

REFERENCE 11

NEWFOUNDLAND AND LABRADOR HYDRO
REPORT ON
1986/87 CLIMATOLOGICAL MONITORING
PROGRAM

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TABLE OF CONTENTS

	<u>PAGE</u>
1.0 <u>SUMMARY</u>	1
2.0 <u>OBJECTIVES</u>	2
3.0 <u>INTRODUCTION</u>	3
4.0 <u>DISCUSSION OF PROGRAM</u>	4
4.1 PASSIVE ICE METER	4
4.2 ANEMOMETER	4
4.3 TEST TOWER SITES	4
4.4 TEST SPANS	5
5.0 <u>CONCLUSIONS AND RECOMMENDATIONS</u>	6
6.0 <u>APPENDICES</u>	7
6.1 SUMMARY OF PASSIVE ICE METER DATA	8-10
6.2 SUMMARY OF ANEMOMETER DATA	11-12
6.3 SUMMARY OF TEST TOWER DATA	13-37

MAPS I, II and III

- 1 -

1.0 SUMMARY

The climatological study concluded on 1987-05-31 was the tenth in an annual series conducted by Newfoundland and Labrador Hydro.

The study included the accumulation of data related to wind and direction, ice accumulation on passive collectors.

This report summarized the data collected during the period of 1986-06-01 to 1987-05-31 and recommends the following:

- 1) The continuation of the Passive Ice Meter Program
- 2) Wind Data continued to be collected at Hawkes Bay only.
- 3) The test towers to be monitored from November 1987 to May 1988 on the Long Range Mountains only.

- 2 -

2.0 OBJECTIVES

The "Report on 86/87 Climatological Monitoring Program" will review the individual components of the study funded under Hydro Work Orders 6027 and 7006 and backcharged to the L.C.D.C. Feasibility Program (W.O. 6801 and 7801).

All the data collected during the 86/87 observation period will be presented.

Conclusions will be drawn based on the accumulated data and recommendations will be made as to the future direction of the program.

- 3 -

3.0 INTRODUCTION

The 1986/87 Climatological Monitoring Program incorporated two (2) programs designed to collect raw data with a goal to optimize transmission line design and route selection parameters for the HVDC Line.

The Passive Ice Meter and Test Tower Sites provide data related to icing conditions, that affect the HVDC transmission line, from Labrador to Soldier's Pond and in particular at selected locations along the proposed HVDC Line routes.

The anemometer Site at Hawke's Bay provides data related to another design parameter of transmission lines: wind speed, direction and peak gust conditions.

This report presents the summarized data collected from June 1986 to May 1987.

4.0 DISCUSSION OF PROGRAM

4.1 PASSIVE ICE METER

May 15, 1987 marked the completion of the tenth successful Passive Ice Meter (PIM) observation period. Observer co-operation was good at most sites and the data reported on the daily and monthly observation sheets have been comprehensive.

Data collected from the eighteen (18) sites is tabulated in Appendix 6.1, Summary of Ice Meter Data.

In general, the information documented during the 1986/87 season showed similar ice accretion to previous years. The ten years data will now provide a good base for an icing profile for the province.

4.2 ANEMOMETER

For 1986/87, wind data was only collected at Hawke's Bay. This site, which is manned, has operated successfully since 1971. Data collected from this Site is tabulated in Appendix 6.2 - Abstract of the Wind.

4.3 TEST TOWER SITES

The Test Tower Program for the 1986/87 season began in mid December 1986, with visits to Long Range Mountain Crossing area.

All sites were visited as regularly as weather would permit and the collected data is tabulated in Appendix 6.3 - Summary of Test Tower Data.

- 5 -

4.3 TEST TOWER SITES (cont'd)

Sites 2, 2b and 14 show an increase in accumulation of Rime over the previous year, but are similar to the accumulations recorded for the 1984/85 seasons. There were no marked differences in any of the other sites with accumulations ranging from 0 to 8".

The site locations of the test towers are shown on Maps I and II.

