

REFERENCE 8

NEWFOUNDLAND AND LABRADOR HYDRO
REPORT ON
1983/84 CLIMATOLOGICAL MONITORING
PROGRAM

PREPARED BY: Newfoundland and Labrador Hydro
Engineering & Construction Division
Transmission Line Design Group

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1.0 SUMMARY

The climatological study concluded on 1984-05-31 was the seventh in an annual series conducted by Newfoundland and Labrador Hydro.

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

This report summarizes the data collected during the period of 1983-06-01 to 1984-05-31 and recommends *the following*:

- (1) The continuation of the Passive Ice Meter Program.
- (2) Wind data continued to be collected at Hawkes Bay and 4-Mile Pond.
- (3) The Rosemount Ice Detector operated at 4-Mile Pond only.
- (4) The test towers be monitored from November 1984 to May 1985 on the Long Range Mountains only.

2.0 OBJECTIVES

The "Report on 83/84 Climatological Monitoring Program" will review the individual components of the study funded under Hydro Work Order 4040 and backcharged to L.C.D.C. Work Order 9760.

All the data collected during the 83/84 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.

3.0 INTRODUCTION

The 1983/84 Climatological Monitoring Program incorporated two 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 Sites provide 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 1983 to May 1984.

4.0 DISCUSSION OF PROGRAM

4.1 PASSIVE ICE METER

May 15, 1984 marked the completion of the seventh successful Passive Ice Meter (PIM) observation period. Observer cooperation was good at most sites and the data reported on the daily and monthly observation sheets have been comprehensive.

Data collected from the twenty-four sites is tabulated in Appendix I Summary of Ice Meter Data.

In general, the information documented during the 1983/84 season showed similar ice accretion to previous years. The seven years data will now provide a good base for an icing profile for the province.

4.2 ANEMOMETER

The wind data programs for 1983/84 consisted of two units, Hawkes Bay and Holyrood. Both Sunnyside and Yankee Point were terminated in 1982. The unit at Hawkes Bay operated year round. However, the unit at Holyrood, similar to previous years only operated sporadically. During the April/84 sleet storm the propellor and direction vane were destroyed and had to be replaced. At present spare parts from other units are used to keep the unit running. It is envisaged that the unit will be operated until major expenditures are required to keep it in service. A more

4.2 ANEMOMETER (Cont'd.)

rugged anemometer is required to combat the harsh environment in that area.

It was recommended in the 1982/83 report to relocate the Levi's Gulch anemometer to Daniel's Harbour. However, the unit which was on loan from AES, was required by AES for Nova Scotia and was returned to them. No action will be taken to replace the unit. *Is this the Levi's Gulch unit?*

4.3 ROSEMOUNT ICE DETECTOR

The Rosemount Ice Detector Program was not initiated for the 1983/84 season.

Why?

4.4 TEST TOWER SITES

The Test Tower Program for the 1983/84 season began in late December 1983; with visits to Long Range Mountain Crossing area. The winter was fairly mild with no substantial accumulations observed. Only one trip was conducted to the Pinware Valley and as in previous years was ice free.

All sites were visited as regularly as weather would permit and the collected data is tabulated in Appendix 6.4 - Summary of Test Tower Data.

4.5 TEST SPANS

During the 1983/84 observation period the three test span were not instrumented. All three test spans were visited regularly and treated as passive collectors.

5.0 CONCLUSIONS AND RECOMMENDATIONS

With the completion of the 1983/84 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 1984/85 with scope of the Program to be as follows:

- (1) Maintain PIM Program.
- (2) Maintain wind data collection at Hawkes Bay and 4-Mile Pond - Holyrood.
- (3) Continue the monitoring of the test towers and test spans (Passive) along the Long Range Mountains area only.
- (4) Maintain the RID at 4-Mile Pond, Holyrood.

