are to be tested in 1993/94.

With the majority of instruments delivered in the summer of 1992, assistance from technologists from the other regions was utilized to get the stations instrumented in a more timely manner and to expose other regions to the modernization effort. In all, the regions provided a total of 14 assistants. In addition to providing invaluable help in completing the P2K installations the helpers were exposed to the entire modernization effort including bench testing of the field equipment before installation, the use of the PC9000 in automated measurement procedures and were given exposure to the new computations software (CompuMod).

1993/94 will be the first year that the majority of field sites will be instrumented with P2K instruments which provides very little time to assess the program in its entirety. It is hoped that the pilot project will be extended through 1994/95 to allow complete assessment and reporting and development of procedures for partial or full implementation (if at all) to the remaining networks.

The training aspect of modernization continues to be the most important cog in assuring the program is implemented and operated with the least difficulties. To this end the pilot team was provided with several training opportunities as follows:

- May 12 to 14: A representative from Valcom conducted a workshop on the new EDAS units;
- A one day workshop on the operation and use of Laptop computers was conducted by the Calgary Computer Scientist;
- Oct 13 to 17: A new version of CompuMod was installed and the team familiarized with it;
- October: The P2K team conducted a workshop for non P2K team members technologist;
- March 15 to 19: An updated version of CompuMod was installed and training in its use provided.

From a personnel point of view the Calgary District, Modernization Head, Mr. Bill Renwick retired. His expertice and experience can never be completely replaced but his successor, Mr. Bruce Barnetson brings his long term experience and own expertice to the project in the capacity of Acting Modernization Head. Mr. Barnetson was formerly the Hydrometric Supervisor for the P2K Team.

In addition to the pilot project several other modernization programs were conducted in 1992/93. Among these were the completion of the installation of the AMIS program for the acquisition of DCP data. This program was put into operation in July, 1992. In September, 1992 a joint meeting among equipment development specialists of the United States Geological Survey, the Operational Technology Section of Environment Canada, Hull and Water Survey Staff, Calgary was held in Lake Louise. There was an excellent exchange of data and information with direct application of a number of items to the P2K pilot. Representatives of the TAVIS Corporation,

pressure transducer manufacturers, visited Calgary and made a field tour of installations.

An Acoustic Flow Meter for Remote Areas (AFFRA) has been installed in the EID Main Branch Canal for two years and a draft report was prepared on its operation and application. It was decided to operate this instrument for one more year to determine its reliability and application for measuring streamflow at variable backwater sites.

A Software Directions Task Force (17 members strong) was established to evaluate software requirements for the modernization effort. Their task objective is to determine software requirements for modernization, to evaluate existing software and to evaluate the possibility of making the software (CompuMod). One meeting and three conference calls were held in 1992/93.

4.2.5 Cost of Operation

The Summary of Financial Considerations 1992/93, Table 9 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 brief description of the procedure utilized for the calculation of depreciation. During 1992-93, Alberta paid the amount of $ 1,062,600 to the hydrometric agreement, whereas the Albera net share was $1,030,991; an overpayment of $31,609.

As this was the second large overpayment in a row (previous year it was $38,400) and the total overpayment had now reached $42,314, Canada reduced Alberta's second quarter payment of 1993/94 by $30,149 thus reducing the total overpayment by Alberta to $12,165.

The reason that the program in 1992/93 was delivered for substantially less than what had been estimated was because of the large reduction in the operation and maintenance vote. Reviewing specific expenditures within this vote indicated that the major component, travel expenses, were very similar in 1991/92 and 1992/93. However, the unanticipated decreases in expenditures occurred as follows:

- Conventional access air charter costs fell from $53K in 1991/92 to $43K in 1992/93;
- Motor vehicle repairs fell dramatically from $72.2K to $41.1K (sign of a newer fleet?);
- Purchase of related hardware items fell from $29.6K to 15.4K;
- Expenditures associated with measuring equipment (servicing, repair, parts purchases, etc.) fell from $22.2K to $3.7K.

TABLE 9

SUMMARY OF FINANCIAL CONSIDERATIONS
1992-93

Type of Expenditure	No. of Stns.	Total Cost	Share	
			Federal	Alberta
Hydrometric Network				
Operated by Water Survey of Canada	431	$1,852,813	$ 897,792	$ 955,021
Depreciation: Equipment and Vehicles		137,400	66,567	70,833
Sediment Network				
Full Program Stations Operated by WSC (a)	3	$ 16,927	$ 2,821	$ 14,106
Depreciation of Sediment Equipment		200	100	100
Cost of Analysis of AEP Stations		400	0	400
Construction and Maintenance				
Construction of one new station; major maintenance at 41 sites		$ 96,799	$ 49,694	$ 47,106
Electrification of six sites		12,105	4,648	7,397
Depreciation: Construction Vehicles & Equipment		3,700	1,847	1,853
Total		$2,120,284	$1,023,469	$1,096,816

Alberta Net Share: $1,096,816 - $65,825(B) = **$1,030,991**

(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 and operated by Alberta Environment.

11.40 Federal units x $5,373.59	= $61,258.93
Depreciation credit: $137,400/343 x 11.40	= 4,566.61
Total Credit	= $65,824.54

TABLE 10

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	1,002,759	1,008,350	(+) 5,591	(+) 0.57
1991-92	957,200	995,600	(+) 38,400	(+) 3.86
1992-93	1,030,991	1,062,600	(+) 31,609	(+) 2.98
Total	12,253,298	12,296,454	(+) 42,314	(+) 0.34

Note: In the second quarter of 1993/94 Alberta's quarterly payment was reduced by $30,149 as a credit for the net overpayment. Thus total overpayment by Alberta to date is $12,165.

