REFERENCE 4

NEWFOUNDLAND AND LABRADOR HYDRO

REPORT ON
1979/80 CLIMATOLOGICAL MONITORING PROGRAM

YEAR 3

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

DATE: 1980 August

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1.0 SUMMARY

The third annual climatological study conducted by Newfoundland and Labrador Hydro concluded on May 31, 1980.

The Passive Ice Meter and Rosemount Ice Detector programs were re-instituted without change on a seasonal basis from October 15, 1979 to May 15, 1980.

The year-round Anemometer, Salt Corrision and Salt Contamination programs were continued without change for the whole year.

All Test Tower Sites were visited between November 1979 and April 1980, including an additional seven sites; four in the Pinware River Valley, two on the proposed Parsons Pond Route and one on the Inner Pond Route.

A new program of three Test Spans was designed by SNC-Lavalin and installed by Hydro. One Test Span was fully instrumented during the Winter of 1979/80.

This report summarizes the data collected during the study period and recommends that a complete review of the climatological study for the last three years be conducted to provide direction for the upcoming year's program. Hence, this report will serve as an interim report, with the final report expected to be completed by the end of October.

2.0 OBJECTIVES

1. To outline the climatological program undertaken during the observation period ~~May~~ JUNE 1979 to May 1980 under Work Order Number 9701 and Work Order Number 9718.

2. To outline, in detail, new additions and expansions of the climatological program.

3. To summarize the data collected during the 1979/80 observation season.

4. To outline the Test Span Program.

4.3 ROSEMOUNT ICE DETECTOR

The Rosemount Ice Detectors at 4 Mile Pond, Sunnyside and Yankee Point were in service from October 15, 1979 to May 15, 1980.

The detector units have developed some problems during previous seasons but the purchase of a spare unit has allowed for only minor outages throughout this season. The Rosemount manufacturers have been made aware of our discontent with the realiability of the units and have committed themselves to sending a representative to check out the system before the next season.

Some problems were encountered with the Leeds & Northrup recorders used at 4 Mile Pond and Yankee Point due to the lack of a proper maintenance schedule. These units have now been replaced by much less complex recorders which are basically maintenance free.

Nfld. Telephone, through their consultant Shawmont, have expressed great interest in using the Rosemount Detector at 4 Mile Pond as part of the monitoring system associated with their wind generator. It is possible Nfld. Telephone may agree to install a remote recording unit at the Hydro office in exchange for access to the collected data.

The availability of remote monitoring for the Rosemount would be invaluable in any attempts to establish a correlation between the Rosemount recorded icing information and actual measured ice accumulation. To date any observations have been on a "hit or miss" basis since the site is only visited once every two weeks and the odds of observing a storm in progress are very small. However, remote monitoring would provide warning of icing storms and the necessary steps could be taken to collect the required data.

Data collected from the three Rosemount sites is tabulated in Appendix III - Summary of Rosemount Ice Detector Data.

4.4 TEST TOWER SITES

As recommended in the "Report on 1978/1979 Weather Study" additional Test Tower sites were added to the monitoring program prior to the 1979/80 season making the total number of sites now being observed twenty-two (22). Four additional towers, PW1, PW2, PW3, & PW4, were established in Southern Labrador along what has become known as the Pinware River Valley Alternative, one tower at Site #2c, one tower at Site #13 and one tower at Site #14. See Map III Climatological Monitoring Sites.

Sites 4 and 4a along the original HVDC route have been observed to be subjected to large deposits of ice, however the Pinware River Valley route because of its shelter from onshore winds and considerably lower elevations was considered to be less susceptible to heavy icing. As suspected, during the first year of monitoring the four sites along this alternative, only minor deposits of glaze were observed at some sites while others remained ice free, again sites 4 and 4a had large accumulations of ice. Hence, the Pinware River Valley routing would vastly improve the confidence level in the HVDC line routing in Southern Labrador. (see photos page 49)

Sites #5, 8, and 11 along the eastern side of the Great Northern Peninsula, again this year, had large accumulations of ice.

