Environment Canada
Conservation and Protection

Environnement Canada
Conservation et Protection

Inland Waters Directorate

Western and Northern Region

Direction générale des eaux intérieures

Région de l'ouest et du nord

CANADA - ONTARIO MEMORANDUM OF AGREEMENT WATER QUANTITY SURVEYS

ANNUAL REPORT 1986-87 for NORTHWESTERN ONTARIO

by

D.G. HANSON

July 1987

Prepared for:
Regional Chief
Manitoba and N.W. Ontario
District
Water Resources Branch,
Winnipeg, Manitoba

CANADA - ONTARIO
MEMORANDUM OF AGREEMENT
WATER QUANTITY SURVEYS

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for
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Prepared by: D.G. Hanson
Water Resources Branch
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Ontario District
Western and Northern
Region

WINNIPEG
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TABLE OF CONTENTS

FIGURES

TABLES

Page

APPENDICES

1.0 INTRODUCTION

This is the fifth Annual Report of the Canada Water Resources Branch, Manitoba and N.W. Ontario District that summarizes the activities relating specifically to the hydrometric program in N.W. Ontario.

It should be noted that the Winnipeg District responsibility for operation of hydrometric networks in Ontario is limited to the Lake Winnipeg drainage system which includes the Winnipeg River system and other rivers draining into the east side of Lake Winnipeg. The remainder and the bulk of the Ontario network is operated by Ontario Region based in Guelph, Ontario.

Since 1975 when the federal-provincial Agreements respecting Water Quantity Surveys were signed, informal reports and data have been forwarded to the Ontario Region office. This information is then included in the Ontario Region annual Cost-share Report. This report has been prepared to continue to fulfill that function and in addition to meet local management needs. It further serves to provide a more comprehensive perspective of the significant water management activities that are evolving in this part of Ontario.

This report contains a brief summary of the activities carried out by the Canada Water Resources Branch (CWRB) during the 1986-87 fiscal year. Although most of the 49 hydrometric stations are classified as federal,

some other funding by the provinces of both Ontario and Manitoba is provided through the Lake of the Woods Control Board (LWCB). Special mechanisms to recover the costs of operations and administer these stations are in place.

The geographic bounds of the Winnipeg District's responsibility in northwestern Ontario is that of the Lake Winnipeg drainage system. For management purposes the area includes several relatively easily identifiable areas. These areas are: the international boundary/Rainy River areas, the Lake of the Woods/Winnipeg River area, the English River system, the Experimental Lakes Area and the rivers draining directly into the east side of Lake Winnipeg.

The report has been prepared in a format similar to the Annual Report of the Canada-Manitoba Memorandum of Agreement for Water Quantity Surveys. Operational costs have been computed and distributed on the basis of Schedules A, B, and C of that Agreement which is common to all provinces. The total hydrometric program costs and listing of operational hydrometric stations is provided annually to the Ontario Water Resources Branch, Guelph office for inclusion in the Annual Report of the Canada-Ontario Memorandum of Agreement for Water Quantity Surveys.

In 1986-87 three new DCP systems, one data logger, one Belfort weighing rain gauge and one additional recorder were integrated into the network. Two stations were discontinued, one classification changed and one

additional contributed data station was operated by the Department of Fisheries and Oceans (DFO).

Spring runoff started in April 1986 with temperatures varying between +18 and -11°C and precipitation well below normal in the first three weeks of the month. However a rainstorm during the weekend of April 25 gave an average of 50 mm of precipitation in the Red Lake, Kenora, Sioux Lookout and Atikokan reporting areas. This rainstorm generated flows exceeding the spring snowmelt peaks.

In May, 1986 wet weather continued throughout northwestern Ontario for the first two weeks but in the last half of the month there was little rainfall. The area was declared a "Restricted Fire Zone" for a two week period beginning near the end of May. Most flows peaked near mid-month and flows and levels remained high through to June.

In July the runoff was in recession with most of the major lakes stabilizing.

A major blizzard swept through the area during November 7-9 and significant snowfall accumulation was recorded. Red Lake recorded 49.6 cm of snow, Kenora 33.1, Sioux Lookout 39.8 and Winnipeg 35.2. Record overnight low temperatures were in the -25°C range.

Above normal temperatures persisted to the end of February. Much of the area received up to 35 cm of snow during the February 24-29 period.

Nearby Winnipeg and vicinity established a record warm winter season with a mean temperature of -9.4°C over the December to February period. The previous record was in 1930-31 with -10°C.

Above normal temperatures occurred in March with precipitation being scattered in the form of rain.

Namakan and Rainy Lakes were above their upper IJC bands throughout May but generally between the upper and lower bands the balance of the year.

Lake of the Woods levels were between the 50 and 75 percentile levels from April to June and then between 25 and 50 to the end of March.

The Department of Communications advised that all operators of DCP's would have to pay annual radio licence fees of $9.00 per unit effective April 1, 1987. This fee is assessed on the same basis as private users.

A DEC 380 micro complete with digitizing tablet, printer, plotter, modem and furniture was installed and operated in the Kenora sub-office. In May the WRB Winnipeg staff installed the equipment and provided orientation and training. At the end of the year all regular hydrometric computations and Lake of the Woods outflow computations were being done on the DEC 380 micro. An updated version of the LWCBS Lake of the Woods outflow program was installed on the DEC 380 in the WSC Kenora office in March, 1987. A manual and a similar program for Boise Cascade are

planned. The WRB Winnipeg's total costs in northwestern Ontario for 1986-87 were $188,676.

The northwestern Ontario total shareable program costs totalled $200,806. The shareable water quantity program costs are greater than total costs as they include vehicle and equipment depreciation and other items as computed according to Schedules A, B, and C.

Distribution of the shareable water quantity program costs on the basis of primary requesting agency, results in the following shares:

** Canada Water Resources Branch:	$110,120
Lake of the Woods Control Board:	$ 76,764
Atomic Energy of Canada Ltd. (AECL):	$ 8,910
Province of Ontario	$ 5,012

This report highlights the program activities undertaken in cooperation with the LWCBS, the International Rainy Lake Board of Control (IRLBC), the Department of Fisheries and Oceans (DFO) and the Atomic Energy of Canada Ltd. (AECL). Operational problems, additions/deletions, and network planning aspects are also discussed.

** Includes International Rainy Lake Board of Control

2.0 SUMMARY OF OPERATIONAL CONSIDERATIONS

2.1 LAKE OF THE WOODS CONTROL BOARD SECRETARIAT (LWCBS) AND THE WATER RESOURCES BRANCH (WRB) WINNIPEG

Generally business over the year was handled by memorandum and telephone. Under LWCB business, the topics were the gauging network plans for 1987-88, capital expenditure plans 1987-88, data review and information, and 1987-88 workplans.

2.2 INTERNATIONAL RAINY LAKE BOARD OF CONTROL, LAC SEUL

Generally business related to the IRLBC and Lac Seul is handled through the LWCBS. At the November 5, 1982 meeting, it was agreed to keep IRLBC business separate where feasible.

2.3 DEPARTMENT OF FISHERIES AND OCEANS (FRESHWATER INSTITUTE)

A network of 22 stations in the Experimental Lakes Area is operated by DFO and the data received by WRB as contributed data. The 1985 hydrometric data was received in hard copy format. WRB is planning to keypunch the data into their database. Negotiations are continuing on the transfer of ownership of instrumentation, equipment and shelters associated with the network.

2.4 ATOMIC ENERGY OF CANADA LIMITED (AECL)

The AECL network is related to their research program for underground storage vaults for nuclear waste. The gauging station network part of their program is directed to understanding the shallow and deep groundwater flow system development in fractured plutonic rock. AECL is attempting to determine typical flow paths, lengths and groundwater fluxes from these depths to surface. In the study of information and base flows there are other cooperative efforts between AECL, NWRI, consultants and universities. The AECL research area is near Atikokan, Ontario.

WRB met with AECL to explain the requirements for contributed data. WRB emphasized the need for a paper trail to trace the published data back to field records collected to the appropriate standard. AECL requested WRB assistance for the operation of a tipping bucket rain gauge in 1987-88.

2.5 COORDINATION WITH WRB ONTARIO REGIONAL OFFICE (GUELPH)

Business related to the Ontario Regional office was carried out by mail and telephone. The Ontario Region writes the annual cost-share report for hydrometric work carried out in Ontario. Usually communication with the Ontario Region was related to the

cost-share report. Current Schedule A's, past year expenditures, current year and next year's estimates of program expenditures were provided for cost share purposes. A Memorandum of Understanding (MOU) between WRB, Guelph, WRB, Winnipeg, and MOE, Ontario was in effect for the operation of three lower Rainy River tributary hydrometric gauging stations.

2.6 NETWORKS

The changes made to the hydrometric network are described in Appendix I, Network Modifications to Schedule A's and a summary of construction activities, is shown in Appendix III, Table 10.

Staff logged many field hours in April and May due to spring runoff and the late April high water conditions. Check measurements were made at most discharge stations to verify or extend existing ratings.

2.6.1 Water Resources Branch Network

The reports "Analysis of Namakan Lake Control Structures" and "Computation of Streamflow Records at Fort Frances and International Falls Controls Structures" were completed by P.M. Pelletier and distributed. Rating equations for the Namakan Lake outflow at Kettle Falls were developed from

weir theory and available data and compared to previous ratings The complex flow situation at Fort Frances through power plants mills dams and canal gates was studied to determine the applicability and accuracy of the existing flow computation techniques

Two Rainy River tributary stations (LaVallee River near Devlin and Sturgeon Creek near Barwick) could not be funded in 1987-88 and were discontinued February 27 1987

Significant effort was put into maintaining the real time systems Several DATS gauges were repaired with lengthy turn around times Several pulse generators on the Hydromet DCP systems failed and needed replacing A surplus DATS gauge was obtained from WRB Regina upgraded and maintained as a spare for the N W Ontario and Manitoba data logging sites Effort was expended on resolving the grounding problem at the Rainy Lake near Fort Frances land line telemetering site After discussions with Bell Canada and Ontario Hydro the shelter grounding was upgraded and plans were made to upgrade the exterior electrical service

A Leupold and Stevens Telemark II data logger was installed at the Lake of the Woods at Keewatin station for evaluation

Annual visits and flow measurements were done for the two American stations in the network

Data reviews were completed for seven gauging stations

2 6 2 Lake of the Woods Control Board Network

In mid February the LWCBS adopted the 1923 GSC Bulletin adjustment datum for two of their provisional data stations on the Winnipeg River

In late February LWCBS proposed that the WSC datum for gauging stations on the Winnipeg River be changed to the 1923 GSC Bulletin adjustment datum WSC is currently considering this proposal

A Belfort 5915 precipitation gauge was installed at the Lac la Croix at Campbell s Camp station and the DCP upgraded from a La Barge to a Hydromet

Hydromet DCP s were installed at the Troutlake and Turtle River stations and the La Barge from Lac la Croix installed at Salveson Lake

The LWCBS delivered the initial version Lake of the Woods total outflow program software to the Kenora sub-office on November 13 1986 during the fall meeting of the LWCB The outflow calculation program was implemented January 1 1987

A pressure transducer was installed in tandem with the Cyclone Island manometer for evaluation

2 6 3 Atomic Energy of Canada (AECL) Network

Two real time gauging stations were operated under a purchase order arrangement These stations are required to support research activites associated with their Underground Research Laboratory project

2 7 NETWORK PLANNING

A network evaluation and plan for the Western and Northern Region was completed Its purpose is to determine the adjustment required in the network to meet the federal and provincial requirements to 1990 The report recommended additional stations to meet national inventory and regional hydrology needs in northwestern Ontario