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- 6.1. Summary of Passive Ice Meter Data
- 6.2 Summary of Anemometer Data
- 6.3 Summary of Test Tower Data
- 6.4 Contamination Data

APPENDIX 6.1

SUMMARY OF PASSIVE ICE

METER DATA

SUMMARY OF PASSIVE ICE METER DATA

1983 - 1984

LOCATION		OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
WABUSH	S01	No Accumulation	0.4 cm Glaze 2 days	No Accumulation	No Accumulation	No Accumulation	0.2 cm Glaze One day	No Accum.	No Accum.
CHURCHILL FALLS	S02	No Accumulation	No Accumulation	Trace of glaze, 1 day.	No Accumulation	Trace of glaze, 3 days.	0.2 cm - glaze - 2 days.	No Accum.	No Accum.
GOOSE BAY	S04	No Accumulation	Trace of Glaze 4 days	Trace of Glaze one day	No Accumulation	Trace of glaze - 3 days - 0.1 cm Glaze & Rime-1 day	0.2 cm-Glaze -1 day - 0.7 cm Rime, Glaze, Wet snow & icicles-1 day	No Accum.	Trace of Glaze 1 day
POINT AMOUR	C07	No Accumulation	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.	2.0 cm Glaze 1 day	No Accum.
YANKEE POINT	C09	No Accum.	No Accum.	Trace of Rime- 1 day 1.3 cm Wet snow 1 day	No Accum.	No Accum.	Trace of Rime & Glaze-1 day Trace of Glaze 1 day	No. Accum.	No. Accum.
PLUM POINT	C10	No Accumulation	No. Accum.	Trace of Glaze- 3 days - Trace of Rime-1 day	Trace of Snow, Ice & Rime - 4 days .	2.5 cm Wet Snow with 3 cm icicles	No Accum.	0.2 cm Rime- One day	No Accum.
HAWKES BAY	C11	No Accum.	Trace of Rime (1 day)	No Accum.	No Accum.	No Accum.	0.6 cm Glaze One Day	0.6 cm Glaze One Day	No Accum.
DANIEL'S HARBOUR	C12	No Accumulation	No Accum.	0.2 cm Glaze 1 day	No Accum.	Freezing Rain-2 days-max. deposit 1.2 cm icicles	Trace of Glaze -One day	No Accum.	No Accum.
GROS MORNE NATIONAL PARK	C13	No Accumulation	No Accum.	No Accum.	3 cm Glaze & 5 cm Wet snow from 13th thru 24th	No Accum.	2.0 cm Glaze remained for 4 days-1.0 cm Rime 3 days	0.5 cm Glaze Two days	No Accum.
PORT-AUX-BASQUE	S16	No Accumulation	No Accum.	No Accum.	No Accum.	0.5 cm Glaze - One day	No Accum.	1.3 cm Glaze - One day	No Accum.
BURNT POND	C17	No Accumulation	No Accum.	Trace of Glaze- One Day	No Accum.	Trace of Glaze- 1 day	0.3 cm Glaze - 3 days	No Accum.	No Accum.
LONG HARBOUR	C31				No Accum.	No Accum.	No Accum.		