4.4 TEST SPANS

During January 1986 vandals struck the test span at Inner Pond toppling one of the towers. The remaining tower is now being monitored as a test tower. The test span at Brian's Pond remained intact and was visited regularly as a passive collector.

- 6 -

5.0 CONCLUSIONS AND RECOMMENDATIONS

With the completion of the 1986/87 Climatological Data Collection Program another year of ice and wind information has been added to the existing data base established to enhance the HVDC Transmission Line Design Parameters and Route Selection.

It is recommended that the Climatological Program continue for 1987/88 with scope of the Program to be as follows:

- 1) Maintain PIM Program
- 2) Maintain wind data collection at Hawkes Bay only.
- 3) Continue the monitoring of the test towers and test span (Passive) along the Long Range Mountains area only.

- 7 -

- 6.1 SUMMARY OF PASSIVE ICE METER DATA
- 6.2 SUMMARY OF ANEMOMETER DATA
- 6.3 SUMMARY OF TEST TOWER DATA

- 8 -

APPENDIX 6.1

SUMMARY OF PASSIVE ICE

METER DATA

SUMMARY OF PASSIVE ICE METER DATA1986 - 1987

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
WABUSH S01	-----	-----	NOT MONITORED	-----	-----	-----	-----	-----
CHURCHILL FALLS S02	-----	-----	NOT MONITORED	-----	-----	-----	-----	-----
GOOSE BAY S04	NIL	Trace of Glaze - One day	NIL	NIL	Trace of Rime - 1 day - Trace of Glaze - 2 days	NIL	NIL	NIL
POINT AMOUR C07	-----	-----	NOT MONITORED	-----	-----	-----	-----	-----
YANKEE POINT C09	1.3 cm Glaze - One Day	1.3 cm Glaze - Two Days	1.3 cm Glaze - Three days	NIL	1.3 cm Glaze - One day	1.3 cm Glaze - Two Days	NIL	NIL
PLUM POINT C10	NIL	NIL	Trace of Rime & Glaze - Two Days	Trace of Rime & Glaze (0.3cm) - 2 days remaining for nine days	Trace of Rime - One day	NIL	NIL	NIL
HAWKES BAY C11	NIL	NIL	NIL	0.6 cm Glaze - One day	NIL	NIL	NIL	NIL
DANIEL'S HARBOUR C12	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
GROS MORNE NATIONAL PARK C13	NIL	NIL	0.2 cm Glaze - One day	REPORTS NOT RECEIVED	-----	-----	-----	-----
PORT-AUX-BASQUE S16	NIL	NIL	NIL	0.2 cm Glaze & Wet Snow - One day	NIL	1.0 cm Glaze - Two Days	NIL	NIL
BURNT POND C17	NIL	NIL	NIL	0.5 cm Glaze - Two Days	Trace of Glaze - One Day	Trace of Glaze (0.2 cm) - One day	Trace of Glaze - One day	NIL

SUMMARY OF PASSIVE ICE METER DATA

1986 - 1987

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
Torbay Airport Area C34	NIL	0.6 cm Glaze & Wet Snow with 1.5 cm Icicles - 2 days	NIL	0.4 cm Glaze - One Day	NIL	Trace of Glaze - Two Days	Trace of Glaze - One day	NIL
Brigus Junction S28	NIL	NIL	NIL	NIL	NIL	Trace of Glaze - Three Days	NIL	NIL
SPRINGDALE C23	NIL	NIL	NIL	0.3 - 0.5 cm Glaze - Remained for Three Days	1.8 cm Glaze and Wet Snow w/icicles - One day	NIL	NIL	NIL
STONEY BROOK C24	-----	-----	-----	NOT MONITORED	-----	-----	-----	-----
GANDER AIRPORT S25	Trace of Glaze - One Day	Trace of Glaze - One Day - Trace of Rime - One Day	Trace to 1.7 cm Glaze - 2 days Trace of Rime - One day	Trace of Rime - One day & 0.2 - 1.6 cm Glaze - Three days	Trace of Rime and Glaze - Seven days	Trace of Rime & Glaze (0.4 - 1.2cm) - 5 days	NIL	NIL
BAY D'ESPOIR S27	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
SUNNYSIDE C28	NIL	Trace of Wet snow - One day	NIL	Trace of Wet Snow - one day	Trace of Glaze - One day	NIL	NIL	NIL
Dildo C31	NIL	0.5 cm Glaze - One Day	Trace of Glaze - One Day	Trace of Glaze - Two Days	Trace of Glaze - Two Days	NIL	NIL	NIL
HOLYROOD C33	NIL	NIL	NIL	NIL	NIL	0.2 cm Glaze - 2 cm - 5 cm Icicles - 1 day	NIL	NIL
HARBOUR DEEP C35	NIL	NIL	NIL	NIL	NIL	Trace of Glaze - One Day	NIL	NIL
PORT BLANDFORD C40	NIL	2 cm Wet Snow - One Day	REPORTS NOT RECEIVED	-----	-----	-----	-----	-----