2 8 PUBLICATION OF DATA

Hydrometric surveys are conducted by the Water Survey of Canada under various agreements with provinces and territories who contribute to the cost of the basic field investigations which are carried out in accordance with mutually agreed upon plans The results of these surveys made in northwestern Ontario are published in these publications Surface Water Data (Ontario) Historical Streamflow Summary (Ontario) Historical Water Levels Summary (Ontario) and Surface Water Data Reference Index (Canada) The costs of publication are paid by WRB The published data is also available on microfiche and magnetic tape from the WRB Ottawa office

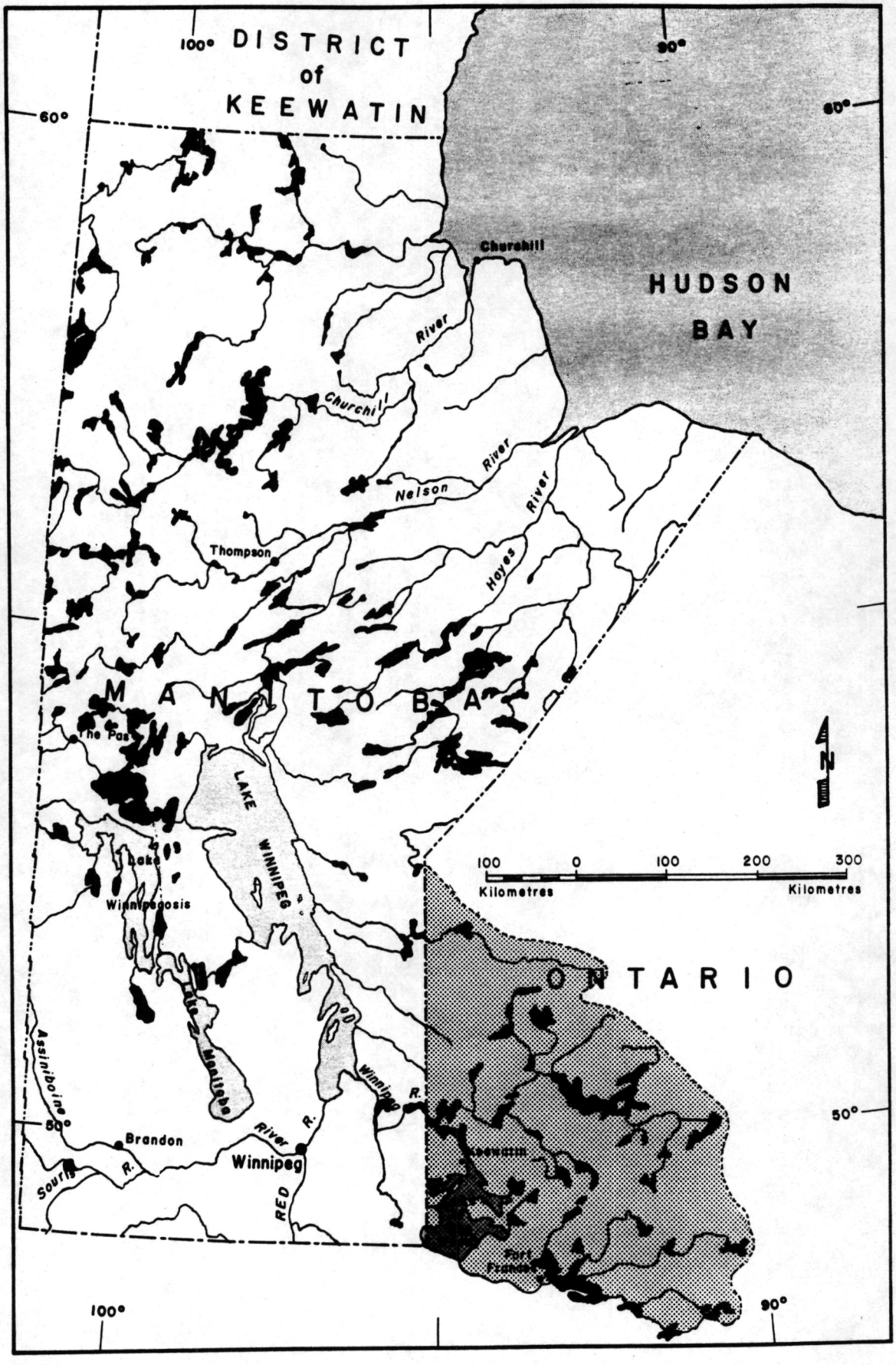