SUMMARY OF PASSIVE ICE METER DATA

1983 - 1984

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
BUCHANS C18	No Accum.	No Accum.	0.6 cm Glaze - 1 day	No Accum.	1.3 cm Glaze - 1 day - Freezing drizzle 3 days - Unable to get accurate reading	No Accum.	1.8 cm Glaze - 1 day	No Accum.
DEER LAKE S19	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored
SPRINGDALE C23	Not Monitored	Not Monitored	0.6 - 3.2 cm Glaze-7 days-Also icicles & Trace of Rime	Trace of Glaze-4 days - 0.6-1.3 cm Glaze on top surface-4 days	Trace of Glaze & Icicles - 4 days	Trace of Glaze - 2 days	Wet Snow with trace of Glaze & 15 cm icicles	No Accum.
STONE BROOK C24	No Accum.	No. Accum.	No Accum.	0.5 cm Rime - 1 day	0.6 cm Glaze - 1 day	0.3 cm Glaze-1 day Wet Snow melted & froze to 0.6-1.3 cm thick	No Accum.	No Accum.
GANDER AIRPORT S25	No Accum.	Trace of Glaze-3 days 1.2 to 1.7 cm Glaze 2 days	No Accum.	0.2 cm Glaze-1 day- 0.3 cm Glaze & 5.7 cm icicles - 1 day	Deposits of Glaze observed for 7 days ranging from 0.1 cm to 1.0 cm	0.2 to 0.7 cm Glaze-3 days	Trace to 0.2 cm Glaze for 3 days	No Accum.
BAY D'ESPOIR S27	No. Accum.	No Accum.	No Accum.	No Accum.	0.2 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.
SUNNYSIDE C28	No Accum.	Yes - But no record of type	0.1 cm Glaze - 1 day	No Accum.	No Accum.	0.5 cm Rime - 1 day	Trace of Glaze - 2 days	No Accum.
WESTERN AVALON C32	No Accum.	No Accum.	0.8 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.	0.8 cm Glaze - 1 day - 1.0 cm Glaze - 1 day	No Accum.
HOLYROOD C33	Not Monitored	Not Monitored	Trace of Glaze - 1 day	No Accum.	No. Accum	No. Accum	Trace of rime	No. Accum.
HARBOUR DEEP C35	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.	0.5 cm Glaze 1 day	No Accum.	No Accum.
PORT BLANDFORD C40	No Accum.	No Accum.	2.5 cm Wet Snow 3 days	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.
S-TURN C30				No Accum.				

APPENDIX 6.2

SUMMARY OF ANEMOMETER DATA

ABSTRACT OF THE WINDSUMMARY

HAWKES BAY

	JUNE 83	JULY 83	AUG. 83	SEPT. 83	OCT. 83	NOV. 83	DEC. 83	JAN. 84	FEB. 84	MAR. 84	APR. 84	MAY 84
Total Mileage for Month	7821	8722	9173	7465	8496	9419	13308	8285	9155	9867	8503	8638
Greatest Mileage in 24 Hrs.	541	616	616	484	606	714	722	658	674	624	534	566
Greatest Mileage & Prevailing Dir. for 1 Hr.	38 SW	36 SW	36 SW	28 SW	36 NW	46 N	42 W	44 SW	44 SW	42 NE	28 NE	36 SW
Date of Greatest Mileage for 1 Hr.	29TH	2ND	15TH	12TH	30TH	28TH	24TH	26TH	4TH	28 & 29	11TH	27TH
Average Speed for Month (mph)	11.0	11.7	12.4	10.4	14.0	13.1	17.9	11.2	13.2	13.3	11.8	11.6
Longest Continued - Direction	SW	SW	SW	SW	SW	NE	NW	SW	SW	SW	NE	SW
- Hours	31	54	50	44	31	69	42	20	43	52	52	23
Prevailing Direction - By Mileage	SW 4323	SW 3562	SW 4730	SW 2801	SW 3829	NW 1889	SW 3562	NW 2014	SW 3318	SW 3201	NE 3111	SW 3007
- By Total Hrs.	290	204	264	187	201	133	164	137	202	187	219	199
Peak Gust (mph)	SW 45	SW 43	SW 41	SW 38	SW 44	N 58	SE 63	SW 57	SW 62	NE 54	NE 44	SE 40

NOTE: Instrument records in imperial units.