Figure 6

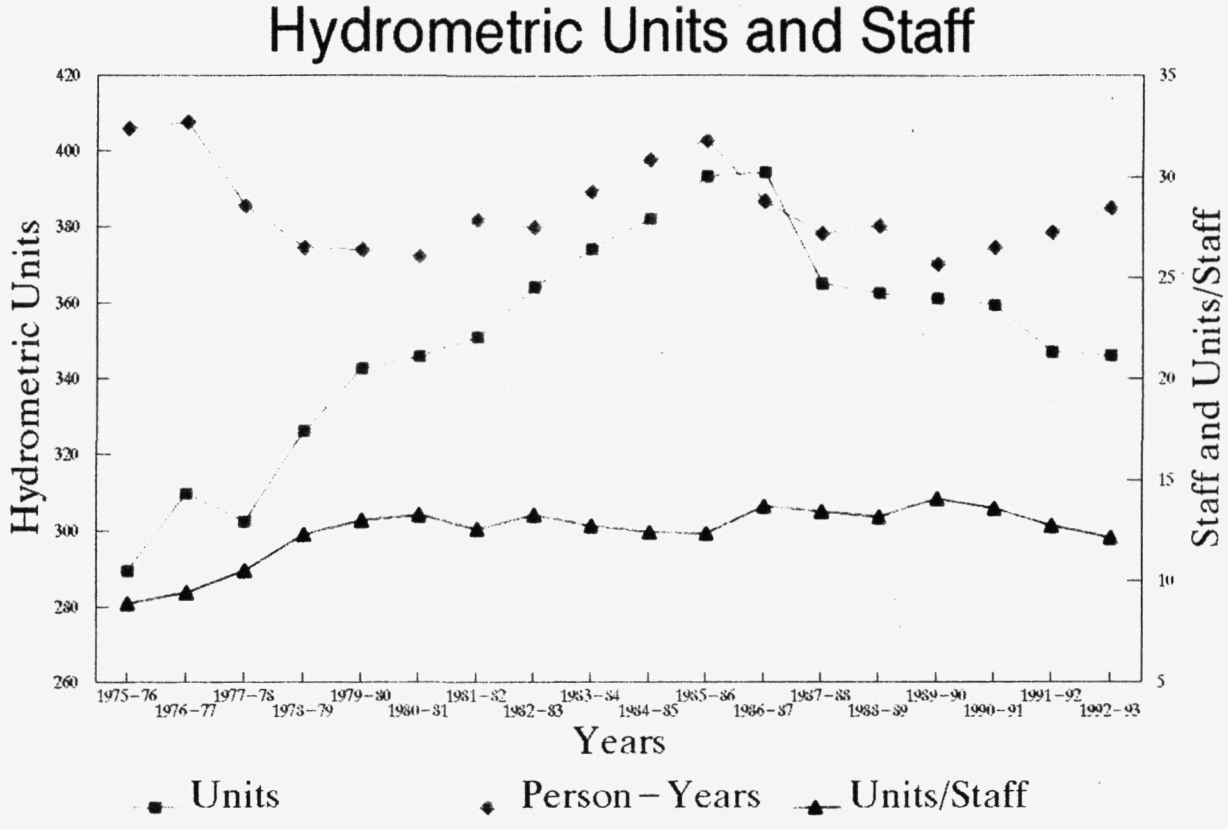
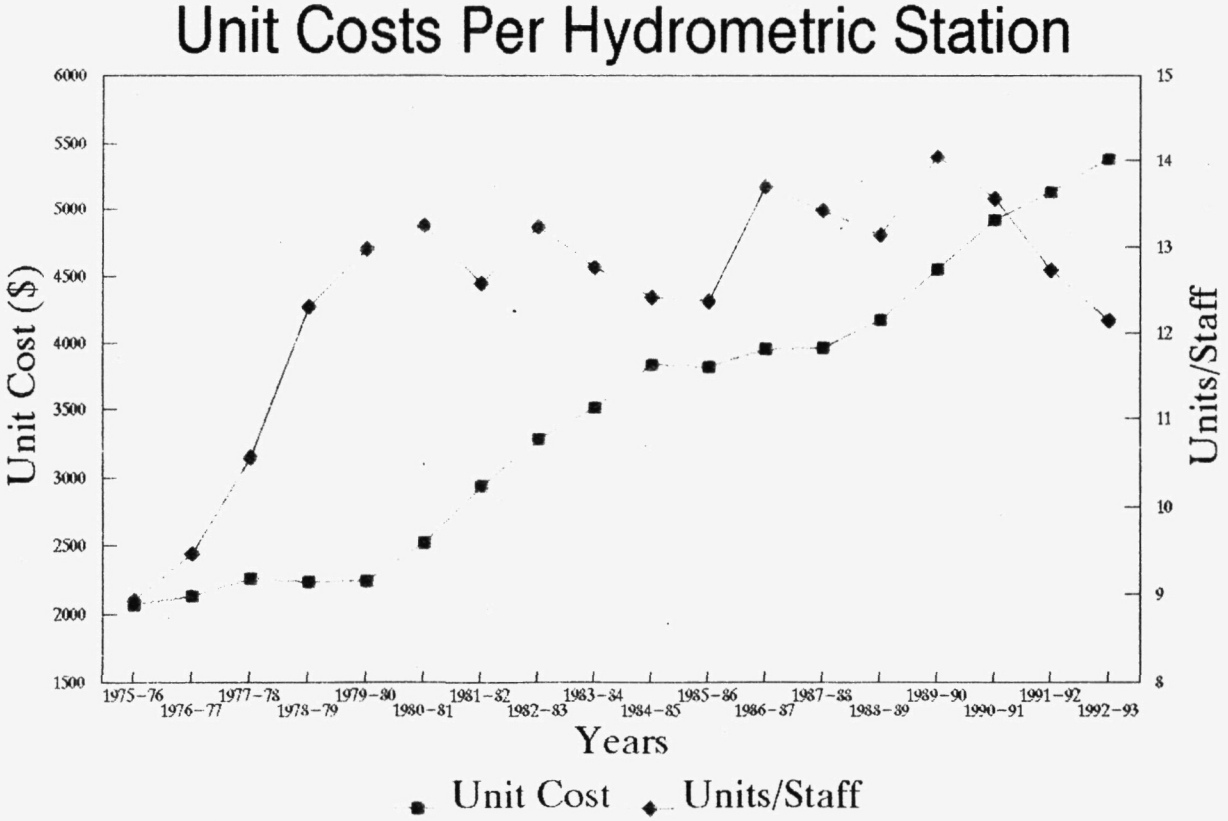


Figure 7



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 had remained there, or above until 1991-92 year when it fell slightly below to 12.74. In 1992-93 units/staff fell another 0.59 per staff to 12.15 units/staff. This continuing reduction in station units per staff can be attributed to the considerable extra work load created by the P2K Pilot Project and hence the addition of extra staff to provide standard coverage of the regular hydrometric network (formerly covered by the activities of staff diverted to the P2K program). Of course, added staff were untrained and are in the Career Development Program and hence their work load (i.e. units operated) are considerably less than those operated by a fully experienced technologist. The history of changes in units operated per hydrometric staff are depicted in Figure 6.

A similar type of summary for hydrometric station unit costs, depicted in Figure 7, 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 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. The increase of 4.2% in 1991/92 was in line with cost index increases. An increase of 4.8% in 1992/93 was above the cost index increase factor but is reflective of the extra staff brought on to ameliorate the work load placed on the hydrometric staff by the operation of the modernization pilot project.

The summary of the cost to Alberta and of the actual payments by Alberta for the period of the agreement, Table 9 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 eighteen year period from 1975-76 to 1992-93, the overpayment by Alberta is +0.34 of the total expected payment from Alberta during this period. The overpayment of $31.6 this year increased Alberta's total overpayment but his was partially offset by the credit of $30.1K applied to the second quarter payment of 1993/94. This adjustment reduced Alberta's overpayment to $12.2K or 0.10% of the total expected payment.

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 overpayment of $5,591 to reduce their deficit to only 0.28% less than the accumulated cost of the program. The excess payment recorded this year is a result of the program being delivered for much less operation costs than had been anticipated when preparing budget estimates. This large reduction in operation costs was due in large part to the low runoff year which had only one significant rainstorm event and next to no spring runoff. This of course meant that much less extra travelling and resultant costs were required. In addition a large portion of operation costs were diverted to the modernization pilot project; as non cost-shareable items.

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. In this case, the estimate would be for the 1994/95 fiscal year and would be utilized for budgetary preparation purposes. Normally the data contained in this report, an estimated size of network, a cost index factor and an estimate of the construction and maintenance program would be utilized to prepare the cost estimate for the forecast year. However, the forecast for 1994/95 is not included in this report (as agreed to at the Co-ordinating Committee Meeting of October 21, 1993) because it is anticipated that the budgets of both the Federal and Provincial governments will be subject to substantial cuts, due to deficit reduction programs, the amount of which are yet unknown and hence networks will have to be cut to match assigned budgets. It is anticipated that budget amounts will be available in January, 1994 at which time network and operation adjustments will be made to adhere to assigned amounts.

The financial information contained in Tables 10 and 11 are a summary for input to the Annual National Cost-Sharing Report. The format and required input to Table 10 vary from the determination of the cost-sharing amounts in Alberta, and thus these values should not be compared.

TABLE 11

WATER QUANTITY SURVEYS

TOTAL PROGRAM COSTS & SHAREABLE COSTS FOR 1992-93
($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	43.0	2095.4	826.9	211.1	3133.4	28.5	1352.1	646.0	112.5	2110.6	1018.6	1092.0

NOTE:
1 These costs don't include those associated with the F&A unit.
2 Operating costs are comprised of $508.0K as described in Appendix B and $138.0K for depreciation as shown in Summary of Financial Considerations.
3 Construction costs are comprised of $108.8K for the program and $3.7K 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 $1031.0K, as shown in Table 8.

TABLE 12

WATER QUANTITY SURVEYS

COMPARISON - SCHEDULE "D" COSTS WITH ACTUAL COSTS AND PAYMENTS
1992-93 (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	1,915,200	974,600	57,400	56,400	1,062,600	1,931,000	31,600	1,062,600	(+)31,600

5.0 FUTURE PROGRAMS

The primary program plan is to maintain, as much as possible, the existing network and the quality of data collected to meet the needs of client agencies realizing however that several factors are mitigating against a status quo resource level for monitoring. It is felt that the levels of network and data quality for 1993/94 can be maintained at 1992/93 levels but that substantial reductions in the network and in perhaps data collection techniques may be inevitable in 1994/95 and beyond. These changes may occur because both the Federal and Provincial governments are determined to reduce the levels of budget deficits and hence less monies will be available for all government programs. In the case of the Federal government the plan is to cut 20% of the monitoring budget over a three year period (the plan is to however re-invest half of this cut back into the monitoring programs for modernization and other monitoring strategies). In the case of the province it is anticipated that substantial budget cuts to every department will occur in 1994/95; a 20% cut has been indicated for every department but the effect of that cut on networks is as yet not determined. In addition a major re-organization of Environment Canada in 1993/94 could impact the hydrometric program.