FIGURE 1 LOCATION MAP – NORTHWESTERN ONTARIO PORTION OF THE LAKE WINNIPEG DRAINAGE BASIN

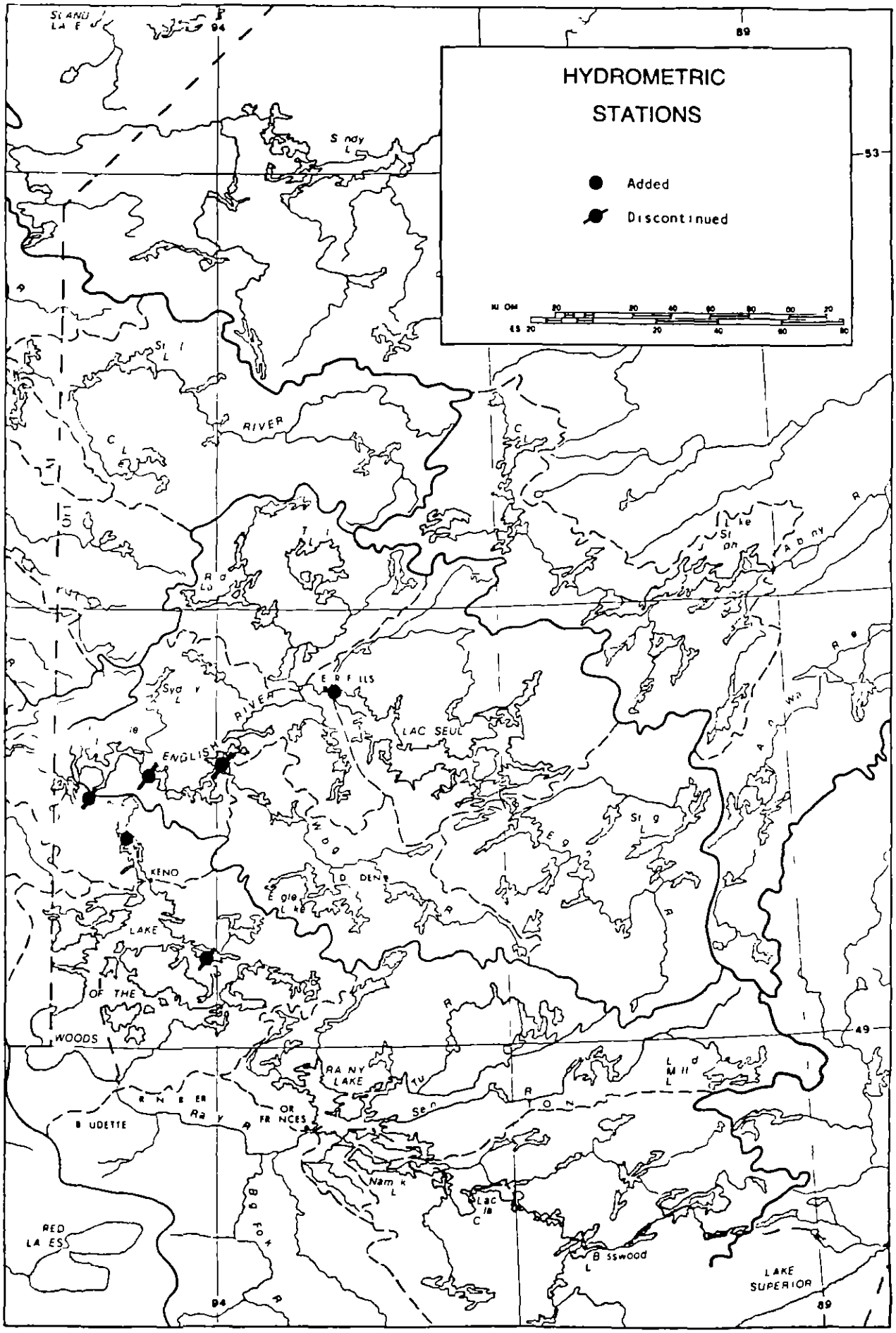


FIGURE 2 CHANGES TO WATER QUANTITY NETWORK EFFECTIVE APRIL 1

DEVELOPMENT OF HYDROMETRIC STATIONS IN NORTHWESTERN ONTARIO

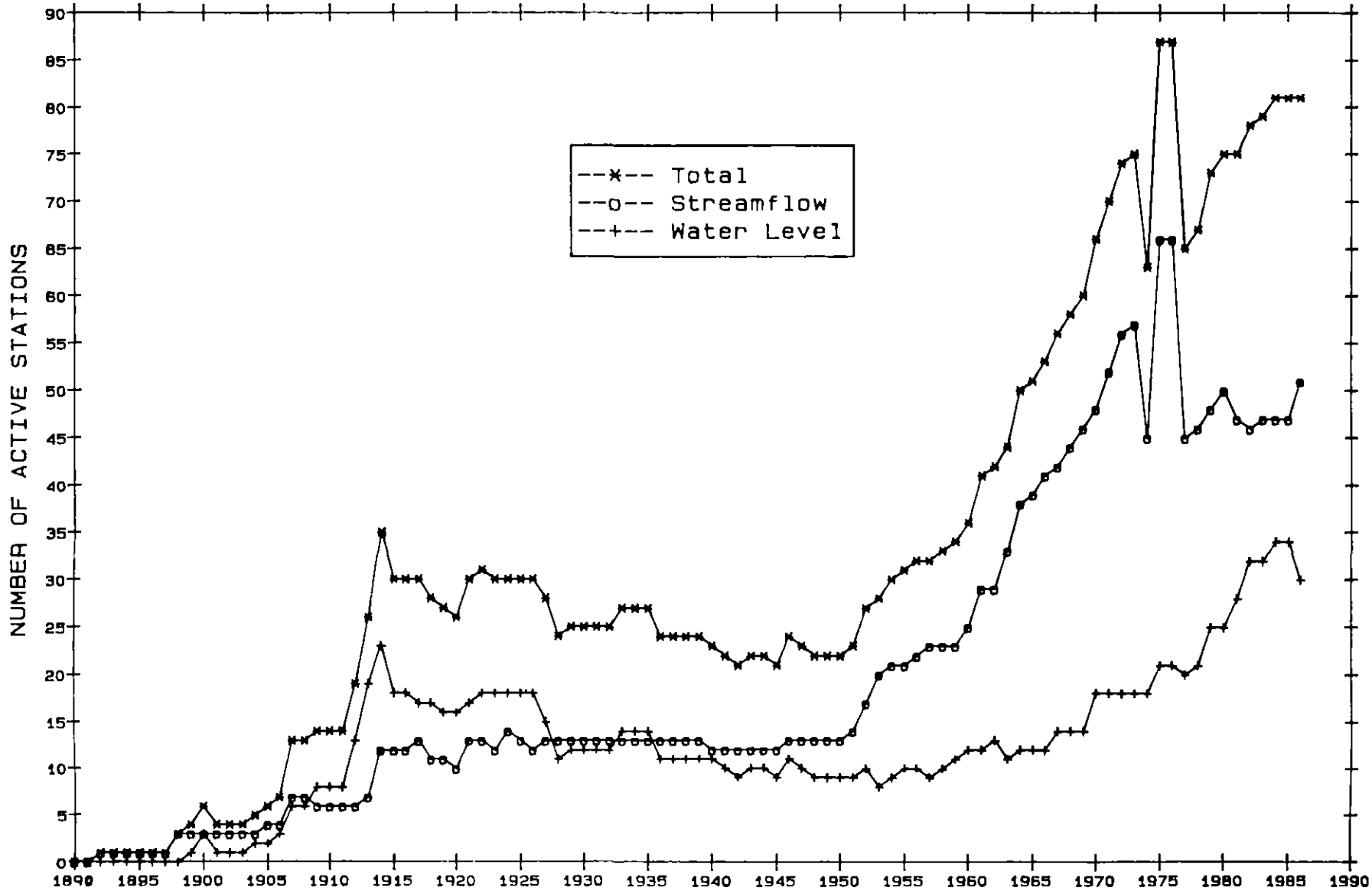
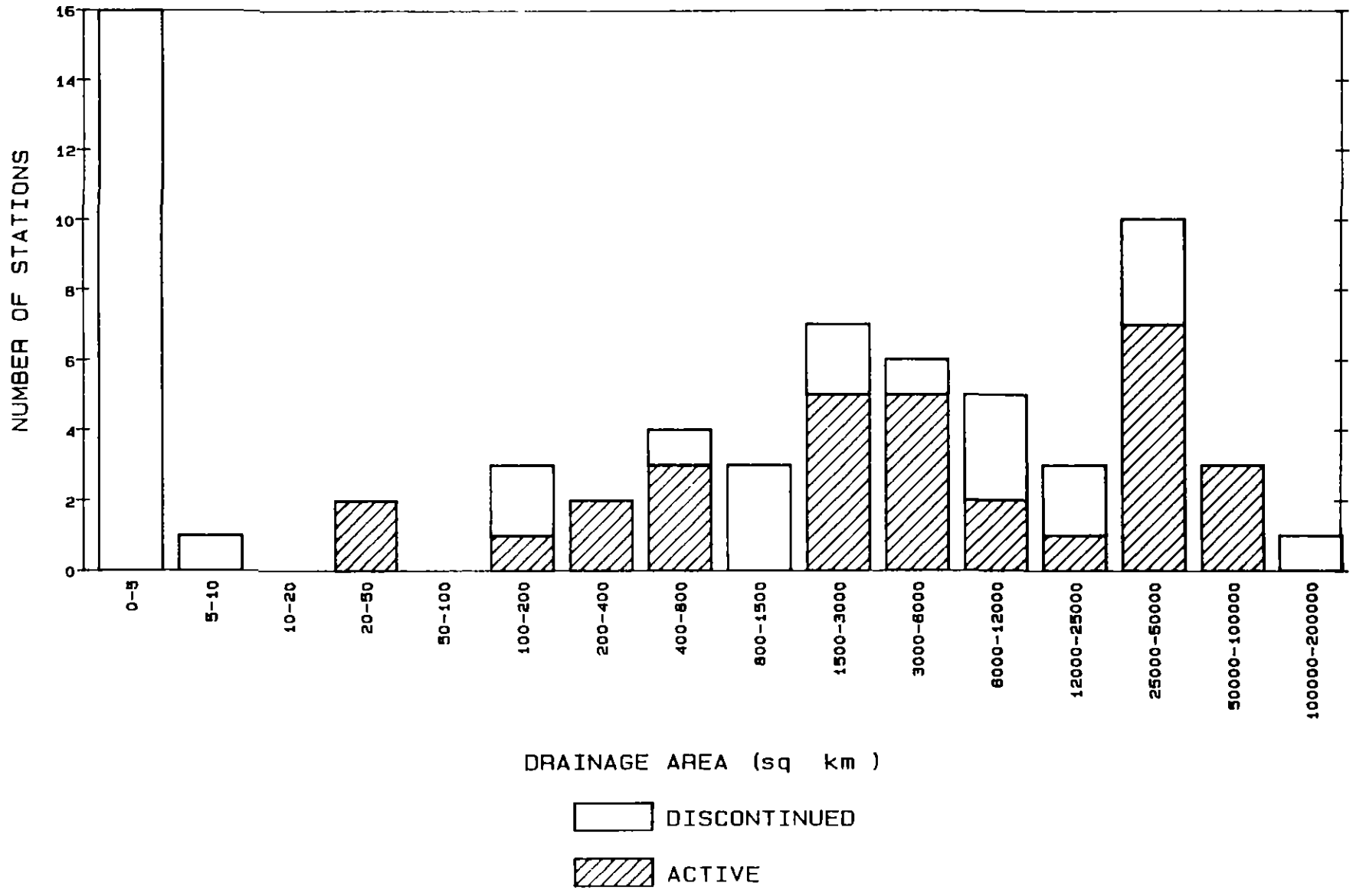


FIGURE 3

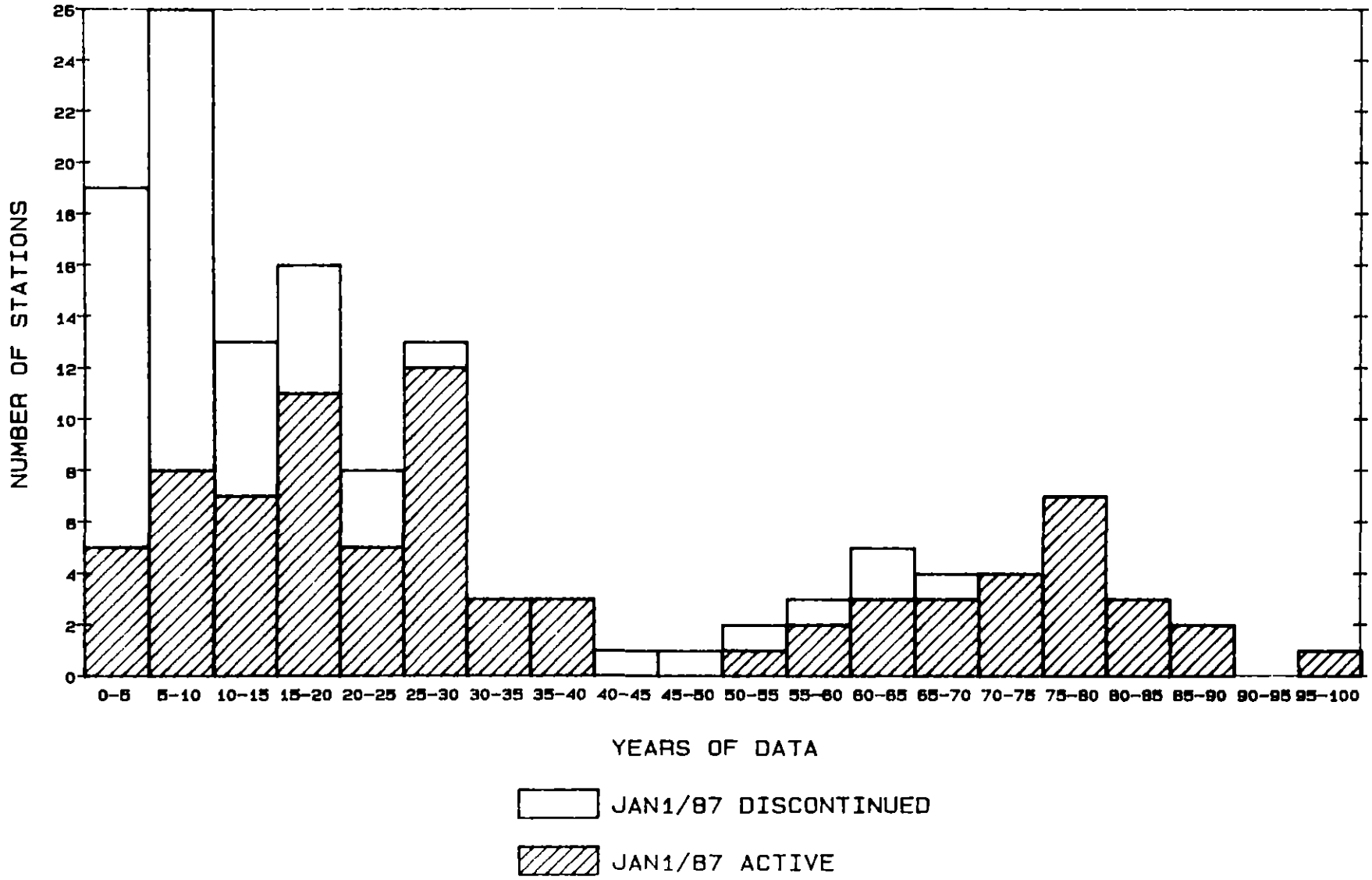


87-01-01

FIGURE 4

DGH

YEARS OF DATA FOR GAUGING STATIONS
IN NORTHWESTERN ONTARIO

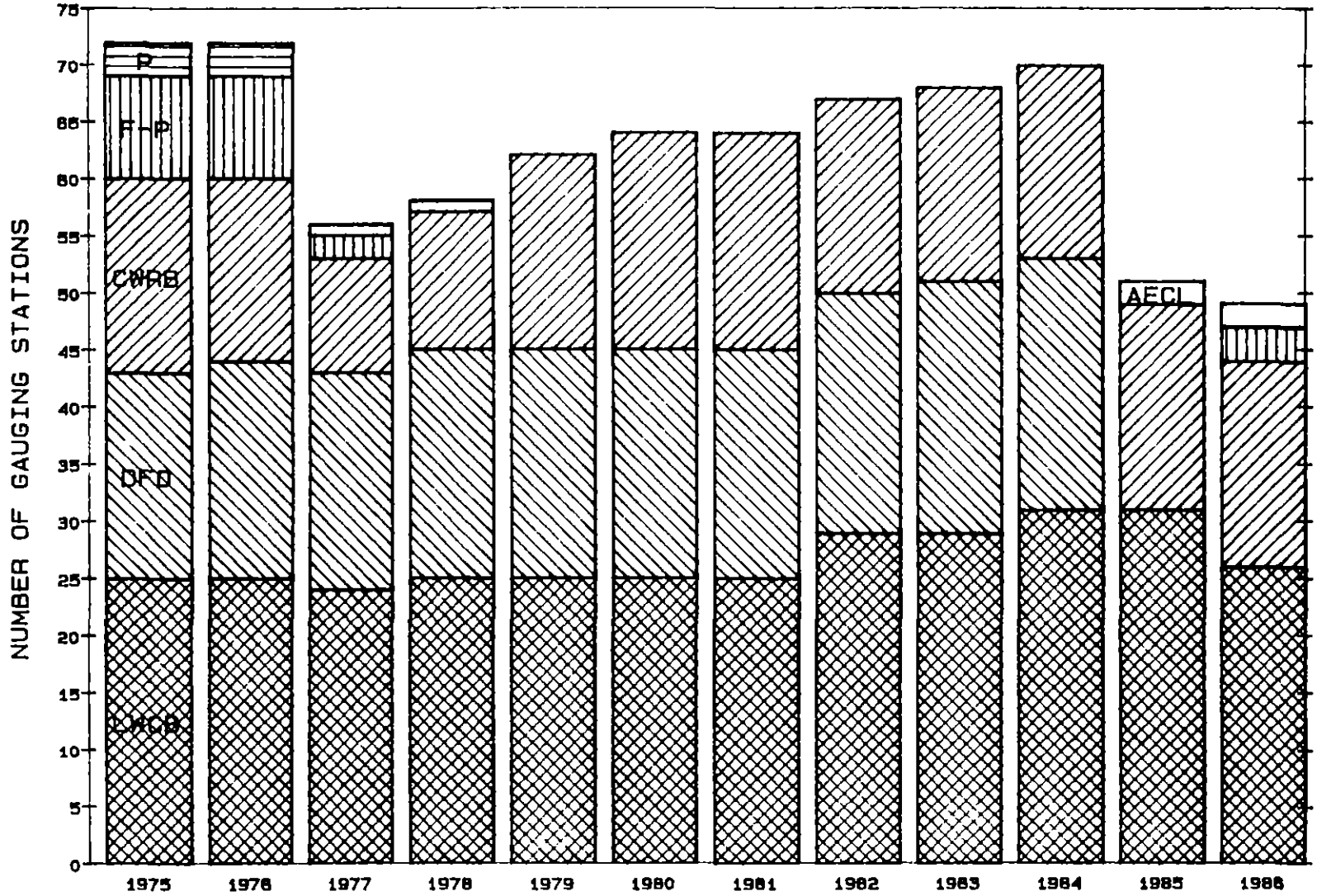


87-01-01

FIGURE 5

DGH

STATION CLASSIFICATIONS ON APRIL 1
WATER SURVEY OF CANADA OPERATED STATIONS



F-P (FED-PROV) P (PROV) CWRB (includes IRLBC) AECL (Atomic Energy of Canada Ltd)