ABSTRACT OF THE WIND

4 MILE POND

SUMMARY

JUNE 83 JULY 83 AUG. 83 SEPT. 83 OCT. 83 NOV. 83 DEC. 83 JAN. 84 FEB. 84 MAR. 84 APR. 84 MAY 84

Total Mileage for Month	*8136			4908	13293	13317	6554	-	-	10503	6010	
Greatest Mileage in 24 Hrs.	825			600	870	772	697			655	904	
Greatest Mileage & Prevailing Dir. for 1 Hr.	46 NW			30 SW	46 SW	47 W	46 S			38 S	50 NW	
Date of Greatest Mileage for 1 Hr.	2ND			23RD	28TH	30TH	10 & 11			31ST	7TH	
Average Speed for Month (mph)	15.0			13.6	18.0	18.5	18.2			17.8	20.1	
Longest Continued - Direction	NE			SW	NE	NE	SW			W	SW	
- Hours	38			34	62	42	33			61	25	
Prevailing Direction - By Mileage	N			SW 1731	SW 2921	N 2933	SW 2749			SE 2069	SW 1610	
- By Total Hrs.	141			93	163	150	137			98	79	
Peak Gust (mph)	N 60			N 44	SE 55	W 63	S 61			S 50	NW 60	

*21 Full Days
3 Part Days

15-30th
only

1st-16th

15-13th

NOTE: Instrument records in imperial units.
527 hrs.
73.2%

APPENDIX 6.3

SUMMARY OF TEST TOWER DATA

TABLE OF DATA

SITE #2 PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	15	240	0	12" soft rime on 5' Level of Tower	240
17-01-84	5	300	-2	2½" soft pennant rime at 5' tower level	300
9-02-84	10	90	-2	2" pennant rime, glaze underneath	90
8-03-84	10	290	-6	Bare	-
16-04-84	5	040	5	Bare	-
14-05-84	5	040	10	Bare	-

TABLE OF DATA

SITE #2A PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	15	300	0	2" soft rime on 5' Level of tower	300
16-01-84	10	300	-13	1/2" soft rime on top of tower	300
9-02-84	10	90	-2	Bare	-
8-03-84	10	200	-2	Bare	-
16-04-84	5	040	0	1/4" glaze overlain with 1/4" rime	040
14-05-84	5	045	10	Bare	-

TABLE OF DATA

SITE #2B PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	36	240	0	12" pennant soft rime at 5' Level of tower	240
16-01-84	10	300	-13	2½" soft rime pennant at 5' tower level	300
9-02-84	10	90	-2	2" rime pennants glaze underneath	90
8-03-84	10	200	-2	12" rime	200
16-04-84	5	040	5	Bare	-

TABLE OF DATA

2C PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	300	0	Bare	-
16-01-84	0	-	-13	Bare	-
9-02-84	5	90	-2	Bare	-
8-03-84	5	200	-2	Bare	-
16-04-84	5	040	0	1" rime on tower and guys	040
14-05-84	5	045	8	Bare	-

TABLE OF DATA

2D PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	Note: Due to poor visibility, site not visited				
16-01-84	10	300	-13	1½" soft rime pennant at 5' tower level ½" rime on PIM	300
9-02-84	10	90	-2	Bare	-
8-03-84	5	200	-2	Bare	-
16-04-84	5	040	0	Bare	-
14-05-84	5	045	10	Bare	-

TABLE OF DATA

2E PORTLAND CREEK

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	240	0	Bare	-
16-01-84	5	300	-13	Bare	-
9-02-84	Not visited, based on other towers assumed bare				
8-03-84	5	200	-2	Bare	-
16-04-84	5	040	5	Bare	-
14-05-84	10	045	11	Bare	-

TABLE OF DATA

SITE #3 HILLS OF ST. JOHN'S

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
09-03-84	5	290	-6	Bare	-
16-04-84	5	050	2	Bare	-

TABLE OF DATA

SITE #4 L'ANSE AU LOUP

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	10	290	-6	18" rime underlain by 2" glaze	290

TABLE OF DATA

SITE #4A L'ANSE AU LOUP

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	10	290	-6	2" glaze trace of rime	290