Possible strategies to minimize the damage to the hydrometric programs will be investigated and implemented including the possibility of tiered standards for hydrometric stations, changes in measurement programs to increase the efficiency of field operations and through modernization efforts. Resource savings through modernization will be minimal as the major operation costs in hydrometric data collection are directed towards the definition of stage-discharge relations which cannot be automated at present with any degree of resource saving. A first step in network reduction will be an evaluation of so called "problem stations" where data collected often do not meet national standards for a variety of reasons but mostly because of very unstable stage-discharge relationships primarily due to beaver activity.

All but one of the former long term full program sediment stations have now been analyzed. The remaining station, "Oldman River near Lethbridge" will be analyzed in 1993/94 and a corresponding report will be prepared.

Because of resource constraints it is anticipated that there will be very little in the way of new station construction. The construction program over the next few years will thus be comprised of mostly maintenance of the existing network and the removal of discontinued stations.

The instrumentation of the modernization pilot project in Alberta was completed (exception were the sites in the PAD area because of shortage in equipment) in the fall of 1992. Thus Water Survey of Canada will be operating the full pilot in 1993/94. This pilot was to end at the end of the 1993/94 fiscal year but because of its late implementation due to late deliveries of instrumentation it is hoped to extend the pilot through to the end of the 1994/95 year. This would allow for two full years of data collection at pilot stations thus providing sufficient data for comparison purposes. It is anticipated that sufficient instrumentation will be available to fully instrument the AEP portion of the pilot in 1993/94. Major efforts of the pilot will be diverted from "familiarization with and making the new instrumentation work" to modernized data computations procedures and

comparison of data collected and processed in the modern and traditional methods.

In addition to the pilot project other modernization efforts will include the continued operation of AFFRAs on the Athabasca River at Hinton and near Obed, the evaluation of the AFFRA program on the EID Main Branch Canal and the operation of a Hydrolab on the Athabasca River near Hinton. The AFFRAs on the Athabasca River are being operated in the hopes that accurate flow data can be produced under ice conditions and that if this is the case that these data could then be utilized as input/output points in the modelling of the river reach for the Northern Rivers study. The Hydrolab is being operated to gain experience in the operation of this instrument in anticipation of integrated monitoring efforts. The AFFRA installed on the EID Main Branch Canal will have been operating for three full years at the end of the 1993 irrigation season and an evaluation of its reliability, applicability and accuracy will be made to determine its fate. If it has proven successful it will replace the existing three stations on the EID diversion canals which are presently utilized to determine total diversion from the Bow River to the Eastern Irrigation District.

The major unknowns for future operations of the hydrometric program in Alberta will continue to be the size of budget reductions and re-organization effects on the program.

A P P E N D I X "A"

SCHEDULE "A"

OF

MEMORANDUM OF AGREEMENT

BETWEEN

GOVERNMENT OF CANADA

AND

GOVERNMENT OF ALBERTA

April 1, 1992

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - FEDERAL DEPARTMENTAL PROGRAMS (1)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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 MINNEWANKA	05BD005	X			X			X
6	JOHNSTON CREEK NEAR THE MOUTH	05BA006	X			X			X
7	LESSER SLAVE RIVER AT SLAVE LAKE	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	SUNWAPTA 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	

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERPROVINCIAL WATERS (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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	BOUNTIFUL COULEE INFLOW NEAR CRANFORD	05AG026	X			X			X
5	BOW RIVER AT CALGARY	05BH004	X				X		X
6	BOW RIVER NEAR THE MOUTH	05BN012	X				X		X
7	B.R.D. DRAIN A NEAR HAYS	05AG004	X			X			X
8	B.R.D. MAIN CANAL	05AC004	X			X			X
9	-BOXELDER CREEK AT HARGRAVES RANCH	05AH050	X			X			X
10	-BOXELDER CREEK NEAR WALSH	05AH001	X			X			X
11	CANADIAN ST. MARY CANAL NEAR SPRING COULEE	05AE026	X			X			X
12	COAL CREEK AT BOW CITY	05BN014	X			X			X
13	CLEARWATER RIVER ABOVE CHRISTINA RIVER	07CD005	X				X	X	
14	COAL LAKE RESERVOIR NEAR WETASKIWIN	05FA016		X			X		X
15	COLD LAKE AT COLD LAKE	06AF002		X			X		X
16	CROWFOOT CREEK NEAR CLUNY	05BM008	X			X			X
17	DICKSON REVERVOIR NEAR DICKSON	05CB006		X			X		X
18	DRAIN L-5 NEAR DIAMOND CITY	05AD040	X			X			X
19	DRY COULEE NEAR MAGRATH	05AE041	X			X			X
20	E.I.D. EAST BRANCH CANAL NEAR LATHOM	05CJ003	X			X			X
21	E.I.D. NORTH BRANCH CANAL NEAR BASSANO	05CJ001	X			X			X
22	E.I.D. SPRINGHILL CANAL NEAR LATHOM	05CJ004	X			X			X
23	EXPANSE COULEE NEAR THE MOUTH	05AG003	X			X			X
24	HIGHWOOD DIVERSION CANAL NEAR HEADGATES	05BL025	X			X			X
25	L.N.I.D. CANAL ABOVE OLDMAN FLUME	05AB019	X			X			X
26	LITTLE BOW CANAL AT HIGH RIVER	05BL015	X				X		X
27	LITTLE BOW RIVER AT CARMANGAY	05AC003	X				X		X
28	LITTLE BOW RIVER BELOW TRAVERS DAM	05AC012	X			X			X
29	LITTLE BOW RIVER NEAR THE MOUTH	05AC023	X			X			X
30	M.I.D. CANAL NEAR SPRING COULEE	05AE021	X			X			X
31	MATZHIWIN CREEK BELOW WARE COULEE	05CJ012	X			X			X
32	NEW WEST COULEE NEAR THE MOUTH	05BN006	X			X			X
33	OLDMAN RIVER NEAR LETHBRIDGE	05AD007	X		X		X		X
34	$PEACE RIVER AT PEACE POINT	07KC001	X				X	X	
35	POTHOLE CREEK AT RUSSELL'S RANCH	05AE016	X			X			X
36	RED DEER RIVER NEAR BINDLOSS	05CK004	X				X		X
37	RONALANE WASTEWAY NEAR HAYS	05BN007		X		X			X
38	ROSEBUD RIVER AT REDLAND	05CE005	X			X			X
39	ROSS CREEK AT MEDICINE HAT	05AH049	X			X			X
40	SEVEN PERSONS CREEK AT MEDICINE HAT	05AH005	X			X			X
41	SOUTH SASKATCHEWAN RIVER AT HIGHWAY NO. 41	05AK001	X			X			X
42	$SLAVE RIVER AT FITZGERALD	07NB001	X		X		X	X	
43	ST. MARY RESERVOIR NEAR SPRING COULEE	05AE025		X			X		X
44	TWELVE MILE CREEK NEAR CECIL	05BN002	X			X			X
45	U.I.D. CANAL NEAR HILL SPRING	05AD013	X			X			X
46	WAPITI RIVER NEAR GRANDE PRAIRIE	07GE001	X				X		X
47	WATERTON RESERVOIR	05AD026		X			X		X
48	W.I.D. CANAL NEAR CHESTERMERE LAKE	05BM003	X			X			X

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERPROVINCIAL WATERS (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - ALBERTA GOVERNMENT								
1	OLDMAN DAM RESERVOIR NEAR PINCHER CREEK	05AA032		X			X		X