86-04-01 FIGURE 6 DGH

3 0 COST OF OPERATION

Detailed cost information and procedures for cost-share format computations for 1986-87 are included in Appendix III Most of the stations in northwestern Ontario are classified Federal but costs have been proportioned on the basis of identified user interest

The cost summary as presented in Table 1 consists of two parts

1) Part A Unit Cost Summary - presents the breakdown by salary operations depreciation and total costs of operating a station unit

2) Part B Total Cost Summary - shows breakdown of salary O & M and capital depreciation costs according to the primary agency

The cost summary information of total operating costs from Table 1 were combined with construction and capital equipment costs and distributed on a primary agency basis as shown in Table 2

Each January the LWCBS requests an estimate of the current year s operating costs to the end of the fiscal year The LWCBS provides these costs in turn to the Conservation and Protection headquarters administration office for their preparation of the annual Lake of

the Woods/Lac Seul Financial Report WRB supplies salary operation and maintenance and capital expenditure figures as totals for each basin which are distributed according to conventional station costs remote station costs, station type and station period of operation Table 3 summarizes the financial accounting by basin for 1986-87 For 1986-87 the cost of operation was as follows

Lac Seul Basin	$44 197
Lake of the Woods Basin	$32 567
TOTAL	$76 764

The remote stations operating costs are significantly higher due to higher access costs Normally fixed or rotary wing aircraft are used for remote access stations as opposed to stationwagon truck or van for conventional access stations Remote access stations are defined as not normally having vehicular access

TABLE 1

NORTHWESTERN ONTARIO WATER QUANTITY PROGRAM
COST SUMMARY 1986 - 87
PART A - UNIT COST SUMMARY

Station Category	No of Station Units	Salary $	Operations $	Capital Depreciation	Total $
1 Hydrometric Conventional Access	1 0	2 743	1 405	307	4 455
2 Hydrometric Remote Access	1 0	3 511	2 420	307	6 238

PART B - TOTAL COST SUMMARY

Primary Agency	No of Stations	No of Stations Units	Salary $	Operations $	Capital Depreciation $	Total $
Canada Water Resources Branch						
Conventional Access	11	7 40	20 298	10 397	2 272	32 967
Remote Access	7	5 80	20 364	14 036	1 781	36 181
Atomic Energy of Canada Ltd						
Conventional Access	2	2 00	5 486	2 810	614	8 910
Remote Access	0	0	0	0	0	0
Lake of the Woods Control Board						
a) Lac Seul Basin						
Conventional Access	8	5 65	15 498	7 938	1 735	25 171
Remote Access	5	3 05	10 709	7 381	936	19 026
b) Lake of the Woods Basin						
Conventional Access	11	6 40	17 555	8 992	1 965	28 512
Remote Access	2	0 65	2 282	1 573	200	4 055
Federal - Provincial						
Conventional Access	3	2 25	6 172	3 161	691	10 024
Remote Access	0	0	0	0	0	0
TOTALS			$98 364	$56 288	$10 194	$164 846

TABLE 2
NORTHWESTERN ONTARIO WATER QUANTITY PROGRAM
COST-SHARE SUMMARY 1986-87

Operational Costs	
Table 1 Part B	$164 846
Guelph/Winnipeg Journal Voucher re MOU	1 243
Capital Construction Costs Appendix 3 Table 9	25 017
Capital Equipment Costs	9 700
TOTAL Water Quantity Program costs	$200 806

Distribution of Costs by Agency

1) Water Resources Branch Winnipeg	$110 120
2) Lake of the Woods Control Board	76 764
3) Atomic Energy of Canada Ltd	8 910
4) Province of Ontario	5 012
TOTAL	$200 806

NOTE 1) Table 1 shows the calculation of agency salary operations and capital depreciation costs The unit costs in Table 1 are derived in Appendix 3 Tables 3 5 and 8 WRB capital construction project costs are shown in Appendix 3 Table 10

2) Revenue to CRF ($4 266 from the Province of Ontario and $5 200 from AECL)

TABLE 3

LAKE OF THE WOODS CONTROL BOARD
FINANCIAL ACCOUNTING

A LAC SEUL BASIN

	Estimated Billing 1987-01-22	Actual Expenditures 1986-87	Difference
Salary	$26 282	26,207	-75
Operating	17,811	17 990	+179
Capital Equipment and Construction	0	0	0
Sub-total	$44 093	44 197	+104
B LAKE OF THE WOODS BASIN			
Salary	$19 895	19 837	-58
Operating	12 410	12 730	+320
Capital Equipment and Construction	0	0	0
Sub-Total	$32 305	32 567	+262
C TOTALS (A & B)	$76 398	76 764[1]	+366

Note about adjustments

(-) indicates an actual expenditure less than estimated hence a credit for payee

(+) indicates an actual expenditure greater than estimated hence a debit for payee

1 WRB repaired two LWCB answering machines during the year at a cost of $188 22 This amount should be added to give a total actual expenditure for the year of $76 952

APPENDIX I

NETWORK MODIFICATIONS TO SCHEDULE A S

1986-87 and 1987-88

NORTHWESTERN ONTARIO NETWORK MODIFICATIONS

A Proposed 1987-88 Schedule A

Discontinued

(1) 05PC016 LaVallee River near Devlin F-Pl
(2) 05PC010 Sturgeon River near Barwick F-Pl

Additions

(1) 05PD032 Lake 114 Inflow near Kenora (Contr Data)
(2) 05QD024 Lake 302 Upland Watershed (Contr Data)

Changes

(1) 05QD008 Cedar River below Wabaskang Lake
- from remote to conventional access delete (R)
- delete cableway (c)

(2) 05PB022 Eye River near Coulson Lake near Atikokan
- delete artificial control (A)

(3) 05PB021 Eye River near Hardtack Lake near Atikokan
- add tipping bucket precipitation gauge (P)

(4) 05QE011 Salveson Lake near Outlet
- add a DCP (D)

(5) 05QC003 Troutlake River below Big Falls
- add a DCP (D)

(6) 05PA011 Lac la Croix at Campbell s Camp
- add a Belfort weighing rain gauge (P)

(7) 05P0029 Lake of the Woods at Cyclone Island
- add artificial control note (A)

(8) 05PE014 Lake of the Woods at Keewatin
- add a Telemark II (I)

(9) 05PC011 Pinewood River near Pinewood
- move to F-1 from F-Pl

(10) 05PC002 Rainy River at Ft Frances Int Falls (PP)
- add a recorder to change from manual operation delete (M) add (R)

(11) 05PC004 Rainy River at Ft Frances Int Falls Mill (FB)
- add artificial control note (A)

NORTHWESTERN ONTARIO
NETWORK MODIFICATIONS (continued)

(12) 05PB014 Turtle River near Mine Centre
- add a DCP (D)

(13) 05PE001 Winnipeg River below Kenora Powerhouse
- change from manual to recorder delete (M) add (R)

B 1986-87 Schedule A

Discontinued

(1) 05QE013 Ball Lake at Ball Lake Lodge
(2) 05PD030 Lake of the Woods at Sioux Narrows
(3) 05QE014 Separation Lake at Walstens Outpost Camp
(4) 05PE021 Winnipeg River at Whitedog Indian Reserve

Additions

(1) - Lac Seul at Hanaway s Lodge
(2) - Winnipeg River at Minaki

Changes

(1) 05QE008 Cedar River below Wabaskang Lake changed to conventional access

APPENDIX II

SCHEDULE A 1986-87

AND

LISTINGS OF THE MAJOR AGENCY NETWORKS

1986 1987 SCHEDULE A

OF

MEMORANDUM OF AGREEMENT

BETWEEN

DEPARTMENT OF THE ENVIRONMENT

MANITOBA NORTHWEST ONTARIO WINNIPEG

AND

GOVERNMENT OF ONTARIO

HYDROMETRIC COST SHARE AGREEMENT 1986/1987

GAUGE INFORMATION

H WATER LEVEL STATION
Q-DISCHARGE STATION
R-RECORDING GAUGE
M MANUAL GAUGE
P POWERPLANT RATING

DATA COLLECTION CODES

R-REMOTE ACCESS STATION
S SEDIMENT SAMPLING
T TELEMARK
Q WATER QUALITY DATA
D DATA COLLECTION PLATFORM
A ARTIFICIAL CONTROL
W=WATER TEMPERATURE DATA
P=PRECIPITATION DATA
C=CABLEWAY
V-VELOCITY RECORDER
I-INTELLIGENT MICROPROCESSOR

FUNDING CODE INDEX

F1 FEDERAL 1 FEDERAL DEPARTMENTAL PROGRAMS
F2= FEDERAL 2 INTERPROVINCIAL WATERS
F3= FEDERAL 3 INTERNATIONAL WATERS
F4= FEDERAL 4 NATIONAL WATER QUANTITY INVENTORY

FP1= FEDERAL PROVINCIAL
P1= PROVINCIAL

CONO- CONTRIBUTED BY THE PROVINCE OF ONTARIO
CONT= CONTRIBUTED DATA
CONF CONTRIBUTED BY OTHER FEDERAL AGENCY
CONW CONTRIBUTEDC BY FRESHWATER INSTITUTE
NEWC NEW CONSTRUCTION

OPERATION SCHEDULE OP

C CONTINUOUS OPERATION
S SEASONAL OPERATION

STATION RESPONSIBILITY CODES

01 MANITOBA CENTRAL
02 MANITOBA WEST E T DAIGNEAULT S AREA
03 MANITOBA EAST S LOKITS AREA
04 THOMPSON SUB OFFICE W ANTONYSHYN
05 THE PAS SUB OFFICE W KROLL
06 KEEWATIN SUB OFFICE R G ROUSSON

10 CONTRIBUTED BY MAN WATER RESOURCES DIVISION
11 CONTRIBUTED BY MANITOBA HYDRO
12 CONTRIBUTED BY FRESHWATER INSTITUTE
13 CONTRIBUTED BY GREAT LAKES PAPER COMPANY
14 CONTRIBUTED BY ONTARIO HYDRO
15 CONTRIBUTED BY GREATER WINNIPEG WATER DISTRICT
16 CONTRIBUTED BY WINNIPEG HYDRO
17 CONTRIBUTED BY BOISE CASCADE CANADA LTD
18 CONTRIBUTED BY ATOMIC ENERGY OF CANADA LIMITED