As in the previous year Site 2a received less accumulations than Sites 2 and 2b. Site 2, as in the past, received the most accumulations of ice. The new site #2c, farther inland and at a higher elevation received very little accumulations. This trend would indicate that as the distance from the coastal environment increases a sharp decrease in the amount of icing will occur. (see photos page 50)

Sites #13 and #14, two of the new additions to the monitoring program, are located along the Parsons Pond Alternative. Site #14 was located at 1850+ elevation and at the point on the route most exposed to onshore, westerly, winds. In January 1980 1½" of hard rime was observed

4.4 TEST TOWER SITES (CONT'D)

here and in February 1980 9"-12" of soft rime was observed at the 5' level of the tower with the tower totally encased at the top; both of these rime icing storms occurred from the west. In March 1980 a third accumulation occurred from the east which deposited 3" of glaze on the tower. These observations were similar to those noted at Site #2. Site #13 which is located further inland and at 1550+ elevation and sheltered from the westerly winds received no noticeable deposits. (see photos page 51)

Data collected from the twenty-two sites is tabulated in Appendix IV- Summary of Test Tower Data.

4.5 SALT CONTAMINATION

The Salt Contamination Program was continued throughout the season, May 15, 1979 to May 15, 1980, and during that time insulator collection, washing and contaminate level analysis was completed every two weeks.

The insulators from the two sites in Labrador were collected by Hydro linemen upon request by the monitor who was responsible for the washing and analysis. However, the personnel were not always available when required and during the winter months the sites were only accessible by snomobile, consequently, the continuity of reporting was erratic and in late winter the program was terminated.

The program on the Great Northern Peninsula, which encompasses eleven sites, has been very successful. Here the collection and washing was conducted on a scheduled basis by monitors who are on contract to Hydro for the supply of such services.

Data collected from the Sallys Cove - Green Point and Daniels Harbour sites during 1979 collection program is tabulated in Appendix V - Summary of Salt Contamination Data.

4.5 SALT CONTAMINATION (CONT'D)

To date most of the data collected is in the raw form and is in the process of being integrated into a computer program for analysis.

This information is not expected to be available until the late fall of 1980.

4.6 SALT CORROSION

The "Report on 1978/79 Climatological Monitoring Program" presented the data from the Alcan "CLIMAT" units from March 1979 to May 1979, the data presented in Appendix VI completes one full year of data collection.

Exposed units were replaced with new units at the end of every three months and the exposed units were returned to Alcan for analysis. Alcan's Reports included Atmospheric Corrosion Index (A.C.I.) and Marine Corrosion Index (M.C.I.) for each unit and their recommendations for conductor and hardware selection based on the M.C.I.

The data obtained from the latest salt corrosion program confirms the recommendation made by Alcan from previous salt corrosion studies conducted by Teshmont.

The data collected from December 1978 to January 1980 and a copy of Alcan's recommendations is presented in Appendix VI - Summary of Salt Corrosion Data.

4.7 TEST SPANS

Under W.O.# 9703 L.C.D.C. retained Montreal Engineering to submit a proposal for a full scale test span on the Long Range Mountains. This proposal was submitted June 1979. Since the engineering advisors for L.C.D.C were in place by June they were asked to review this proposal for the establishment of a full scale test span in the Long Range

4.7 TEST SPANS (CONT'D)

Mountains on the heavily loaded 28 mile section. The engineering advisors, SNC-Lavalin, in turn proposed 3 small scale single spans be installed on each of three possible routes through the area of concern to determine the actual ice loads and hence the feasibility of their selections. See Map I SNC-Lavalin Route & Test Span Location.

In early winter of 1979 a representative of SNC-Lavalin accompanied Hydro personnel to the area and the test spans were located, one on each of three alternate routes.