APPENDIX 6.2
SUMMARY OF ANEMOMETER DATA

ABSTRACT OF THE WINDSUMMARYHAWKES BAY

	JUNE '86	JULY '86	AUG. '86	SEPT. '86	OCT. '86	NOV. '86	DEC. '86	JAN. '87	FEB. '87	MAR. '87	APR. '87	MAY '87
Total Mileage for Month	10,780	8,948	9,485	9,211	10,912	12,575	12,250	9,944	10,484	9,883	11,121	11,314
Greatest Mileage in 24 Hrs.	578	702	558	586	728	998	678	676	750	732	673	718
Greatest Mileage & Prevailing Dir. for 1 Hr.	38 SW	40 SW	32 SW	32 NW & SE	40 SW & NW	48 W	44 NW	44 NE & SE	44 NE	38 NE & SW	48 SW	36 SW
Date of Greatest Mileage for 1 Hr.	18th	25th	5th	13th & 28th	15th & 25th	14th	8th	4th & 12th	25th	6th & 17th	19th	4th, 14th & 15th
Average Speed for Month (mph)	15.6	12.1	12.8	12.8	19.6	12.5	16.4	13.4	15.6	13.3	15.5	15.2
Longest Continued - Direction	SW	SW	SW	SW	NW	SW	SW	NE	SW	NE	SW	SW
- Hours	33	35	37	57	43	41	33	25	45	56	61	59
Prevailing Direction - By Mileage	SW 5838	SW 2836	SW 4123	SW 2754	SW 3958	W 3421	NW 3487	E 1840	SW 3673	NE 3007	SW 3560	SW 6612
- By Total Hrs.	SW 307	SW 172	SW 235	SW 163	SW 185	SW 165	NW 191	E 158	SW 204	NE 192	SW 168	SW 328
Peak Gust (mph)	SW 47	SW 50	SW 40	NW & SE 43	NW 52	W 59	NW 56	E & SE 56	NE 52	NE 50	SW 58	SW 47

NOTE: Instrument records in imperial units.

- 13 -

APPENDIX 6.3

SUMMARY OF TEST TOWER DATA

- 14 -

TABLE OF DATA

SITE BIG HILL

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	2" Rime	-
87-01-22	0	0	-25	4" Rime on Tower, 2" on Guys	-
87-02-27	15	280	-5	8" Rime on Top of Tower	-
87-04-16	10	070	-3	Bare	-

- 15 -

TABLE OF DATA

SITE #10 MAIN RIVER

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
87-04-16	10	070	-3	Bare	-

- 16 -

TABLE OF DATA

SITE #13 PARSONS POND

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-02-27	15	280	-3	Bare	-
87-04-16	10	070	-3	Bare	-

- 17 -

TABLE OF DATA

SITE #15 PARSONS POND

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-02-27	15	280	-5	Bare	-
87-04-16	10	070	-3	Bare	-

- 18 -

TABLE OF DATA

SITE #14a PARSONS POND

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Trace of Rime	-
87-01-22	0	0	-25	1" Rime	-
87-02-27	35	280	-5	4" Rime on Top of Tower	-
87-04-16	10	070	-3	Bare	-