ACTIVE GAUGING STATIONS FOR ONTARIO 3 1986 1
FEDERAL 1 FEDERAL DEPARTMENTAL PROGRAMS

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
05QE008	1690 0	0	06	QR CD	F1	C	CEDAR RIVER BELOW WABASKANG LAKE	1
05QC001	4920 0	0	06	QR CT	F1	C	CHUKUNI RIVER NEAR EAR FALLS	2
05PB022	0 0	0	06	QR DA	F1	C	EYE RIVER NEAR COULSTON LAKE NR ATIKOKAN	3
05PB021	0 0	0	06	QR DA	F1	C	EYE RIVER NEAR HARDTACK LAKE NR ATIKOKAN	4
05QE015	0 0	0	06	HR R	F1	S	GRASSY NARROWS LAKE AT GRASSY NARROWS	5
05QB003	0 0	0	06	HR TAP	F1	C	LAC SEUL AT GOLDPINES	6
	0 0	0	06	HM	F1	M	LAC SEUL AT HANAWAY S LODGE	7
05QB002	0 0	0	06	HM	F1	S	LAC SEUL AT HUDSON	8
05QB001	0 0	0	06	HR RDP	F1	C	LAC SEUL AT LAC SEUL	9
05QE012	548 0	0	06	QR RCD	F1	C	LONG LEGGED RIVER BELOW LONG LEGGED LAKE	10
05QE011	0 0	0	06	HR R	F1	C	SALVESEN LAKE NEAR OUTLET	11
05QA004	4740 0	0	06	QR RCD	F1	C	STURGEON RIVER AT MCDOUGALL MILLS	12
05QE009	1530 0	0	06	QR R	F1	C	STURGEON RIVER AT OUTLET SALVESEN LAKE	13
05QC003	2370 0	0	06	QR C	F1	C	TROUTLAKE RIVER BELOW BIG FALLS	14
05QD006	6370 0	0	06	QR T	F1	C	WABIGOON RIVER NEAR QUIBELL	15
05PF051	0 0	0	06	HR R	F1	S	WINNIPEG RIVER ABOVE BOUNDARY FALLS	16
	0 0	0	06	HM	F1	M	WINNIPEG RIVER AT MINAKI	17

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS	REMOTE STATIONS	TOTALS
	DISCHARGE (C) 6	DISCHARGE (C) = 3	
	DISCHARGE (S) - 0	DISCHARGE (S) 0	
	DISCHARGE (M) - 0	DISCHARGE (M) 0	DISCHARGE 9
	WATER LEVEL (C) 1	WATER LEVEL (C) 2	WATER LEVEL = 8
	WATER LEVEL (S) 1	WATER LEVEL (S) = 2	TOTAL - 17

ACTIVE GAUGING STATIONS FOR ONTARIO
FEDERAL 2 INTERPROVINCIAL WATERS

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
05RC001	5730 0	0	06	QR RD	F2	C	BERENS RIVER ABOVE BERENS LAKE	1

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS	REMOTE STATIONS	TOTALS
	DISCHARGE (C) = 0	DISCHARGE (C) 1	
	DISCHARGE (S) = 0	DISCHARGE (S) 0	
	DISCHARGE (M) = 0	DISCHARGE (M) 0	DISCHARGE - 1
	WATER LEVEL (C) = 0	WATER LEVEL (C) = 0	WATER LEVEL 0
	WATER LEVEL (S) = 0	WATER LEVEL (S) = 0	TOTAL 1

ACTIVE GAUGING STATIONS FOR ONTARIO 2 1986 1987
FEDERAL 3

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
05PB018	332 0	0	06	QR	IP	F3	C	ATIKOKAN RIVER AT ATIKOKAN	1
05PA012	4510 0	0	06	QR	RD	F3	C	BASSWOOD RIVER NEAR WINTON	2
05PA010	0 0	0	06	HR		F3	C	FRENCH LAKE NEAR ATIKOKAN	3
05PA011	0 0	0	06	HR	RD	F3	C	LAC LA CROIX AT CAMPBELL S CAMP	4
05PD011	0 0	0	06	HR	IA	F3	C	LAKE OF THE WOODS AT CLEARWATER BAY	5
05PD029	0 0	0	06	HR	RDP	F3	C	LAKE OF THE WOODS AT CYCLONE ISLAND	6
05PD008	0 0	0	06	HR	IAP	F3	C	LAKE OF THE WOODS AT HANSON BAY	7
05PE014	0 0	0	06	HR	TA	F3	C	LAKE OF THE WOODS AT KEEWATIN	8
05PD001	0 0	0		HR	TAD	F3	C	LAKE OF THE WOODS AT WARROAD	9
05PE005	0 0	0	06	QR	A	F3	C	LAKE OF THE WOODS OUTLET AT MINK CREEK	10
05PE006	0 0	0	06	QP	CA	F3	C	LAKE OF THE WOODS EAST OUTLET AT POWERH	11
05PE011	0 0	0	06	QR	CA	F3	C	LAKE OF THE WOODS WEST OUTLET AT POWERH	12
05PA003	0 0	0	06	HR	RDA	F3	C	NAMAKAN LAKE ABOVE KETTLE FALLS DAM	13
05PA006	13400 0	0	06	QR	R	F3	C	NAMAKAN RIVER AT OUTLET OF LAC LA CROIX	14
05PB015	443 0	0	06	QR	R	F3	C	PIPESTONE RIVER ABOVE RAINY LAKE	15
05PB007	0 0	0	06	HR	IA	F3	C	RAINY LAKE NEAR FORT FRANCES	16
05PC019	38600 0	0	06	QP	Q A	F3	C	RAINY RIVER AT FORT FRANCES	17
05PC002	38600 0	0	06	HM	A	F3	C	RAINY RIVER AT FT FRANCES INT FALLS PP	18
05PC003	38600 0	0	06	HR	A	F3	C	RAINY RIVER AT FT FR INT FALLS PWR PLT	19
05PC004	38600 0	0	06	HR		F3	C	RAINY RIVER AT FT FR INT FALLS MILL FB	20
05PC005	38600 0	0	06	HM		F3	C	RAINY RIVER AT FT FR INT FALLS PLT CNL	21
05PC018	50200 0	0	06	QR	CD	F3	C	RAINY RIVER AT MANITOU RAPIDS	22
05PE001	0 0	0	06	HM	A	F3	C	WINNIPEG RIVER BELOW KENORA POWERHOUSE	23
05PE020	70400 0	0	06	QP	A	F3	C	WINNIPEG RIVER BELOW L OF WOODS OUTLETS	24
05PE012	0 0	0	06	HR	A	F3	C	WINNIPEG RIVER BELOW NOPMAN DAM AND PWR	25

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	7	DISCHARGE (C)	3		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	10
	WATER LEVEL (C)	12	WATER LEVEL (C)	3	WATER LEVEL =	15
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL =	25

ACTIVE GAUGING STATIONS FOR ONTARIO 2 198[illegible] 1937
FEDERAL 4 NATIONAL WATER QUANTITY INVENTORY

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
05PD026	744 0	0	06	QR	F4	C	BERRY CREEK AT OUTLET OF BERRY LAKE	1
05QA002	6400 0	0	06	QR D	F4	C	ENGLISH RIVER AT UMFREVILLE	2
05PB014	4870 0	0	06	QR	F4	C	TURTLE RIVER NEAR MINE CENTRE	3

DR AREA =0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	3	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M) -	0	DISCHARGE (M)	0	DISCHARGE =	3
	WATER LEVEL (C) -	0	WATER LEVEL (C) =	0	WATER LEVEL	0
	WATER LEVEL (S) -	0	WATER LEVEL (S) -	0	TOTAL	3

ACTIVE GAUGING STATIONS FOR ONTARIO
FEDERAL PROVINCIAL 1

2 1986 1987

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
05PC016	243 0	0	06	QR	FP1	S	LA VALLEE RIVER NEAR DEVLIN	1
05PC011	461 0	0	06	QR T	FP1	S	PINEWOOD RIVER NEAR PINEWOOD	2
05PC010	168 0	0	06	QR	FP1	S	STURGEON RIVER NEAR BARWICK	3

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	0	DISCHARGE (C)	0		
	DISCHARGE (S)	3	DISCHARGE (S)	- 0		
	DISCHARGE (M)	0	DISCHARGE (M)	- 0	DISCHARGE	3
	WATER LEVEL (C)	- 0	WATER LEVEL (C)	0	WATER LEVEL	0
	WATER LEVEL (S)	- 0	WATER LEVEL (S)	0	TOTAL	3

ACTIVE GAUGING STATIONS FOR ONTARIO 2 1980 1987
FEDERAL PROVINCIAL 2

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
						FP2		NIL	

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	0	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	0
	WATER LEVEL (C)	0	WATER LEVEL (C)	0	WATER LEVEL	0
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL	0

ACTIVE GAUGING STATIONS FOR ONTARIO
FEDERAL PROVINCIAL 3 REGIONAL WATER QUANTITY INVENTORY

2 1986 1987

STA NO	DR AREA	DIST	RESP GAUGE DATA	FUND CD	OP	STATION NAME	NO
				FP3		NIL	

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	0	DISCHARGE (C)	0		
	DISCHARGE (S) -	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M) -	0	DISCHARGE =	0
	WATER LEVEL (C)	0	WATER LEVEL (C) -	0	WATER LEVEL	0
	WATER LEVEL (S)	0	WATER LEVEL (S) -	0	TOTAL =	0

ACTIVE GAUGING STATIONS FOR ONTARIO
PROVINCIAL 1

2 1986 1937

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
					P1		NIL	

DR AREA =0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	= 0	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	0
	WATER LEVEL (C)	0	WATER LEVEL (C)	= 0	WATER LEVEL	0
	WATER LEVEL (S)	0	WATER LEVEL (S)	= 0	TOTAL	= 0

ACTIVE GAUGING STATIONS FOR ONTARIO 2 1986 1967
PROVINCIAL 2

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
						P2		NIL	

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	0	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	0
	WATER LEVEL (C)	0	WATER LEVEL (C) -	0	WATER LEVEL	0
	WATER LEVEL (S)	0	WATER LEVEL (S) -	0	TOTAL =	0