The span on the Brians Pond Route was constructed on a well exposed ridge at 1600+ feet of elevation but still well sheltered from any westerly winds. The span on the Inner Pond Route was constructed on the edge of the escarpment just southeast of Sharp Hill at 1850+ feet of elevation and largely exposed to the southwest. The span on the Parsons Pond Route was constructed at 1900+ feet of elevation and is very sheltered from all sides in a deep valley.

The spans consist of two guyed steel towers supporting approximately 40 m of 1192.5 MCM ACSR 54/19 conductor. Load cells have been installed in two guys and recording equipment is housed in wooden shelters heated by propane. (see photo page 52)

During the first winter of operation, December 1979 to May 1980, only the Brians Pond Span was instrumented and the recorded data obtained was forwarded to SNC-Lavalin for their analysis.

The Parsons Pond Test Span location presents a major operational problem as it is buried under excessive amounts of snow for the entire winter. Three feet of snow had accumulated near the towers in early December, by mid January the depth had increased to approximately fifteen feet and during the final visit on May 20, 1980 little change had occurred. These conditions will make it impossible to service equipment and provide ventilation for a heating system housed in a six foot shelter at ground level.

4.7 TEST SPANS (CONT'D)

Consequently if this site is to be used during the coming season it will be necessary to relocate the entire system to a less sheltered area.

The analysis by SNC-Lavalin of the test span data indicates that during the first observation season no significant data was recorded since no heavy ice-wind load occurred.

4.8 ADDITIONAL PROGRAMS

An important design parameter in transmission line design is wind load and in the case of the HVDC line this parameter is very important especially in the Long Range Mountain crossing area. In 1979 the Atmospheric Environment Services were consulted on the availability of a system capable of operating unattended for up to thirty days under extreme climatic conditions. On February 22, 1979 A.E.S. proposed a completely self contained anemometer and temperature recording system available from them, for a purchase price of $3,000 which also included installation and calibration by them. The information retrieval and transportation would be provided by L.C.D.C. while data analysis and reporting would be provided by A.E.S. in exchange for use of the data. This proposal, if accepted, would provide reliable data for an area of great concern to the HVDC line route.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 1979/80 meteorological data collection program has again provided information needed to enhance the transmission line design and routing. The completion of this year's program marks the third year that the program has been in existance.

With the completion of the third year of data collection it is concluded that the data for the last three years should be reviewed and assimilated to establish what kind of patterns, if any, are being established relating to ice, wind and salt contamination. This, in turn, would provide direction for the climatological study in the up coming years.

It is envisaged that the final report will be completed by the end of October 1980.

APPENDIX I

SUMMARY OF PASSIVE ICE METER DATA

SUMMARY OF PASSIVE ICE METER DATA

(1979 - 1980)

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
WABUSH	No Accum.	Trace Glaze - 1 day 0.1 cm Glaze - 1 day	No Accum.	No Accum.	Trace Glaze - 2 days	Trace Glaze - 2 days	Trace Rime - 1 day	No Accum.
Churchill Falls	0.2 - 0.5 cm Glaze - 2 days	0.3 - 1.0 cm Glaze - 4 days	Trace Glaze - 3 days	No Accum.	No Accum.	Trace Glaze - 2 days	No Accum.	No Accum.
Goose Bay	No Accum.	0.2 - 0.5 cm Glaze - 4 days	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.
Point Amour	No Accum.	8.4 cm Wet Snow - 1 day	1.3 cm Glaze - 1 day	No Accum.	No Accum.	-	-	No Accum.
St. Anthony	-	-	Trace Glaze - 2 days	Trace Glaze - 2 days	Trace Glaze - 1 day	No Accum.	-	No Accum.
Yankee Point	No Accum.	No Accum.	0.6 - 1.3 cm Wet Snow - 2 days	No Accum.	0.6 - 1.3 cm Wet Snow - 2 days	No Accum.	0.6 cm Wet Snow - 1 day	No Accum.
Plum Point	No Accum.	No Accum.	0.4 cm Rime - 1 day	Trace - 0.5 cm Rime - 3 days	No Accum.	Trace - 0.2 cm Glaze - 2 days	0.2 cm Glaze & Rime - 1 day	No Accum.
Hawkes Bay	No Accum.	No Accum.	No Accum.	1.6 cm Glaze - 1 day	No Accum.	0.3 cm Glaze - 1 day	No Accum.	No Accum.
Daniels's Harbour	No Accum.	No Accum.	No Accum.	Trace Glaze - 1 day	Trace Glaze - 1 day	No Accum.	No Accum.	No. Accum.
Gros Morne National Park	No Accum.	Trace Rime - 1 day 0.25 cm Glaze - day	Trace Glaze - 2 days	Trace Glaze - 2 days	-	0.9 cm Rime - 1 day 1.0 cm Glaze - 3 days	No Accum.	No Accum.