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

*GAUGING STATIONS LOCATED IN ALBERTA BUT OPERATED BY THE REGINA DISTRICT

$GAUGING STATIONS LOCATED IN ALBERTA BUT OPERATED BY THE YELLOWKNIFE DISTRICT

MAJOR DESIGNATION - FEDERAL

SUBDESIGNATION - INTERNATIONAL WATERS (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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	BREED CREEK NEAR INTERNATIONAL BOUNDARY	11AA040	X			X			X
5	*CRESSDAY RESERVOIR NEAR CRESSDAY	11AB097		X		X			X
6	*GREASEWOOD RESERVOIR NEAR ELKWATER	11AB092		X		X			X
7	*JAYDOT RESERVOIR NEAR JAYDOT	11AB098		X		X			X
8	+LAKE SHERBURNE	05AE036		X			X		X
9	LEE CREEK AT CARDSTON	05AE002	X				X		X
10	*MASSY RESERVOIR NEAR ELKWATER	11AB104		X		X			X
11	*MICHELE RESERVOIR NEAR ELKWATER	11AB091		X		X			X
12	*MIDDLE CREEK NEAR THE SASKATCHEWAN BOUNDARY	11AB009	X			X			X
13	+MILK RIVER AT EASTERN CROSSING OF INT'L BOUNDARY	11AA031	X			X			X
14	MILK RIVER AT MILK RIVER	11AA005	X				X		X
15	MILK RIVER AT WESTERN CROSSING OF INT'L BOUNDARY	11AA025	X			X			X
16	MINERS COULEE NEAR INTERNATIONAL BOUNDARY	11AA029	X			X			X
17	*MITCHELL RESERVOIR NEAR ELKWATER	11AB099		X		X			X
18	MOUNTAIN VIEW IRRIGATION DISTRICT CANAL	05AD017	X			X			X
19	+NORTH FORK MILK RIVER ABOVE ST. MARY CANAL	11AA032	X			X			X
20	NORTH MILK RIVER NEAR INTERNATIONAL BOUNDARY	11AA001	X			X			X
21	*REESOR RESERVOIR NEAR ELKWATER	11AB090		X		X			X
22	ROLPH CREEK NEAR KIMBALL	05AE005	X			X			X
23	SAGE CREEK AT Q RANCH NEAR WILD HORSE	11AA026	X			X			X
24	+SOUTH FORK MILK RIVER NEAR BABB	11AA033	X			X			X
25	+ST. MARY CANAL AT ST. MARY CROSSING	05AE029	X			X			X
26	ST. MARY RIVER AT INTERNATIONAL BOUNDARY	05AE027	X				X		X
27	+SWIFTCURRENT CREEK AT SHERBURNE	05AE033	X			X			X
28	VERDIGRIS COULEE NEAR THE MOUTH	11AA038	X			X			X
29	*WALBURGER COULEE BELOW DIVERSIONS	11AB086	X			X			X
30	WATERTON LAKE AT WATERTON PARK	05AD025		X			X		X
31	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 - NATIONAL WATER QUANTITY INVENTORY (4)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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	LAC LA BICHE AT LAC LA BICHE	07CA004		X			X		X
4	LESSER SLAVE LAKE AT FAUST	07BJ002		X		X			X
5	McLEOD RIVER NEAR ROSEVEAR	07AG007	X				X		X
6	NORTH SASKATCHEWAN RIVER AT EDMONTON	05DF001	X				X		X
7	NOTIKEWIN RIVER AT MANNING	07HC001	X				X		X
8	PEACE RIVER AT DUNVEGAN BRIDGE	07FD003	X				X		X
9	PEERLESS LAKE NEAR PEERLESS LAKE	07JB001		X		X		X	
10	PEMBINA RIVER AT JARVIE	07BC002	X				X		X
11	RED DEER RIVER AT RED DEER	05CC002	X				X		X
12	SMOKY RIVER AT WATINO	07GJ001	X				X		X
13	WABASCA RIVER AT WADLIN LAKE ROAD	07JD002	X				X		X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - FEDERAL-PROVINCIAL AGREEMENTS (1)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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	GREBOIRE 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	STEEPBANK 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 MAMAWI CREEK	07KF015	X			X		X	
3	EMBARRAS RIVER BELOW DIVERGENCE	07DD003	X			X		X	