TABLE OF DATA

SITE #9 28 MILE SECTION - 2

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	250	0	Trace of glaze	-
16-01-84	0	-	-13	Trace of rime	-
9-02-84	10	90	-2	Bare	-
8-03-84	20	300	-6	Bare	-
16-04-84	5	040	0	1" rime on tower	45
14-05-84	10	045	10	Bare	-

TABLE OF DATA

SITE #10 MAIN RIVER

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	240 ^o	0	Bare	-
16-01-84	0	-	-13	Bare	-
9-02-84	0	-	-2	Bare	-
8-03-84	20	300	-6	Bare	-
16-04-84	5	040	0	Bare	-
15-05-84	5	045	10	Bare	-

TABLE OF DATA

SITE #11 — 2

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
16-04-84	5	045	10	Bare	-
16-6-84	5	330	6	3" glaze overlain with 2" rime	020

TABLE OF DATA

SITE #12 — ?

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
16-04-84	5	330	8	3" glaze overlain with 2" rime	020
14-5-84	5	045	10	Bare	-

TABLE OF DATA

SITE #13 PARSONS POND

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	250	0	Bare	-
16-01-84	0	-	-13	Bare	-
9-02-84	-	Not visited, based on other towers, assumed bare			-
8-03-84	20	290	-6	Bare	-
16-04-84	5	040	0	Bare	-
14-05-84	-	-	10	Bare	-

TABLE OF DATA

SITE #14 PARSONS POND

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION /
18-12-83	10	290	0	9" soft rime pennants at 5' Level of Leg	290
16-01-84	10	300	-13	2" soft rime pennants at 5'	300
9-02-84	5	90	-2	1/2" glaze	90
8-03-84	10	200	-2	2" soft rime	200
16-04-84	5	040	2	Bare	-
14-05-84	-	-	10	Bare	-

TABLE OF DATA

SITE #15 PARSONS POND

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
18-12-83	10	250	0	Bare	-
16-01-84	0	-	-13	Bare	-
9-02-84	Not visited, based on other towers, assumed bare				
8-03-84	20	300	-6	Bare	-
16-04-84	5	040	0	Bare	-
14-05-84	-	-	10	Bare	-

TABLE OF DATA

SITE #16 — }>

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
*9-02-84	10	90	-2	Bare	-
8-03-84	15	200	-2	Bare	-
16-04-84	5	040	2	Bare	-
14-05-84	5	200	15	Bare	-

*First monthly monitoring trip data

TABLE OF DATA

SITE #17

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
9-02-84	10	90	-2	Bare	-
8-03-84	15	200	-2	Bare	-
16-04-84	5	040	0	1" rime on guys and tower	040
14-05-84	5	045	10	Bare	-

*first monitoring trip data

TABLE OF DATA

SITE #18

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
9-02-84	10	90	-2	Bare	-
8-03-84	15	200	-2	Bare	-
16-04-84	5	040	0	½" soft rime on tower guys bare	040
14-5-84	5	045	10	Bare	-

TABLE OF DATA

SITE #19

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
9-02-84	10	90	-2	Bare	-
8-03-84	15	200	-2	Bare	-
16-04-84	5	040	8	Bare	-
14-5-84	5	045	10	Bare	-

TABLE OF DATA

SITE #20 - 2

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
9-02-84	10	90	-2	Bare	-
8-03-84	15	200	-2	Bare	-
16-04-84	5	040	8	Bare	-
14-6-84	5	045	10	Bare	-

TABLE OF DATA

SITE #PW1 PINWARE RIVER

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	10	300	-6	Bare	-

TABLE OF DATA

SITE #PW2 PINWARE RIVER

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	10	290	-6	Bare	-

TABLE OF DATA

SITE #PW3 PINWARE RIVER

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	5	300	-6	Bare	-

TABLE OF DATA

SITE #PW4 PINWARE RIVER

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. OC	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
8-03-84	5	290	-6	Bare	-