ACTIVE GAUGING STATIONS FOR ONTARIO
CONTRIBUTED BY THE FRESHWATER INSTITUTE

2 1986 1987

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
05PD027	0 0	0	12	HR	A	CONW	S	LAKE 114 NEAR KENORA	1
05PD014	8	0	12	QR	A	CONW	S	LAKE 114 OUTLET NEAR KENORA	2
05QD021	0 0	0	12	HR	RA	CONW	S	LAKE 223 NEAR KENORA	3
05QD017	0 0	0	12	QR	RA	CONW	S	LAKE 223 OUTLET NEAR KENORA	4
05QD018	0 0	0	12	QR	RA	CONW	S	LAKE 224 OUTLET NEAR KENORA	5
05QD019	0 0	0	12	QR	RA	CONW	S	LAKE 225 OUTLET NEAR KENORA	6
05QD015	0 0	0	12	QR	RA	CONW	S	LAKE 226 OUTLET NEAR KENORA	7
05QD009	0 0	0	12	HR	RA	CONW	S	LAKE 227 NEAR KENORA	8
05QD008	5	0	12	QR	RA	CONW	S	LAKE 227 OUTLET NEAR KENORA	9
05PD021	0 0	0	12	HR	A	CONW	C	LAKE 239 NEAR KENORA	10
05PD023	3 6	0	12	QR	A	CONW	C	LAKE 239 OUTLET NEAR KENORA	11
05PD024	0 0	0	12	QR	A	CONW	S	LAKE 239 LOWER EAST INLET NEAR KENORA	12
05PD031	0 0	0	12	QR	A	CONW	S	LAKE 239 NORTHEAST INLET NEAR KENORA	13
05PD015	7 3	0	12	QR	A	CONW	C	LAKE 240 OUTLET NEAR KENORA	14
05QD022	0 0	0	12	HR	A	CONW	S	LAKE 302 NEAR KENORA	15
05QD023	0 0	0	12	QR	A	CONW	S	LAKE 302 OUTLET NEAR KENORA	16
05PD020	0 0	0	12	HR		CONW	S	LAKE 303 NEAR KENORA	17
05PD019	7	0	12	QR	A	CONW	S	LAKE 303 OUTLET NEAR KENORA	18
05PD018	0 0	0	12	HR		CONW	S	LAKE 304 NEAR KENORA	19
05PD017	2 3	0	12	QR	A	CONW	C	LAKE 470 OUTLET NEAR KENORA	20
05PD028	0 0	0	12	QR	A	CONW	S	LAKE 661 OUTLET NEAR KENORA	21
05PD022	6	0	12	QR	A	CONW	S	N W TRIBUTARY TO LAKE 239 NEAR KENORA	22

DR AREA -0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	3	DISCHARGE (C)	0		
	DISCHARGE (S)	7	DISCHARGE (S)	5		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	15
	WATER LEVEL (C)	1	WATER LEVEL (C)	0	WATER LEVEL	7
	WATER LEVEL (S)	4	WATER LEVEL (S)	2	TOTAL	= 22

ACTIVE GAUGING STATIONS FOR ONTARIO 2 1986 1987
CONTRIBUTED BY THE PROVINCE OF ONTARIO

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
05QE005	52300 0	0	14	QP	A	CONO	C	ENGLISH RIVER AT CARIBOU FALLS	1
05QE006	26400 0	0	14	QP	QA	CONO	C	ENGLISH RIVER AT EAR FALLS	2
05QE007	37000 0	0	14	QP	A	CONO	C	ENGLISH RIVER AT MANITOU FALLS	3
05QB005	0 0	0	14	HR	A	CONO	C	LAKE ST JOSEPH DIVERSION ABOVE CONT DAM	4
05QB006	0 0	0	14	QR	A	CONO	C	LAKE ST JOSEPH DIVERSION AT ROOT PORTAGE	5
05PE009	0 0	0	14	HM	A	CONO	C	WINNIPEG RIVER AT MINAKI	6
05PE010	0 0	0	14	QP	A	CONO	C	WINNIPEG RIVER AT WHITEDOG FALLS POWERH	7

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	5	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE -	5
	WATER LEVEL (C)	2	WATER LEVEL (C)	0	WATER LEVEL	2
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL =	7

ACTIVE GAUGING STATIONS FOR ONTARIO 2 1986 1987
CONTRIBUTED BY PRIVATE AGENCY

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
05QD003	2510 0	0	13	QP	A	CONT	C	EAGLE RIVER AT EAGLE RIVER	1
05PB009	5880 0	0	17	QP	A	CONT	C	SEINE RIVER AT STURGEON FALLS GEN STN	2
05QD016	2300 0	0	13	QP	A	CONT	C	WABIGOON RIVER AT DRYDEN	3

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	3	DISCHARGE (C)	0		
	DISCHARGE (S)	0	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	3
	WATER LEVEL (C)	0	WATER LEVEL (C)	0	WATER LEVEL	0
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL	3

ACTIVE GAUGING STATIONS FOR ONTARIO
CONTRIBUTED BY OTHER FEDERAL AGENCY

2 1986 1987

STA NO	DR AREA	DIST	RESP	GAUGE DATA	FUND CD	OP	STATION NAME	NO
05PB020	0 0	0	18	QR	CONF	S	EAST TRIBUTARY TO DASHWA LAKE NEAR ATIKOKAN	1
05PB019	0 0	0	18	QR	CONF	S	N E TRIBUTARY TO DASHWA LAKE NEAR ATIKOKAN	2

DR AREA 0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	= 0	DISCHARGE (C)	0		
	DISCHARGE (S)	2	DISCHARGE (S)	0		
	DISCHARGE (M)	0	DISCHARGE (M)	0	DISCHARGE	2
	WATER LEVEL (C)	0	WATER LEVEL (C)	0	WATER LEVEL -	0
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL	= 2

ACTIVE GAUGING STATIONS FOR ONTARIO
NEW CONSTRUCTION

2 1986 1987

STA NO	DR AREA	DIST	RESP	GAUGE	DATA	FUND CD	OP	STATION NAME	NO
						NEWC		NIL	

DR AREA -0 0 IS NOT APPLICABLE

SUMMARY	CONVENTIONAL STATIONS		REMOTE STATIONS		TOTALS	
	DISCHARGE (C)	- 0	DISCHARGE (C)	0		
	DISCHARGE (S)	- 0	DISCHARGE (S)	0		
	DISCHARGE (M)	= 0	DISCHARGE (M)	0	DISCHARGE	0
	WATER LEVEL (C)	0	WATER LEVEL (C)	0	WATER LEVEL =	0
	WATER LEVEL (S)	0	WATER LEVEL (S)	0	TOTAL =	0

CANADIAN WATER RESOURCES BRANCH NETWORK*

STATION NO	STATION NAME
05PB018	Atikokan River at Atikokan
05PA012	Basswood River near Winton (USGS)
05RC001	Berens River above Berens Lake
05PD026	Berry Creek at Outlet of Berry Lake
05PA010	French Lake near Atikokan
05PA011	Lac la Croix at Campbell s Camp
05QE012	Long-Legged River below Long-Legged Lake
05PA003	Namakan Lake above Kettle Falls Dam
05PA006	Namakan River at Outlet of Lac la Croix
05PB015	Pipestone River above Rainy Lake
05PB007	Rainy Lake near Fort Frances
05PC019	Rainy River at Fort Frances
	Computations of Rainy River at Fort Frances requires
	(05PC002) Rainy River at Fort Frances - International Falls Powerplant Forebay
	(05PC003) Rainy River at Fort Frances - International Falls Powerplant Tailrace
	(05PC004) Rainy River at Fort Frances - International Falls Power Mill Forebay
	(05PC005) Rainy River at Fort Frances - International Falls Powerplant Canal
05PC018	Rainy River at Manitou Rapids (USGS)
05PB014	Turtle River near Mine Centre

* Includes International Rainy Lake Board of Control stations

LAKE OF THE WOODS CONTROL BOARD NETWORK

LAKE OF THE WOODS AND LAC SEUL BASINS

a) LAC SEUL BASIN STATIONS

Station No	Station Name	
05QE008	Cedar River below Wabaskang Lake	CQ
05QC001	Chukini River near Ear Falls	CQ
05QA002	English River at Umfreville	CQ
05QE015	Grassy Narrows Lake at Grassy Narrows	SHR
05QB003	Lac Seul at Goldpines	CH
-	Lac Seul at Hanaway s Lodge	MH
05QB002	Lac Seul at Hudson	SH
05QB001	Lac Seul at Lac Seul	CHR
05QA004	Sturgeon River at McDougall Mills	CQR
05QE011	Salveson Lake near Outlet	CHR
05QE009	Sturgeon River at Outlet of Salveson Lake	CQR
05QC003	Troutlake River below Big Falls	CQ
05QC006	Wabigoon River near Quibell	CQ

b) LAKE OF THE WOODS BASIN STATIONS

05PD011	Lake of the Woods at Clearwater Bay	CH
05PD029	Lake of the Woods at Cyclone Island	CHR
05PE006	Lake of the Woods Eastern Outlet at Kenora Powerhouse	CQ
05PD008	Lake of the Woods at Hanson Bay	CH
05PE014	Lake of the Woods at Keewatin	CH
05PE005	Lake of the Woods Outlet at Mink Creek	CQ
05PD001	Lake of the Woods at Warroad	CH
05PE011	Lake of the Woods Western Outlet at Norman Dam Powerhouse	CQ
05PF051	Winnipeg River above Boundary Falls	SHR
-	Winnipeg River at Minaki	MH
05PE001	Winnipeg River below Kenora Powerhouse	CH
05PE020	Winnipeg River below Lake of the Woods Outlets	CQ
05PE012	Winnipeg River below Norman Dam and Powerhouse	CH

NOTES

CQ - Flow station continuous operation 1 00 unit
SQ - Flow station seasonal operation 0 75 unit
CH - Water level station continuous operation 0 40 unit
SH - Water level station seasonal operation 0 25 unit
MH - Staff-gauge miscellaneous readings 0 00 unit
R - Remote

ATOMIC ENERGY OF CANADA LIMITED NETWORK

05PB022	Eye River near Coulson Lake north of Atikokan	CQ
05PB021	Eye River near Hardtack Lake north of Atikokan	CQ

FEDERAL-PROVINCIAL NETWORK

05PC016	LaVallee River near Devlin	SQ
05PC011	Pinewood River near Pinewood (Fed=LWCB)	SQ
05PC010	Sturgeon River near Barwick	SQ

APPENDIX III

COSTING PROCEDURES AND ASSUMPTIONS ALONG WITH DETAILED COST COMPUTATIONS INCLUDING NUMBER OF STATIONS AND COSTS FOR 1986-87

COSTING PROCEDURES AND ASSUMPTIONS

Details of 1986-87 costs and computational methods are presented in this appendix

For accounting and estimating purposes costs are summarized using three categories

I Salary Costs

II Operations and Maintenance Costs

III Capital Costs

Program costs are determined using the departmental cost accounting and coding systems along with the Department of Supply and Services detailed transaction computer listings

Because total operational costs of hydrometric stations vary significantly with the period of operation and with the type of record produced weighting factors have been developed These weighting factors are used to compute station units which in turn are used to apportion both the operation and maintenance and the capital costs

STATION UNITS

The calculation of station units is based on the 1986-87 Schedule A for northwestern Ontario which is included in Appendix III The number of

station units is not modified to include new stations constructed or stations discontinued during the fiscal year The standard weighting factors used by the Water Survey of Canada in the Western and Northern Region to calculate Federal Federal-Provincial and Provincial costs are

Type of Station	Symbol	Unit
12 month flow record	Q^{12}	1 00
8 month flow record	Q^{8}	0 75
12 month water level record	H^{12}	0 40
8 month water level record	H^{8}	0 25
12 month sediment record	S^{12}	1 00
8 month sediment record	S^{8}	0 75
Miscellaneous Record	M	0 00

Table 1 contains the number of stations and station units for gauging stations operated in each hydrometric category

SALARY COSTS

Salary costs are wages of field personnel (hydrometric survey technicians and supervisory staff) directly associated with the collection and computation of the hyrometric and sediment record Salaries vary according to classification related to career development supervisory or non-supervisory duties and are adjusted to account for assignments to

other programs The salaries of other personnel assigned to hydrometric or sediment operations as the need arises are included Salary costs are apportioned according to hydrometric conventional access and remote access stations Table 2 presents the staff and salaries chargeable for the 1986-87 fiscal year Table 3 contains the calculation of station unit salary cost