- 19 -

TABLE OF DATA

SITE #14 PARSONS POND

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	10" Rime on Tower	-
87-01-22	0	0	-25	8" Rime on Tower	-
87-02-27	35	280	-5	10" Rime on Tower	-
87-04-16	10	070	-3	Bare	-

- 20 -

TABLE OF DATA

SITE #2 PORTLAND CREEK

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	15" Rime on Tower	-
87-01-22	0	0	-25	12" Rime on Tower	-
87-03-12	5	250	-11	20" Rime on Tower	-
87-04-16	10	070	-3	Bare	-

- 21 -

TABLE OF DATA

SITE #2b PORTLAND CREEK

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	18" Rime on Tower	-
87-01-22	0	0	-25	18" Rime on Tower	-
87-03-12	5	270	-11	14" Rime on Tower	-
87-04-16	10	070	-3	Bare	-

- 22 -

TABLE OF DATA

SITE #2e PORTLAND CREEK

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Trace	-
87-01-22	0	0	-25	Bare	-
87-03-12	10	270	-11	2.5" Rime on Tower	-
87-04-16	10	070	-3	Bare	-

- 23 -

TABLE OF DATA

SITE #2g LONG RANGE MOUNTAINS

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-02-27	35	280	-3	1" Rime	-
87-04-16	10	070	-3	Bare	-

- 24 -

TABLE OF DATA

SITE #2h LONG RANGE MOUNTAINS

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-02-27	35	280	-5	Trace of Rime	-
87-04-16	10	070	-3	Bare	-

- 25 -

TABLE OF DATA

SITE #2i LONG RANGE MOUNTAINS

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Trace of Rime	-
87-01-22	0	0	-25	1" Rime on Tower	-
87-02-27	35	280	-5	3" Rime on Tower	-
87-04-16	10	070	-3	Bare	-

- 26 -

TABLE OF DATA

INNER POND

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	3" Rime	-
87-01-22	0	0	-25	1.5" Rime	-
87-03-12	5	270	-11	5" Rime	-
87-04-16	10	070	-3	Bare	-

- 27 -

TABLE OF DATA

BRIAN'S POND TEST SPAN

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	----- Not Visited -----				-
87-04-16	10	070	-3	Bare	-

- 28 -

TABLE OF DATA
SITE #16 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	10	270	-11	Bare	-
87-04-16	10	070	-3	Bare	-

- 29 -

TABLE OF DATA
SITE #17 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	1.5" Rime	-
87-03-12	10	270	-7	Bare	-
87-04-16	10	070	-3	Bare	-

- 30 -

TABLE OF DATA
SITE #18 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	10	135	-5	Bare	-
87-04-16	10	070	-3	Bare	-

- 31 -

TABLE OF DATA

SITE #19 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	10	135	-8	Bare	-
87-04-16	10	070	-3	Bare	-

- 32 -

TABLE OF DATA
SITE #20 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	8	135	-10	Bare	-
87-04-16	10	070	-3	Bare	-

TABLE OF DATA
SITE #12 CAT ARM

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
86-12-12	3	250	-12	Bare	-
87-01-22	0	0	-25	Bare	-
87-03-12	8	135	-10	Bare	-
87-04-16	10	070	-3	Bare	-

- 34 -

TABLE OF DATA

SITE PWI - LABRADOR

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION (Deg)
87-01-22	10	270	-20	Bare	-

- 35 -

TABLE OF DATA

SITE PW2 - LABRADOR

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
87-01-22	10	270	-20	Bare	-

- 36 -

TABLE OF DATA
SITE IW3 - LABRADOR

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
87-01-22	10	270	-20	Bare	-

- 37 -

TABLE OF DATA

SITE PW4 - LABRADOR

<u>DATE</u>	<u>WIND SPEED (MPH)</u>	<u>WIND DIR. (TRUE)</u>	<u>TEMP. °C</u>	<u>ACCUMULATION NOTED</u>	<u>DIRECTION OF ACCUMULATION (Deg)</u>
.87-01-22	10	270	-20	Bare	-