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - RIVER BASIN MANAGEMENT (2)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
	SYMBOL $ INDICATING STATION LOCATED IN ALBERTA BUT OPERATED BY WSC YELLOWKNIFE DISTRICT								
1	BEAVER LAKE AT RANGER STATION	06AA003		X		X			X
2	BEAVERLODGE RIVER NEAR BEAVERLODGE	07GD001	X			X			X
3	BERRRY CREEK NEAR THE MOUTH	05CH007	X			X			X
4	BERRY CREEK RESERVOIR NEAR SUNNYNOOK	05CH014		X		X			X
5	BOW RIVER BELOW BASSANO DAM	05BM004	X			X			X
6	BOW RIVER BELOW CARSELAND DAM	05BM002	X			X			X
7	BULLPOUND CREEK NEAR THE MOUTH	05CG003	X			X			X
8	CASTLE RIVER NEAR BEAVER MINES	05AA022	X				X		X
9	CHAIN LAKES RESERVOIR NEAR NANTON	05AB037		X			X		X
10	COOKING LAKE AT COOKING LAKE	05EB012		X		X			X
11	$DOG RIVER NEAR FITZGERALD	07NB008	X				X	X	
12	ETHEL LAKE NEAR COLD LAKE	06AC004		X		X			X
13	FORSTER RESERVOIR NEAR CESSFORD	05CH013		X		X			X
14	HAMMERHILL SPILLWAY NEAR GLEICHEN	05BM005	X			X			X
15	HAY RIVER NEAR MEANDER RIVER	07OB003	X			X			X
16	HIGHWOOD RIVER NEAR THE MOUTH	05BL024	X				X		X
17	HILDA LAKE NEAR COLD LAKE	06AC003		X		X			X
18	KAKWA RIVER NEAR GRANDE PRAIRIE	07GB002	X			X		X	
19	KLESKUN HILLS MAIN DRAIN NEAR GRANDE PRAIRIE	07GE002	X			X			X
20	MARIE LAKE NEAR COLD LAKE	06AC005		X		X			X
21	MARTINEAU RIVER ABOVE COLD LAKE	06AF008	X				X	X	
22	MOORE LAKE NEAR COLD LAKE	06AC002		X		X			X
23	MURIEL LAKE NEAR GURNEYVILLE	06AC007		X			X		X
24	NORTH SASKATCHEWAN RIVER NEAR ROCKY MOUNTAIN HOUSE	05DC001	X			X			X
25	OLDMAN RIVER NEAR BROCKET	05AA024	X		X		X		X
26	ONETREE CREEK NEAR PATRICIA	05CJ006	X			X			X
27	PEACE RIVER AT PEACE RIVER	07HA001	X				X		X
28	PIYAMI DRAIN NEAR PICTURE BUTTE	05AD037	X			X			X
29	RED DEER RIVER AT DRUMHELLER	05CE001	X				X		X
30	SMOKY RIVER ABOVE HELLS CREEK	07GA001	X			X			X
31	SOUTH SASKATCHEWAN RIVER AT MEDICINE HAT	05AJ001	X				X		X
32	ST. MARY RIVER NEAR LETHBRIDGE	05AE006	X				X		X
33	STEEN RIVER AT STEEN RIVER	07OB004	X			X			X
34	SWAN RIVER NEAR KINUSO	07BJ001	X				X		X
35	VERDIGRIS LAKE TRIBUTARY NEAR MILK RIVER	11AA039	X			X			X
36	WABAMUN LAKE AT WABAMUN	05DE002		X			X		X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
1	ADAMS CREEK NEAR KINUSO	07BJ004	X			X			X
2	ALKALI CREEK NEAR THE MOUTH	05CX005	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	ATIMOSME 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	BELLY RIVER NEAR GLENWOOD	05AD041	X				X		X
11	BERLAND RIVER NEAR THE MOUTH	07AC007	X			X			X
12	BERRY CREEK NEAR ROSE LYNN	05CH008	X			X			X
13	BIGKNIFE CREEK NEAR GADSBY	05FC002	X			X			X
14	BLACKMUD CREEK NEAR ELLERSLIE	05DF003	X			X			X
15	BLINDMAN RIVER NEAR BLACKFALDS	05CC001	X				X		X
16	BLOCK CREEK NEAR LEEDALE	05CC010	X			X			X
17	BOYER RIVER NEAR FORT VERMILION	07JF002	X			X			X
18	BRAZEAU RIVER BELOW CARDINAL RIVER	05DD007	X			X			X
19	BROWN CREEK AT FORESTRY ROAD	05DD004	X			X			X
20	BUCHANAN CREEK NEAR MANNING	07HC002	X			X			X
21	BUFFALO CREEK AT HIGHWAY NO. 41	05FE002	X			X			X
22	BULLPOUND CREEK NEAR WATTS	05CG004	X			X			X
23	CADOTTE RIVER AT OUTLET CADOTTE LAKE	07HB001	X			X			X
24	CASTLE RIVER AT RANGER STATION	05AA028	X			X			X
25	CATARACT CREEK NEAR FORESTRY ROAD	05BL022	X				X		X
26	CHINCHAGA RIVER NEAR HIGH LEVEL	07OC001	X				X		X
27	CHRISTINA RIVER NEAR CHARD	07CE002	X			X		X	
28	CHRISTMAS CREEK NEAR BLUE RIDGE	07AH002	X			X			X
29	CLEAR RIVER NEAR BEAR CANYON	07FD009	X			X			X
30	CLEARWATER RIVER ABOVE LIMESTONE CREEK	05DB003	X			X			X
31	CLEARWATER RIVER NEAR DOVERCOURT	05DB006	X				X		X
32	CROWSNEST RIVER AT FRANK	05AA008	X				X		X
33	CUTBANK RIVER NEAR GRANDE PRAIRIE	07GB001	X			X		X	
34	DAPP CREEK AT HIGHWAY NO. 44	07BC006	X			X			X
35	DEEP VALLEY CREEK NEAR VALLEYVIEW	07GF008	X			X			X
36	DEER CREEK MAIN STEM	05CA003	X			X			X
37	DRIEDMEAT CREEK NEAR THE MOUTH	05FA018	X			X			X
38	DRIFTWOOD RIVER NEAR THE MOUTH	07BK007	X				X		X
39	DRYWOOD CREEK NEAR THE MOUTH	05AD010	X				X		X
40	DUTCH CREEK NEAR THE MOUTH	05AA026	X			X			X
41	EAST PRAIRIE RIVER NEAR ENILDA	07BF001	X			X			X
42	ELBOW RIVER AT BRAGG CREEK	05BJ004	X				X		X
43	EUREKA RIVER NEAR WORSLEY	07FD013	X			X			X
44	FISH CREEK NEAR PRIDDIS	05BK001	X			X			X
45	FLAT CREEK NEAR BOYLE	07CA003	X			X			X
46	FREEMAN RIVER NEAR FORT ASSINIBOINE	07AH001	X			X			X
47	GHOST RIVER ABOVE WAIPOROUS CREEK	05BG010	X				X		X
48	GRANDE PRAIRIE CREEK NEAR SEXSMITH	07GE003	X			X			X
49	GROS VENTRE CREEK NEAR DUNMORE	05AH037	X			X			X
50	HAYNES CREEK NEAR HAYNES	05CD006	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	HEART RIVER NEAR NAMPA	07HA003	X				X		X
52	HIGHWOOD RIVER AT DIEBEL'S RANCH	05BL019	X			X			X
53	HINES CREEK ABOVE GERRY LAKE	07FD011	X			X			X
54	HOUSE RIVER AT HIGHWAY NO. 63	07CB002	X			X			X
55	IOSEGUN RIVER NEAR LITTLE SMOKY	07GG003	X			X			X
56	IRON CREEK NEAR HARDISTY	05FB002	X			X			X
57	JACKPINE CREEK AT WADLIN LAKE ROAD	07JD003	X			X			X
58	JAMES RIVER NEAR SUNDRE	05CA002	X			X			X
59	JUMPINGPOUND CREEK NEAR COX HILL	05BH013	X			X			X
60	JUMPINGPOUND CREEK NEAR THE MOUTH	05BH009	X				X		X
61	KEG RIVER AT HIGHWAY NO. 35	07HF002	X			X			X
62	KNEEHILLS CREEK NEAR DRUMHELLER	05CE002	X			X			X
63	LA BICHE RIVER AT HIGHWAY NO. 63	07CA011	X				X		X
64	LAFOND CREEK NEAR RED EARTH CREEK	07JC001	X			X			X
65	LALBY CREEK NEAR GIROUXVILLE	07GJ005	X			X			X
66	LITTLE PADDLE RIVER NEAR MAYERTHORPE	07BB005	X			X			X
67	LITTLE RED DEER RIVER NEAR THE MOUTH	05CB001	X				X		X
68	LITTLE RED DEER RIVER NEAR WATER VALLEY	05CB002	X			X			X
69	LITTLE SMOKY RIVER NEAR GUY	07GH002	X				X		X
70	LLOYD CREEK NEAR BLUFFTON	05CC009	X			X			X
71	LOGAN RIVER NEAR THE MOUTH	07CA012	X			X		X	
72	LOVETT RIVER NEAR THE MOUTH	07BA003	X			X			X
73	LUTOSE CREEK NEAR STEEN RIVER	07OB006	X			X			X
74	MACKAY CREEK AT WALSH	05AH002	X			X			X
75	MANYBERRIES CREEK AT BRODIN'S FARM	05AF010	X			X			X
76	MASKWA CREEK NO. 1 ABOVE BEARHILLS LAKE	05FA014	X			X			X
77	McLEOD RIVER ABOVE EMBARRAS RIVER	07AF002	X				X		X
78	MEADOW CREEK NEAR THE MOUTH	05AB029	X			X			X
79	MEANDER RIVER AT OUTLET HUTCH LAKE	07OB005	X			X			X
80	MEDICINE RIVER NEAR ECKVILLE	05CC007	X				X		X
81	MONITOR CREEK NEAR MONITOR	05GA003	X			X			X
82	MONTAGNEUSE RIVER NEAR HINES CREEK	07FD012	X			X			X
83	MUSKEG RIVER NEAR GRANDE CACHE	07GA002	X			X			X
84	NAMEPI CREEK NEAR THE MOUTH	05EC004	X			X			X
85	NORDEGG RIVER AT SUNCHILD ROAD	05DD009	X				X		X
86	NORTH RAM RIVER AT FORESTRY ROAD	05DC011	X			X			X
87	OLDMAN RIVER NEAR WALDRON'S CORNER	05AA023	X		X		X		X
88	OWL RIVER BELOW PICHE RIVER	07CA013	X			X		X	
89	PADDLE RIVER AT BARRHEAD	07BB006	X			X			X
90	PADDLE RIVER NEAR ROCHFORT BRIDGE	07BB004	X			X			X
91	PARFLESH CREEK NEAR CHANCELLOR	05BM007	X			X			X
92	PEAVINE CREEK NEAR FALHER	07GH004	X			X			X
93	PEIGAN CREEK NEAR PAKOWKI ROAD	05AH041	X			X			X
94	PEKISKO CREEK NEAR LONGVIEW	05BL023	X			X			X
95	PEMBINA RIVER BELOW PADDY CREEK	07BA001	X			X			X
96	PIGEON LAKE CREEK NEAR USONA	05FA019	X			X			X
97	PINCHER CREEK AT PINCHER CREEK	05AA004	X			X			X
98	PINE CREEK NEAR GRASSLAND	07CA005	X			X			X
99	PINTO CREEK NEAR GRANDE PRAIRIE	07GC002	X			X			X
100	PIPESTONE CREEK BELOW BIGSTONE CREEK	05FA022	X			X			X

MAJOR DESIGNATION - FEDERAL-PROVINCIAL

SUBDESIGNATION - REGIONAL WATER QUANTITY INVENTORY (3)