OPERATIONAL COSTS

Operations and maintenance costs cover a multitude of items Table 4 presents a detailed breakdown of the expenditures according to the departmental coding system of line objects (expenditure items) and cost codes This information was extracted from the Federal Department of Supply and Services year end expenditure data on computer listings The coding system enables the separation of costs to hydrometric conventional (0005 code) and hydrometric remote (0006 code) for all expenditures Table 5 provides a summary of the O & M costs and presents the derived station unit O & M costs for hydrometric conventional and hydrometric remote categories

CAPITAL DEPRECIATION COSTS

Capital costs include vehicle and equipment depreciation The total inventory value of hydrometric sediment and construction field equipment not including water level recording equipment is depreciated at 10% annually

Table 6 presents the summation of the equipment inventory value at the beginning and end of the 1986-87 fiscal year and the average of the two is used as the value for computing the equipment depreciation Depreciation figures for vehicles are presented in Table 7 and are based on the Federal Fleet Management Information System suggested vehicle life times Depreciation is charged only for the months that the vehicle is actually used for field operation

Table 8 presents a summary of the vehicle depreciation and the equipment depreciation along with the computation of the unit capital depreciation to be charged to hydrometric conventional and remote access program Construction vehicle and equipment depreciation is charged to the construction costs which are presented in Table 9

CONSTRUCTION COSTS

A construction cost summary showing the cost breakdown by major items is presented in Table 9 This information is obtained from the 1986-87 district construction report with the exceptions as noted The construction equipment and vehicle depreciation values are derived from Table 6 and 7 respectively The addition of vehicle and depreciation costs results in cost breakdown being slightly higher than is shown in the WRB Annual Construction Report Table 10 details the actual project costs on an individual basis

Table 1

3-1986-1987

HYDROMETRIC SUMMARY (STATION UNITS)

FEDERAL	CONVENTIONAL		REMOTE	
Discharge (C)	16 x 1 00 =	16 00	(C) 7 x 1 00 =	7 00
Discharge (S)	0 x 0 75 =	0 00	(S) 0 x 0 75 =	0 00
Water Level (M)	2 x 0 00 =	0 00	(M) 0 x 0 00 =	0 00
Water Level (C)	13 x 0 40 =	5 20	(C) 5 x 0 40 =	2 00
Water Level (S)	1 x 0 25 =	25	(S) 2 x 0 25 =	50
Sub-totals	32	21 45	14	9 50
FEDERAL-PROVINCIAL				
Discharge (C)	0 x 1 00 =	0 00	(C) 0 x 1 00 =	0 00
Discharge (S)	3 x 0 75 =	2 25	(S) 0 x 0 75 =	0 00
Discharge (M)	0 x 0 00 =	0 00	(M) 0 x 0 00 =	0 00
Water Level (C)	0 x 0 40 =	0 00	(C) 0 x 0 40 =	0 00
Water Level (S)	0 x 0 25 =	0 00	(S) 0 x 0 25 =	0 00
Sub-totals	3	2 25	0	0 00
PROVINCIAL				
Discharge (C)	*0 x 1 00 =*	*0 00*	*(C) 0 x 1 00 =*	*0 00*
Discharge (S)	0 x 0 75 =	0 00	(S) 0 x 0 75 =	0 00
Discharge (M)	0 x 0 00 =	0 00	(M) 0 x 0 00 =	0 00
Water Level (C)	0 x 0 40 =	0 00	(C) 0 x 0 40 =	0 00
Water Level (S)	0 x 0 25 =	0 00	(S) 0 x 0 25 =	0 00
Sub-totals	0	0 00	0	0 00
TOTALS	35	23 70 (71%)	14	9 50 (29%)

NUMBER OF	
Discharge Stations	26
Water Level Stations	23
Remote Stations	14
Sediment Stations	0
Water Quality Stations	0
Water Temp Stations	0
D C Platforms	14
Telemarks	6
Intelligent Microprocessors	5
Total Stations	49
Total Stations Units	33 20

TABLE 2

WATER QUANTITY PROGRAM

SALARY COST 1986-87

POSITION NO	POSITION TITLE	SALARY
840-1301 (12 months)	Hydrometric Survey Supervisor	$36 903
840-1593 (12 months)	Hydrometric Survey Technician	$33 692
840-1434 (12 months)	Hydrometric Survey Technician	$26 902
Overtime	All positions	$ 876
	TOTAL	$98 373

Total p-y utilization 3 0 person years

TABLE 3

CALCULATION OF STATION UNIT SALARY COST 1986-87

STATION GROUP	UNITS
a) Hydrometric Conventional Access Station Units	23 70
b) Hydrometric Remote Access Station Units	9 50
Combined Hydiometric Station Units	33 20

Since salary costs are not coded directly to the conventional and remote program stations apportionment of the shareable salaiy charges is based on a weighting factor of 1 28 for remote versus conventional unit salary

Combined Hydrometric Weighted Salary Units

= 23 70 + (1 28 x 9 50) = 35 86

Unit Salary Cost (Hydrometric Conventional)

$$= \frac{98,373}{35\ 86} = \$2\ 743$$

Unit Salary Cost (Hydrometric Remote)

= 2 743 x 1 28 = $3 511

TABLE 4

LIST OF DEPARTMENT OF SUPPLY & SERVICES (DSS DETAILED OPERATIONS AND MAINTENANCE (O&M) COSTS FOR N W ONTARIO 1986-87

DESCRIPTION	LINE OBJECT	0001	0003	0005	0006	0007	0010	0017	TOTALS
02 TRANSPORTATION & COMMUNICATION									
TRAVEL EXPENSES	401								0 00
CAR MILEAGE	402								0 00
BUS TRAV CTS CHARGE	404								0 00
TRAVEL EXPENSE	411		86 00	7040 00	2305 00		2399 00		11830 00
CAR MILEAGE	412								0 00
CAR RENTALS	413								0 00
ITIN WK TRAV CHAR	414								0 00
TRAVEL GOVT CONF	423								0 00
TRAVEL USA BUSIN	430								0 00
TRAVEL USA ITIN WORK	431			134 00	250 00				384 00
TRAVEL TAXI CHARGE	441								0 00
VACATION TRAV FROM I P A	443								0 00
TRAVEL TRAINING	444					2610 00			2610 00
TRAVEL FOR STAFFING	445								0 00
TRAV EXP NON PS	450								0 00
TRAVEL COSTS	560								0 00
CENT REMOV SERV DSS	566								0 00
MERCH AIR TRANS	601			28 00					28 00
MERCH RAIL TRANS	602								0 00
MERCH TRUCK TRANS	604	3 00		115 00					118 00
MERCH BUS TRANS	605			46 00					46 00
UNSPEC TRANS COSTS	609			25 00					25 00
PARCEL POST	651			15 00					15 00
OTHER POSTAL SERV	652			184 00					184 00
COURIER SERV	653			30 00					30 00
CENT FREIGHT SERV	654	2 00		187 00			34 00		43 00
TEL GTA DEPT COMM	701								0 00
TEL INST REP CHARGE	02								0 00
TEL LONG DIST CHARGE	03			62 00	445 00			1980 00	478 00
TEL SERV CHARGES	04			553 00					25 00
MESS DATA COMM SERV	806			1206 00				119 00	1325 00
RENT MESS DATA EQUIP	80								0 00
ADVERTISING PRINTING	901								0 00
SUB TOTAL		25 00	86 00	13925 00	3000 00	2610 00	2433 00	2099 00	24178 00
03 INFORMATION									
ADVERTISING OTHER	903								0 00
PRINT COMPET POST	1012								0 00
OTHER PRINT SERV ACQ DSS	1013								0 00
OTH PRINT COMM PRINT	1022								0 00
SUB TOTAL		0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00

TABLE 4 (cont d)

04 PROFESSIONAL & SPECIAL SERVICE								
GAUGE ATTEND SERV	1271		270 00					270 00
STF DEV TR PSC EX LGTR	1220				535 00			535 00
TUI FEES UNIV & COLL	1221							0 00
TR PS OTH	1222				1163 00			1163 00
CONTRCT STENO TYP SERV	1301							0 00
CONTRACT CLERICAL SERVICES	1302							0 00
OTH TEMP HELP SERV	1303		38 00	71 00				109 00
LAUND CLEAN REL SERV	1501							0 00
EDP SERV PURCH OTH DEPT	1505	9000 00						9000 00
EDP PURCH SOFT	1510							0 00
REAL ESTATE SERVICES	1515							0 00
CNTRCT ADMIN DSS SERV CHG	1525							0 00
GRAPHIC SERV	1535							0 00
OTH PHOTO SERV	1536							0 00
MAINT SERV MONUM PLQ	1543							0 00
PRINT SERV WIT DEPT	1545							0 00
BROKERAGE FEES	1554							0 00
MEMBERSHIP FEES	1575							0 00
SNOW ICE REMOVAL SERVICES	1581		25 00					25 00
OTH SERV CONTR NOT SPEC	1586							0 00
PETTY CASH PURCH SERV	1589							0 00
SRV NES PUR GOV DEPT	1596							0 00
MISCELLANEOUS SERVICES	1597							0 00
SUB TOTAL		9000 00	0 00 333 00	71 00	1698 00	0 00	0 00	11102 00
07 RENTALS								
RENTAL LANDS	1601		1456 00					1456 00
RENT EDP EQUIP	1615							0 00
WD PRDC PEF EQUIPM	1620							0 00
RNT PHOTO PRINT EQUIP	16 1							0 00
RNT OFF MACH EXC FURN	1622							0 00
PHOTO AND AUDIOVISUAL EQUIP	1624							0 00
RENT MACH EQUIP	1625							0 00
LEASE MOTOR VEHIC	1630		1 5 00					1 5 00
RENTAL AIRCRAFT	1635		341 00	1 723 00		990 00	0 00	19054 00
RENT SHIP	1636							0 00
RENT BLDG OTH	1642							0 00
RENT GAS CYLIND	1650		1750 00					1750 00
RENT EQUIP NES	1651		155 00	282 00		20 00		457 00
SUB TOTAL		0 00	341 00 3536 00	18005 00	0 00	1010 00	0 00	22892 00
08 PURCHASED REPAIR & UPKEEP								
MEA CONT LAB INST EXCXRAY	1718		905 00					905 00
SA SAN ALRM SIGH SYST	1719							0 00
FURNITURE FIXTURE	1722							0 00
OTHER EQUIP	1 27		87 00					8 00
EDP EQUIPMENT	1735							0 00
OTH MACH EXCL FURN	1 37		30 00					30 00
SHIPS BOATS	1740							0 00
RD MOT VEH	1746		346 00					346 00
ACCID REPAIR DEPT L VEHICLE	1748							0 00
OVERSNOW VEHICLES	1749							0 00
GAUGE STATIONS	1805							0 00
OFFICE BLDG	1845							0 00
TENANT SERV DPW REVO FUND	1880							0 00
U TOTAL		0 00	0 00 1 68 00	0 00	0 00	0 00	0 00	1 8

TABLE 4 (cont'd)