NOTE: All measurements are diameter.

SUMMARY OF PASSIVE ICE METER DATA

(1979 - 1980)

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
Stephenville	No Accum.	No Accum.	Trace Glaze - 1 day	Trace Glaze - 2 days	-	-	-	No Accum.
Port Aux Basques	No Accum.	No Accum.	Trace Glaze - 2 days	Trace Glaze - 1 day	Trace Glaze - 3 days	-	-	No Accum.
Burnt Pond	No Accum.	No Accum.	No Accum.	0.4 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.	No Accum.
Buchans	No Accum.	0.5 cm Glaze - 2 days	Trace Glaze - 1 day	1.0 cm Glaze - 2 days	0.3 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.
Hampden	No Accum.	No Accum.	No Accum.	Trace - 2 days	No Accum.	Trace - 0.9 cm Glaze - 2 days	No Accum.	No Accum.
Springdale	Trace Glaze - 1 day	No Accum.	No Accum.	No Accum.	No Accum.	3.8 cm Rime - 1 day	No Accum.	No Accum.
Stony Brook	No Accum.	0.2 cm Glaze - 1 day	No Accum.	0.5 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.	No Accum.
Gander Airport	No Accum.	0.1 - 0.2 cm Glaze - 3 days	No Accum.	0.3 - 0.4 cm Glaze - 2 days	Trace Glaze - 2 days	Trace - 0.1 cm Glaze - 2 days	Trace - 0.5 cm Glaze - 4 days	No Accum.
Bay D'Espoir	-	-	No Accum.	No Accum.	-	-	-	No Accum.
Sunnyside	No Accum.	No Accum.	Wet Snow - 2 days	Trace - 2 days	Trace - 1 day	0.2 cm Rime - 1 day	No Accum.	No Accum.
St. Lawrence	-	-	-	Trace - 2.0 cm Glaze - 3 days Wet Snow - 1 day	Trace - 2.1 cm Glaze - 3 days	Trace - 2.0 cm Glaze - 3 days	-	No Accum.

NOTE: All measurements are diameter.

SUMMARY OF PASSIVE ICE METER DATA

(1979 - 1980)

LOCATION	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
"S" Turn	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.	No Accum.	-	No Accum.
Long Harbour						No Accum.	No Accum.	No Accum.
Western Avalon	No Accum.	No Accum.	No Accum.	1.7 cm Glaze - 1 day	0.7 cm Glaze - 1 day	0.3 cm Glaze - 1 day	No Accum.	No Accum.
Holyrood	No Accum.	No Accum.	No Accum.	No Accum.	Trace Glaze - 2 days			No Accum.
St. John's Airport	No Accum.	No Accum.	No Accum.	Trace Rime - 1 day Trace - 1.3 cm Glaze - 1 day	-	-	-	No Accum.
Harbour Deep	No Accum.	No Accum.	No Accum.	No Accum.	-	No Accum.	-	No Accum.
Port Blandford	No Accum.	No Accum.	2.5 cm Wet Snow - 1 day	0.2 cm Glaze - 1 day	No Accum.	No Accum.	No Accum.	No Accum.
Deer Lake	-	-	-	-	-	-	-	-
Baie Verte	-	-	-	-	-	-	-	-

NOTE: All measurements are diameter.