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
101	PONTON RIVER ABOVE BOYER RIVER	07JF003	X			X			X
102	PRAIRIE BLOOD COULEE NEAR LETHBRIDGE	05AD035	X			X			X
103	PRAIRIE CREEK BELOW LICK CREEK	05DB005	X			X			X
104	PRAIRIE CREEK NEAR ROCKY MOUNTAIN HOUSE	05DB002	X				X		X
105	RACEHORSE CREEK NEAR THE MOUTH	05AA027	X			X			X
106	RAM RIVER NEAR THE MOUTH	05DC006	X				X		X
107	RAT CREEK NEAR CYNTHIA	07BA002	X			X			X
108	RAVEN RIVER NEAR RAVEN	05CB004	X				X		X
109	RAY CREEK NEAR INNISFAIL	05CE010	X			X			X
110	RED DEER RIVER ABOVE PANTHER RIVER	05CA004	X			X			X
111	RED DEER RIVER BELOW BURNT TIMBER CREEK	05CA009	X				X		X
112	REDEARTH CREEK NEAR RED EARTH	07JC002	X			X			X
113	REDWATER RIVER NEAR THE MOUTH	05EC005	X			X			X
114	RENWICK CREEK NEAR THREE HILLS	05CE011	X			X			X
115	RIBSTONE CREEK NEAR EDGERTON	05FD001	X			X			X
116	ROSE CREEK NEAR ALDER FLATS	05DE007	X			X			X
117	ROSEBUD RIVER BELOW CARSTAIRS CREEK	05CE006	X			X			X
118	ROSS CREEK NEAR IRVINE	05AH003	X			X			X
119	SADDLE RIVER NEAR WOKING	07FD006	X			X			X
120	SAKWATAMAU RIVER NEAR WHITECOURT	07AH003	X			X			X
121	SAM LAKE TRIBUTARY NEAR SCHULER	05AH047	X			X			X
122	SAND RIVER NEAR THE MOUTH	06AB001	X			X			X
123	SAULTEAUX RIVER NEAR SPURFIELD	07BK005	X			X			X
124	SAWRIDGE CREEK NEAR SLAVE LAKE	07BK009	X			X			X
125	SHEEP COULEE NEAR CARSTAIRS	05CE019	X			X			X
126	SHEEP RIVER AT BLACK DIAMOND	05BL014	X				X		X
127	SIFFLEUR RIVER NEAR THE MOUTH	05DA002	X			X			X
128	SIMONETTE RIVER NEAR GOODWIN	07GF001	X			X			X
129	SOUNDING CREEK NEAR OYEN	05GA008	X			X			X
130	SOUSA CREEK NEAR HIGH LEVEL	07DA001	X			X			X
131	SOUTH WABASCA LAKE NEAR DESMARAIS	07JA002		X		X			X
132	STIMSON CREEK NEAR PEKISKO	05BL007	X			X			X
133	STRAWBERRY CREEK NEAR THE MOUTH	05DF004	X			X			X
134	STRETTON CREEK NEAR MARWAYNE	05EE005	X			X			X
135	STURGEON RIVER NEAR FORT SASKATCHEWAN	05EA001	X			X			X
136	SUNDANCE CREEK NEAR BICKERDIKE	07AF010	X			X			X
137	SWAN RIVER NEAR SWAN HILLS	07BJ003	X			X			X
138	THREEHILLS CREEK BELOW RAY CREEK	05CE018	X			X			X
139	THREEHILLS CREEK NEAR CARBON	05CE007	X			X			X
140	THREEPOINT CREEK NEAR MILLARVILLE	05BL013	X			X			X
141	TODD CREEK AT ELTON'S RANCH	05AA006	X			X			X
142	TOMAHAWK CREEK NEAR TOMAHAWK	05DE009	X			X			X
143	UTIKUMA LAKE NEAR NIPISI	07JA001		X		X			X
144	VERMILION RIVER NEAR MARWAYNE	05EE007	X			X			X
145	WABAMUN CREEK NEAR DUFFIELD	05DE003	X			X			X
146	WABASCA RIVER BELOW TROUT RIVER	07JB002	X				X	X	
147	WABASH CREEK NEAR PIBROCH	07BC007	X			X			X
148	WAINSCOTT COULEE NEAR BROWNVALE	07FD014	X			X			X
149	WAIPAROUS CREEK NEAR THE MOUTH	05BG006	X				X		X
150	WANDERING RIVER NEAR WANDERING RIVER	07CA006	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	WASKAHIGAN RIVER NEAR THE MOUTH	07GG001	X				X		X
152	WEST ARROWWOOD CREEK NEAR ARROWWOOD	05BM014	X			X			X
153	WEST PRAIRIE RIVER NEAR HIGH PRAIRIE	07BF002	X				X		X
154	WEST WHITEMUD CREEK NEAR IRETON	05DF007	X			X			X
155	WHITEMUD CREEK NEAR ELLERSLIE	05DF006	X			X			X
156	WHITEMUD RIVER NEAR DIXONVILLE	07HA005	X			X			X
157	WILDHAY RIVER NEAR HINTON	07AC001	X			X			X
158	WILLOW CREEK ABOVE CHAIN LAKES	05AB028	X				X		X
159	WILLOW CREEK NEAR NOLAN	05AB002	X			X			X
160	WILLOW RIVER NEAR WABASCA	07JA003	X			X			X
161	WOLF CREEK AT HIGHWAY NO. 16A	07AG003	X				X		X
162	WOLF RIVER AT OUTLET OF WOLF LAKE	06AB002	X				X	X	

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS 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	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	BEAVERTAIL CREEK NEAR HYTHE	07GD002	X			X			X
9	BELLY-ST. MARY DIVERSION CANAL	05AD021	X				X		X
10	BERRY CREEK BELOW DEADFISH CREEK	05CH016	X			X			X
11	BERRY CREEK RESERVOIR OUTLET	05CH011	X			X			X
12	BIRCH CREEK NEAR CONKLIN	07CE006	X			X		X	
13	BLINDMAN RIVER NEAR BLUFFTON	05CC008	X			X			X
14	BLOOD INDIAN CREEK NEAR CABIN LAKE	05CK007	X			X			X
15	BLOOD INDIAN CREEK NEAR THE MOUTH	05CK001	X			X			X
16	B.R.D. DRAIN D NEAR VAUXHALL	05BN008	X			X			X
17	B.R.D. DRAIN T NEAR HAYS	05AG005	X			X			X
18	BOYER RIVER NEAR PADDLE PRAIRIE	07JF004	X			X			X
19	BUFFALO LAKE NEAR ERSKINE	05CD005		X		X			X
20	CALLING LAKE AT RANGER STATION	07CB001		X		X			X
21	CANADIAN ST. MARY CANAL AT DROP NO. 1	05AF028	X			X			X
22	CAVAN LAKE DIVERSION NEAR DUNMORE	05AH044	X			X			X
23	CHIP LAKE AT OUTLET TO LOBSTICK RIVER	07BB008		X		X			X
24	COLQUHOUN CREEK NEAR GRANDE PRAIRIE	07GE006	X			X			X
25	COYOTE CREEK NEAR CHERHILL	07BB014	X			X			X
26	DEADFISH INFLOW CANAL NEAR CESSFORD	05CH012	X			X			X
27	DICKSON DAM TUNNEL OUTLET	05CB007	X				X		X
28	ELBOW RIVER ABOVE ELBOW FALLS	05BJ006	X			X			X
29	ELBOW RIVER BELOW GLENMORE DAM	05BJ001	X				X		X
30	ELDER CREEK AT HIGHWAY NO. 686	07HB002	X			X			X
31	ELKWATER LAKE AT ELKWATER	05AH025		X		X			X
32	EMBARASS RIVER NEAR WEALD	07AF014	X			X			X
33	ERITH RIVER BELOW HANLAN CREEK	07AF016	X			X			X
34	FAWCETT LAKE NEAR SMITH	07BK008		X		X			X
35	FISH CREEK AT BOW BOTTOM TRAIL	05BK003	X			X			X
36	FISH CREEK ABOVE LITTLE FISH LAKE	05CG006	X			X			X
37	GOLD CREEK NEAR FRANK	05AA030	X			X			X
38	GREGG RIVER NEAR THE MOUTH	07AF015	X			X			X
39	GROAT CREEK NEAR WHITECOURT	07AG008	X			X			X
40	GULL LAKE AT ASPEN BEACH	05CC006		X		X			X
41	HARGRAVES DIVERSION FROM BOXELDER CREEK	05AH051		X		X			X
42	HARTLEY CREEK NEAR FORT MACKAY	07DA009	X			X		X	
43	HASTINGS LAKE NEAR DEVILLE	05EB011		X		X			X
44	HIGHWOOD RIVER BELOW LITTLE BOW CANAL	05BL004	X				X		X
45	HIGHWOOD RIVER NEAR ALDERSYDE	05BL009	X			X			X
46	IRON CREEK NEAR VIKING	05FB003	X			X			X
47	ISLE LAKE AT EUREKA BEACH	05EA008		X		X			X
48	JACKFISH RIVER BELOW CHRISTINA LAKE	07CE005	X			X		X	
49	JOSLYN CREEK NEAR FORT MACKAY	07DA016	X			X		X	
50	KENNEDY COULEE NEAR ACADIA VALLEY	05CK006	X			X			X