09 UTILITIES,MATERIALS & SUPPLY								
ELECT CONSUMP	1901			1315 00		105 00		1420 00
OTHER PUBLIC UTILITIES	1907							0 00
FOOD MAT FOOD PREP	2002							0 00
ROPE FABRIC	2006			5 00				5 00
OTHER SAND & GRAVEL MET	2009							0 00
PROPANE GAS LPG	2013			699 00				699 00
AUTOMOTIVE GAS	2014			4252 00			1008 00	5260 00
AVIATION GAS	2015							0 00
JET FUEL	2016							0 00
OTH PETRO COAL PROD	2018			60 00	3 00		13 00	76 00
LEATH FUR RUB MAT	2019			74 00				74 00
WOOD FAB MAT	2020			79 00				79 00
PAPER PAPER BOARD	2021							0 00
TEXTILE FAB MAT	2022			21 00				21 00
CHEMICAL REL PROD	2023			31 00				31 00
HYDROGEN HELIUM	2024							0 00
CHLORIN OXYG ACETYL	2027			130 00				130 00
IRON STEEL ALLOYS	2028				18 00			18 00
METAL FABR BASIC PROD	2030			5 00				5 00
CEMENT	2031							0 00
ROOFING MAT	2033							0 00
GLASS	20 4							0 00
INSULATION MAT	2035							0 00
PROTECTIVE CLOTHING	2040			272 00				272 00
FOOTWEAR APPAREL ACCESS	2041			164 00				164 00
TOILET CLEAN PREP ETC	2042							0 00
HOUSE FURNISHING	2044							0 00
KITCH UTENS CUTL TABLEW	2045							0 00
STCK ITEM OTH DSS	2048							0 00
MEDIC SUP OPHTHA ORTHO	2050							0 00
LIBRARY STCK PRINT	2051							0 00
MAPS CHARTS	2052			600 00			5 00	605 00
STATION OFF SUPP	2054			139 00				139 00
DRAFT ART SUPP	2055							0 00
PHOTOC PAP CHEM	2058							0 00
DATA PROCES SUPP	2059	161 00						161 00
PHOTOGRAPH GOODS	2060						4 00	4 00
MED PHARMAC PROD	2061							0 00
CONTAIN CLS RETURN	2063							0 00
FLAGS	2067							0 00
PAINT	2068			21 00			20 00	41 00
MISC PROD AUD VIS BULB	2070			329 00			19 00	348 00
HARDWARE	2071			87 00			20 00	107 00
SLIDES FILMS & VH TAPES	2081							0 00
SUBSCRIPTIONS	2082		19 00					19 00
PURCHASED CASH INC TX	2083			14 00				14 00
CNVEY ELEV MAT HANDL EQUIP	2105							0 00
HT AIR COND REFRIG EQUIP	2111			36 00				36 00
PLUMB EQUIP FIT	2113							0 00
ELEC LIGHT DIST CONT EQUIP	2114		4 00	130 00	227 00	70 00	8 00	439 00
OTH ELEC APPL EQUIP	2116			0 00				0 00
GEN ELEC EQUIP	2117			0 00				0 00
BATTERIES	2118			908 00				908 00
MEA CONT MED OPT INST	2122			320 00	29 00			349 00
SIGNAL SYSTEM	2123							0 00

TABLE 4 (cont'd)

SAF SANIT EQUIP	2124								0 00
HND TOOL CUTL	2126			18 00					18 00
GRADER BLADES	2127		5 00						5 00
OTH EQUIP INCL X RAY	2128			18 00					18 00
EDP EQUIPMENT	2135								0 00
OFF EQUIP UND $500	2136								0 00
OTH OFF EQUIP	2136								*0 00*
SHIPS BOATS	2140								0 00
MARINE EQUIP	2141								
RD MOT VEH	2146			311 00					311 00
RUB TIRE TUBES	2147			21 00					21 00
MISC VEHICLES	2148								0 00
OVERSNOW VEHICLES	2149								0 00
SUB TOTAL		161 00	28	10059 00	277 00	175 00	1097 00	0 00	11797 00
14 ALL OTHER PAYMENTS									
OTH MISC EXPEND	2527								*0 00*
VEH RE FEES	2528								0 00
CURRENT METER PARTS				710 00	290 00				1000 00
		0 00		710 00	290 00	0 00	0 00	0 00	1000 00
TOTALS		$9,186	$455	$29,931	$21,643	$4,483	$4,540	$2,099	$72,337

0001 GENERAL
0003 DCP IMPLEMENTATION PROGRAM
0005 HYDROMETRIC SURVEYS CONVENTIONAL ACCESS
0006 HYDROMETRIC SURVEYS REMOTE ACCESS
0007 HYDROMETIC NON SHAREABLE
0010 CONSTRUCTION
0017 DATA CONTROL
* Includes $693 travel expense for sediment training

TABLE 5

CALCULATION OF STATION UNIT O & M COST 1986-87

STATION GROUP	UNITS
a) Hydrometric Conventional Access Station Units	23 70

Unit O & M Cost (Hydrometric Conventional)

= Hydrometric Conventional (005) + EDP Unit Costs
Conventional Stations Units

= 29,931 = 1 263 + 142 = $1 405
23 70

b) Hydrometric Remote Access Station Units	9 50

Unit O & M Cost (Hydrometric Remote)

= Hydrometric Remote (006) + EDP Unit Costs
Remote Stations Units

= 21,643 = 2 278 + 142 = $2 420
9 50

NOTE The EDP Unit Costs are derived in the 1986-87 Canada-Manitoba MOA report

TABLE 6

INVENTORY OF HYDROMETRIC AND CONSTRUCTION
EQUIPMENT BASED ON EDR CARDS*

HYDROMETRIC AND SEDIMENT

April 1, 1986	April 1, 1987	1987-87 Average
40 240	43 967	42 103

CONSTRUCTION

April 1, 1986	April 1,1987	1986-87 Average
4 023	4 023	4 023

* No precise values are currently available for northwestern Ontario Inventory value has been approximated historically as 20% of the Manitoba value The ratio of station units between northwestern Ontario and Manitoba is 0 203 so 20% appears reasonable The inventory values used are prorated to Manitoba s

TABLE 7

VEHICLE DEPRECIATION

FY 1986-87

Vehicle Number	Original Capital Cost $	Depre per month $	Time in use Months	Annual Depr $	Remarks
STATION WAGONS - Lifetime 5 years (60 months)					
80-097	7 077	118	12	1 416	
MULTI PURPOSE VEHICLES OR LIGHT TRUCKS - Lifetime 6 years (72 months)					
83-154	12 300	171	12	2 052	
86-053	15 067	209	12	2 508	

Field Survey Vehicles Depreciation (excluding Construction Vehicles) = $5,976
Construction Vehicles Depreciation = $ 299

(Northwestern Ontario s usage 0 10 x $2 988)

TABLE 8

CALCULATION OF STATION UNIT
CAPITAL DEPRECIATION COST 1986-87

VEHICLE DEPRECIATION*		$5 976
EQUIPMENT DEPRECIATION**		
Average Inventory Value for 1986-87 = $42 103		
Capital Depreciation of equipment (10 years)	42,103 / 10	4,210
TOTAL CAPITAL DEPRECIATION		$10 186
STATION GROUP		UNITS
a) Hydrometric Conventional Access Station Units		23 70
b) Hydrometric Remote Access Station Units		9 50
Combined Hydrometric Station Units		33 20

Unit Capital Depreciation Cost = $10,186 / 33 20 = $307
(Hydrometric Conventional)

Unit Capital Depreciation Cost = $307 x 1 0 = $307
(Hydrometric Remote)

* Departmental Fleet Management Information System
** Departmental Equipment-In-Use Material Management System

TABLE 9

NORTHWESTERN ONTARIO CONSTRUCTION PROGRAM
COST SUMMARY 1986-87

FEDERAL STATIONS	9 STATIONS
Materials and Supplies	$9 501 44
Travel Expenses	3 181 82
Salaries	10 622 00
Contracts	1 010 40
Constr Vehicle and Equipment Depreciation[1]	701 00
Total Federal Station Costs[2]	$25 016 66

NOTES

1) Total construction vehicle and equipment depreciation cost equals $701 for northwestern Ontario These costs are not included in the Construction Report all other figures are from the 1986-87 Manitoba-Northwestern Ontario District Construction Report

2) Includes Keewatin warehouse insulation and upgrading costs

TABLE 10

CONSTRUCTION AND CAPITAL PROJECT COSTS SUMMARY

STATION	STATION NO	PROJECT NO	ITEM	ACTUAL $ COSTS [1]
Ball Lake at Ball Lake Lodge	05QE013	885	Dismantling & removal of shelter	1 402
Keewatin Warehouse	-	890	Insulate & install heaters in warehouse	10 485
Lac la Croix at Campbell s Camp	05PA011	891	Insulate shelter	1 350
Lake of the Woods at Sioux Narrows	05PD030	888	Dismantle functional installation	551
Namakan Lake above Kettle Falls	05PA003	892	Insulate shelter	1 403
Separation Lake at Walsten s Camp	05QE014	886	Dismantle installation	671
Sturgeon River at McDougall Mills	05QA004	884	Replace cablecar	1 874
Turtle River near Mine Centre	05PB014	883	Construct cableway anchor shelter	5 910
Winnipeg River at Whitedog	05PE021	887	Dismantle installation	664
			TOTAL	$24 310

Note 1) Total of construction and hydrometric staff salary O & M and capital costs

APPENDIX IV

SUMMARY OF STATION DATA AND COST INFORMATION
NATIONAL ANNUAL REPORT FORMAT
1986-87

Province/Territory Ontario
Northwestern Ontario (WRB Wpg)

TABLE 1
WATER QUANTITY SURVEYS
GAUGING STATION DATA FOR 86-87

No of Stations			Changes during 86-87		Stn Designation April 1 86			
April 1/ 85	April 1/ 86	Change	Added	Discontinued	Fed	F/P	Prov	Contrib
51	49	-2	2	4	46*	3*	0*	34

* Bracket Sediment Stations

TABLE 2
WATER QUANTITY SURVEYS
COMPARATIVE GAUGING STATION DATA April 1/75 to April 1, 1986

Federal Stations			F P Stations			Provincial Stations			Total Stations		
Apr 1/75	Apr 1/ 86	Chge	Apr 1/75	Apr 1/86	Chge	Apr 1/75	Apr 1/ 86	Chge	Apr 1/75	Apr 1/86	Chge
60	46	-14	9	3	-6	3	0	-3	72	49	-23

TABLE 3
WATER QUANTITY SURVEYS
DETAILED GAUGING STATION DATA 86-87

F 1	F 2	F 3	F 4	Total F	FP 1	FP 2	FP 3	Total F P	P 1	P 2	Total P	Contributed	Total All
17	1	25	3	46	3	0	0	3	0	0	0	34	83

Province ONTARIO

NORTHWESTERN ONTARIO (WRB WPG)

TABLE 4
WATER QUANTITY SURVEYS
TOTAL PROGRAM COSTS & SHAREABLE COSTS FOR 1986-87
(× $1000)

Total Program Costs					Shareable Costs *						
P/Yrs	Sal	Oper	Cap	Total	P/Yrs	Sal	Oper	Const	Total	F Share	P Share
3 3	109 0	70 0	9 7	188 7	3 3	98 4	67 7	25 0	191 1	186 1	5 0

* An additional 9 7K of capital (instrumentation & equipment) was a shareable cost

TABLE 5
WATER QUANTITY SURVEYS
COMPARISON - SCHEDULED & ACTUAL COSTS FOR 1986-87
(Dollars)

Salary & Operations		Construction		Total			Annual Payment Received	Received Minus Actual
Sch D/F	Actual Cost	Sch D/F	Actual Cost	Sch D/F	Actual Cost	Difference		
			NOT APPLICABLE					

AUTHOR

WRB - Wpg., Manitoba.

TITLE CANADA-ONTARIO MEMORANDUM OF AGREEMENT WATER QUANTITY SURVEYS

DATE DUE mmmm Borrowed	N.Ont. BORROWER'S NAME 86/87 Ann. Rept.	Ret'd

DATE DUE	BORROWER'S NAME