APPENDIX II

SUMMARY OF ANEMOMETER DATA

ABSTRACT OF THE WIND

SUMMARY

SUNNYSIDE

	JUNE 79	JULY 79	AUG. 79	SEPT. 79	OCT. 79	NOV. 79	DEC. 79	JAN. 80	FEB. 80	MAR. 80	APR. 80	MAY 80
Total Mileage for Month	6,864	8,375	6,446	8,454	8,274	7,848	9,076	8,954	7,717	9,114	6,520	7,580
Greatest Mileage in 24 Hrs.	472	653	617	555	648	510	650	677	525	600	386	497
Greatest Mileage & Prevailing Dir. for 1 Hr.	SW-25	SW-35	S-32	S-30	W-30	SW-30	SE-42	SW-35	NW-35	SE-35	NE-25	N-28
Date of Greatest Mileage for 1 Hr.	28th.	6th.	14th.	7th.	9th.	17th.	17th.	25th.	27th.	15th.	27th.	23rd.
Average Speed for Month (mph)	10.6	11.25	9.8	11.7	11.1	10.9	12.2	12.3	11.1	12.3	9.1	10.2
Longest Continued - Direction	SW	SW	SW	SW	SW	SW	SW	SW	W	NE	SW	SW
- Hours	105	139	48	80	39	47	53	95	27	191	51	76
Prevailing Direction - By Mileage	SW		SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
- By Total Hrs.	SW		SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Peak Gust (mph)	SW-36	SW-54	SW-56	SW-59	S-65	SW-48	S-71	E-56	NW-49	SE-49	NE-42	N-46

NOTE: Instrument records in imperial units.

ABSTRACT OF THE WIND

SUMMARY

HAWKES BAY

	JUNE 79	JULY 79	AUG. 79	SEPT. 79	OCT. 79	NOV. 79	DEC. 79	JAN. 80	FEB. 80	MAR. 80	APR. 80	MAY 80
Total Mileage for Month	8,890	8,959	11,135	14,530	9,257	8,818	10,990	11,737	7,997	10,670	9,041	9,870
Greatest Mileage in 24 Hrs.	663	518	987	981	781	680	758	750	794	856	518	664
Greatest Mileage & Prevailing Dir. for 1 Hr.	SW-51	SW-38	SW-58	SW-60	W-38	NW-38	E-44	E-50	NE-50	NE-50	SE-36	SW-40
Date of Greatest Mileage for 1 Hr.	11th.	27th.	14th.	16th.	9th.	19th.	27th.	24th.	17th.	12th.	23rd.	21st.
Average Speed for Month (mph)	16.8	14.9	15.3	20.9	12.6	12.2	14.8	16.3	11.5	14.3	12.6	13.4
Longest Continued - Direction	SW	SW	SW	SW	SW	NW	E	W	W	NE	E	E
- Hours	39	50	31	39	39	49	66	47	23	88	40	67
Prevailing Direction - By Mileage	SW	SW	SW	SW	W	NW	W	W	W	SW	E	E
- By Total Hrs.	SW	SW	SW	SW	W	NW	E	W	W	SW	E	E
Peak Gust (mph)	SW-51	SW-38	SW-60	SW-60	NW-46	NW-47	NW-49	E-60	NE-63	SE-64	SE-50	SW-51

NOTE: Instrument records in imperial units.