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
51	KILLARNEY LAKE TRIBUTARY NEAR CHAUVIN	05GA010	X			X			X
52	KYISKAP CREEK NEAR GRANUM	05AB038	X			X			X
53	LAC LA NONNE AT LAC LA NONNE	07BB007		X		X			X
54	LAC STE. ANNE AT ALBERTA BEACH	05EA006		X		X			X
55	LATERAL 10 SPILLWAY NEAR CHIN	05AG007	X			X			X
56	LESSER SLAVE LAKE AT SLAVE LAKE	07BJ006		X			X		X
57	LILY CREEK NEAR SLAVE LAKE	07BG004	X			X			X
58	LITTLE BERLAND RIVER AT HIGHWAY NO. 40	07AC008	X			X			X
59	LITTLE BOW RIVER ABOVE TRAVERS RESERVOIR	05AC034	X			X			X
60	LITTLE ELBOW RIVER ABOVE NIHAHI CREEK	05BJ009	X			X			X
61	LITTLE SMOKY RIVER AT LITTLE SMOKY	07GG002	X			X			X
62	LOMOND LATERAL NEAR HEADGATE	05AC017	X			X			X
63	LOYALIST CREEK NEAR CONSORT	05GA013	X			X			X
64	MACKAY CREEK NEAR GRABURN GAP	05AH042	X			X			X
65	McALPINE CREEK (EAST FORK) NEAR ELKWATER	05AH043	X			X			X
66	McGREGOR LAKE INFLOW NEAR MILO	05AC024	X			X			X
67	McGREGOR-TRAVERS CANAL NEAR CHAMPION	05AC025	X			X			X
68	McLEOD RIVER NEAR CADOMIN	07AF013	X			X			X
69	McLEOD RIVER NEAR WHITECOURT	07AG004	X			X			X
70	MICHICHI CREEK AT DRUMHELLER	05CE020	X			X			X
71	MILK RIVER RIDGE RESERVOIR	05AF030		X		X			X
72	MINISTIK LAKE NEAR NEW SAREPTA	05EB013		X		X			X
73	MIQUELON LAKE AT PROVINCIAL PARK	05EB014		X		X			X
74	MONITOR CREEK NEAR CONSORT	05GA011	X			X			X
75	MOOSEHILLS CREEK NEAR ELK POINT	05ED003	X			X			X
76	MOOSELAKE RIVER NEAR FRANCHERE	06AC006	X			X			X
77	MOSQUITO CREEK NEAR THE MOUTH	05AC031	X			X			X
78	NORTH SASKATCHEWAN RIVER NEAR LODGEPOLE	05DE006		X		X			X
79	OLDMAN RIVER NEAR THE MOUTH	05AG006	X				X		X
80	PADDLE RIVER AT HWY. 764	07BB013		X		X			X
81	PADDLE RIVER NEAR ANSELMO	07BB011	X			X			X
82	PADDLE RIVER NEAR SANGUDO	07BB012		X		X			X
83	PAINTEARTH CREEK NEAR HALKIRK	05FC004	X			X			X
84	PARLBY CREEK AT ALIX	05CD007	X			X			X
85	PEACE RIVER AT FORT VERMILION	07HF001		X		X			X
86	PEMBINA RIVER NEAR ENTWISTLE	07BB002	X				X		X
87	PIGEON LAKE AT GRANDVIEW	05FA013		X		X			X
88	PONY CREEK NEAR CHARD	07CE003	X			X		X	
89	PORTER CREEK ABOVE BAPTISTE LAKE	07BE003	X			X			X
90	POTHOLE TURNOUT NEAR MAGRATH	05AE038	X			X			X
91	REDWATER RIVER NEAR VIMY	05EC007	X			X			X
92	REDWILLOW RIVER NEAR BEAVERLODGE	07GD003	X				X		X
93	ROBERT CREEK NEAR ANZAC	07CE004	X			X		X	
94	RUSH LAKE DRAIN NEAR NEW DAYTON	05AF031	X			X			X
95	SALT CREEK NEAR GROUARD	07BF009	X			X			X
96	SNAKE CREEK NEAR VULCAN	05AC030	X			X			X
97	SOUNDING CREEK NEAR CHINOOK	05GA012	X			X			X
98	SOUTH HEART RESERVOIR NEAR McLENNAN	07BF008		X		X			X
99	SPRAY RIVER AT BANFF	05BC001	X				X		X
100	STEELE LAKE NEAR JARVIE	07BC005		X		X			X

MAJOR DESIGNATION - PROVINCIAL

SUBDESIGNATION - PROVINCIAL DEPARTMENTAL PROGRAMS

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - WATER SURVEY OF CANADA, ALBERTA DISTRICT								
101	STIRLING LAKE OUTFLOW NEAR STIRLING	05AF029	X			X			X
102	STONY CREEK NEAR TAWATINAW	07BE004	X			X			X
103	STURGEON LAKE AT WILLIAMSON PARK	07GH003		X		X			X
104	STURGEON RIVER NEAR MAGNOLIA BRIDGE	05EA010	X			X			X
105	STURGEON RIVER NEAR VILLENEUVE	05EA005	X				X		X
106	SYLVAN LAKE AT SYLVAN LAKE	05CC003		X		X			X
107	TEEPEE CREEK NEAR LA CRETE	07JD004	X			X			X
108	TINDASTOLL CREEK NEAR MARKERVILLE	05CC012	X			X			X
109	TRAP CREEK NEAR LONGVIEW	05BL027	X			X			X
110	TROUT CREEK NEAR GRANUM	05AB005	X			X			X
111	UNNAMED CREEK NEAR FORT MACKAY	07DA011	X			X		X	
112	VERMILION PARK LAKE NEAR VERMILION	05EE008		X		X			X
113	VERMILION RIVER AT VEGREVILLE	05EE009	X			X			X
114	VERMILION RIVER TRIBUTARY NEAR BRUCE	05EE006	X			X			X
115	WAMPUS CREEK NEAR HINTON	07AF003	X			X			X
116	WASKASOO CREEK AT RED DEER	05CC011	X			X			X
117	WATERTON RIVER NEAR GLENWOOD	05AD028	X				X		X
118	WATERTON-BELLY DIVERSION CANAL	05AD027	X				X		X
119	WEILLER CREEK NEAR WETASKAWIN	05FA024	X			X			X
120	WEST ARROWWOOD CREEK NEAR ENSIGN	05BM018	X			X			X
121	WHITE EARTH CREEK NEAR SMOKY LAKE	05EC006	X			X			X
122	WILLOW CREEK BELOW LANE CREEK	05AB039	X			X			X
123	WILLOW CREEK NEAR CLARESHOLM	05AB021	X				X		X
124	WINAGAMI LAKE AT PROVINCIAL PARK	07BF006		X		X			X
125	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	CHENAL DES QUATRE FOURCHES BELOW FOUR FORKS	07KF006 MISC	X				X	X	
4	FLETCHER CHANNEL BELOW DIVERGENCE	07DD004 MISC	X				X	X	
5	GOOSE ISLAND CHANNEL BELOW DIVERGENCE	07DD005 MISC	X				X	X	
6	MAMAWI LAKE CHANNEL AT DOG CAMP	07KF010 MISC	X			X		X	
7	PRAIRIE RIVER NEAR LAKE CLAIRE	07KF014 MISC	X			X		X	
8	REVILLON COUPE BELOW RIVIERE DES ROCHERS	07NA004 MISC	X					X	
9	RIVIERE DES ROCHERS BELOW REVILLON COUPE	07NA902 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
5	BEDDINGTON CREEK NEAR CALGARY	05BH904	X			X			X
6	BIGELOW RESERVOIR NEAR WIMBOURNE	05CE901		X		X			X
7	BRD CANAL AT DROP NO. 3	05AC902	X			X			X
8	B.R.I.D. WESTERN BLOCK LATERAL A NEAR HEADGATES	05AC013	X			X			X
9	CHESTERMERE LAKE AT SOUTH OUTLET	05BM904		X		X			X
10	COLUMBINE CREEK NEAR THE MOUTH	06AA004	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 - ALBERTA GOVERNMENT								
11	DRIEDMEAT LAKE AT OUTFLOW	05FA020		X		X			X
12	ELBOW RIVER AT SARCEE BRIDGE	05BJ010	X			X			X
13	ETZIKOM COULEE NEAR NEMISKAM	05AF905	X			X			X
14	FALLENTIMBER CREEK NEAR SUNDRE	05CA012	X			X			X
15	FOOTHILLS CREEK NEAR PINCHER CREEK	05AD901	X			X			X
16	JACKFISH CREEK NEAR LACOREY	06AC001	X			X			X
17	KEHO LAKE NEAR NOBLEFORD	05AC914		X		X			X
18	KRAWCHUK DRAINAGE NEAR McLENNAN	07HA902	X			X			X
19	LAKE MCGREGOR AT SOUTH DAM	05AC022		X		X			X
20	LEE CREEK BELOW CONFLUENCE OF EAST FORK	05AE904	X			X			X
21	LITTLE BOW RESERVOIR NEAR ENCHANT	05AC922		X		X			X
22	L.N.I.D. CANAL BELOW KEHO OUTFLOW	05AC026	X			X			X
23	L.N.I.D. MONARCH BRANCH CANAL BELOW HEADWORKS	05AC028	X			X			X
24	LODGE CREEK AT HIGHWAY NO. 41	11AB902	X			X			X
25	PADDLE RIVER RESERVOIR NEAR ROCHFORT BRIDGE	07BB914		X			X		X
26	PARLBY CREEK NEAR MIRROR	05CD902	X			X			X
27	POINTE-AUX-PINS CREEK NEAR ARDROSSAN	05EB902	X			X			X
28	POINTE-AUX-PINS TRIBUTARY 1 NEAR ARDROSSAN	05EB909	X			X			X
29	POINTE-AUX-PINS TRIBUTARY 2 NEAR ARDROSSAN	05EB910	X			X			X
30	POINTE-AUX-PINS TRIBUTARY 3 NEAR ARDROSSAN	05EB911	X			X			X
31	ROMEO CREEK ABOVE ROMEO LAKE	07BB903	X			X			X
32	RYCROFT SURVEY #3 NEAR RYCROFT	07FD910	X			X			X
33	SPOTTED LAKE NEAR MIRROR	05CD903		X		X			X
34	SQUAW COULEE DIVERSION BELOW SQUAW COULEE DAM	05AC917	X			X			X
35	TODD CREEK NEAR HIGHWAY NO. 22	05AA909	X			X			X
36	TRAVERSE RESERVOIR NEAR ENCHANT	05AC921		X		X			X
37	UID CANAL REACH #1 AT 12+344	05AD933	X			X			X
38	VERMILION RIVER DRAINAGE NEAR HOLDEN	05EE913	X			X			X
39	VIXEN CREEK NEAR BELLOY	07FD921	X			X			X
40	WASKATENAU CREEK NEAR WASKATENAU	05EC002	X			X			X
41	WHITBURN DRAINAGE PROJECT NEAR SPIRIT RIVER	07FD912	X			X			X
42	YOUNG DRAINAGE PROJECT NEAR SPIRIT RIVER	07FD913	X			X			X

MAJOR DESIGNATION - CONTRIBUTED DATA

NO.	STATION NAME	STATION NUMBER	RECORD OBTAINED FLOW	LEVEL	SED.	OPERATION 8M	12M	ACCESS REMOTE	NORMAL
	OPERATED BY - TRANSALTA UTILITIES LTD.								
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

MAJOR DESIGNATION - SEDIMENT PROGRAM

NO.	STATION NAME	STATION NUMBER	HYDROMETRIC DESIGNATION	OPERATION 8M	OPERATION 12M	ACCESS REMOTE	ACCESS NORMAL
	FEDERAL - 4						
1	SLAVE RIVER AT FITZGERALD	07NB001	F-2	X		X	
	FEDERAL - PROVINCIAL - 3						
1	OLDMAN RIVER NEAR LETHBRIDGE	05AD007	F-2	X			X
	PROVINCIAL - 1						
1	OLDMAN RIVER NEAR WALDRONS CORNER	05AA023	FP-3	X			X
	PROVINCIAL - 2						
1	OLDMAN RIVER NEAR BROCKET	05AA024	FP-2	X			X

A P P E N D I X "B"

SCHEDULE "B"

COSTING PROCEDURE

COMPUTATION OF ALBERTA SHARE

CALCULATION OF ANNUAL PAYMENTS

A. COSTING PROCEDURE

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

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.

Weight Factor	Type of Station
1.00	12 month discharge
0.75	8 month discharge
0.40	12 month water level
0.25	8 month water level

II. Remote Access

Salary and operation costs 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:

Weight Factor	Type of Station
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.

Weight Factor	Type of Station
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:

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 2 and 4 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 1, but comprises 1.80 weighted units. Based upon the unit cost of $ 5,373.59 the cost of operating 'Dog River near Fitzgerald' is $ 9,672.46. One-half of this amount was added to the share of each party in Table B-1 to obtain the costs shown in 'Summary of Financial Considerations' and Tables 9 and 10 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.

TABLE B-I

HYDROMETRIC AND SEDIMENT COSTINGS FOR 1992-93 (Stations Operated by WSC-Alberta)

Category	Operation Schedule	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	52	0.75	42.75					
Normal Access W.L.	12	8	0.40	3.20					
	8	2	0.25	0.50					
Remote Access Flow	12	2	1.80	3.60					
	8	0	1.50	0.00					
Remote Access W.L.	12	0	1.10	0.00					
	8	1	0.95	0.95					
Sub-total		96		78.25	$305,646	$114,837	$420,483	$420,483	-
FEDERAL-PROVINCIAL									
Normal Access Flow	12	41	1.00	41.00					
	8	138	0.75	103.50					
Normal Access W.L.	12	3	0.40	1.20					
	8	10	0.25	2.50					
Remote Access Flow	12	4	1.80	7.20					
	8	13	1.50	19.50					
Remote Access W.L.	12	0	1.10	0.00					
	8	1	0.95	0.95					
Normal Access Sediment	8	1	1.05	1.05					
Sub-total		210*		176.90	$690,974	$259,614	$950,588	$475,294	$475,294
PROVINCIAL									
Normal Access Flow	12	13	1.00	13.00					
	8	78	0.75	58.50					
Normal Access W.L.	12	1	0.40	0.40					
	8	26	0.25	6.50					
Remote Access Flow	12	0	1.80	0.00					
	8	7	1.50	10.50					
Remote Access W.L.	12	0	1.10	0.00					
	8	0	0.95	0.00					
Normal Access Sediment	8	2	1.05	2.10					
Sub-total		125*		91.00	$355,448	$133,549	$488,977	-	$488,977
TOTAL		431*		346.15	$1,352,068	$508,000	$1,860,068	$895,777	$964,291

* Does not include Sediment Stations. These are already counted in the Hydrometric station portion.

Unit Salary Cost = $3,906.02 Unit O&M = $1,467.57 Total Unit Cost = $5,373.59

A P P E N D I X "C"

SCHEDULE "D"

1992-93

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 1992/93 TO BE PAID TO CANADA BY ALBERTA

	Operation	Construction	Total
a) Streamflow and water level installations	$990.2K	$57.4K	$1047.6K
b) Sediment installations	$ 15.0K		$ 15.0
	ANNUAL PAYMENT		$1062.6K

Administrator for Alberta

R K Desrosiers
(Signature)

Director
Technical Services Division
Water Resources Management Services
ALBERTA ENVIRONMENT

Administrator for Canada

(Signature)

Director
Inland Waters Directorate
Conservation & Protection
ENVIRONMENT CANADA