ABSTRACT OF THE WIND

SUMMARY

YANKEE POINT

	JUNE 79	JULY 79	AUG. 79	SEPT. 79	OCT. 79	NOV. 79	DEC. 79	JAN. 80	FEB. 80	MAR. 80	APR. 80	MAY 80
Total Mileage for Month	5,983	5,032	5,661	7,110	6,187	*	*	8,209	*	*	**	**
Greatest Mileage in 24 Hrs.	483	336	612	518	675			602				
Greatest Mileage & Prevailing Dir. for 1 Hr.	NE-25	SW-24	W-31	NE-31	E-37			SE-39				
Date of Greatest Mileage for 1 Hr.	28th	26th	14th	12th	9th			12th				
Average Speed for Month (mph)	10.2	8.0	9.5	12.5	11.7			14.2				
Longest Continued - Direction	NE	E	SW	NW	W			W				
- Hours	52	40	36	32	27			48				
Prevailing Direction - By Mileage	SW	SW	SW	SW	W			W				
- By Total Hrs.	SW	SW	NE	SW	W			E				
Peak Gust (mph)	NE-43	NE-43	NE-55	NW-50	E-53	S-48	NE-59	E-63	NE-59	SE-61		

* Equipment failure ** Not available at time of report
NOTE: Instrument records in imperial units.

ABSTRACT OF THE WIND

SUMMARY

4-MILE POND

	JUNE 79	JULY 79	AUG. 79	SEPT. 79	OCT. 79	NOV. 79	DEC. 79	JAN. 80	FEB. 80	MAR. 80	APR. 80	MAY 80
Total Mileage for Month	10,636	*	*	15,139	14,234	15,255	13,590	15,017	14,001	17,384	12,219	11,902
Greatest Mileage in 24 Hrs.	768			974	957	938	832	917	957	1,116	747	804
Greatest Mileage & Prevailing Dir. for 1 Hr.	S-44			SW-58	S-71	W-56	S-70	S-65	NE-59	NE-54	SE-52	S-40
Date of Greatest Mileage for 1 Hr.	6th			14th	25th	17th	7th	8th	11th	24th	5th	10th
Average Speed for Month (mph)	18.6	21.6	17.4	21.0	20.2	21.2	21.4	20.2	20.3	24.2	17.0	17.1
Longest Continued - Direction	SW			S	W	W	S	SW	W	N	E	E
- Hours	49			40	46	62	72	114	43	58	136	94
Prevailing Direction - By Mileage	SW			W	S	W	W	SW	SW	SW	E	
- By Total Hrs.	SW			W	W	W	W	SW	SW	SW	E	N&SW
Peak Gust (mph)	S-30	W-75	SW-50	SW-78	S-93	W-76	SW-104	S-87	NE-82	E-74	SE-67	SE-56

* Equipment Failure

NOTE: Instrument records in imperial units.

APPENDIX III

SUMMARY OF ROSEMOUNT ICE DETECTOR DATA

ROSEMOUNT ICE DETECTOR

4-MILE POND

DATE	TIME	NO. OF ICING SIGNALS	CALCULATED ACCUMULATION (MILLIMETRES)
November 27/79	3:48 p.m.-5:12 p.m.	7	3.6
November 28/79	2:58 p.m.	1	0.5
November 29/79	7:44 a.m.	1	0.5
December 06/79	12:24 a.m.-2:10 a.m.	4	2.0
December 09/79	7:05 a.m.-7:13 a.m.	2	1.0
December 09/79	11:38 a.m.-12:06	3	1.5
December 11/79	2:07 p.m.	1	0.5
December 12/79	3:20 p.m.-8:13 p.m.	24	12.2
December 25/79	3:04 p.m.-7:19 p.m.	4	2.0
December 26/79	6:30 a.m.-8:05 a.m.	2	1.0
December 26/79	9:30 p.m.		
December 27/79	-11:06 a.m.	34	17.3
December 30/79	4:04 p.m.-6:58 p.m.	3	1.5
December 31/79	2:30 p.m.	1	0.5
December 31/79	5:14 p.m.-6:40 p.m.	3	1.5
January 1/80	2:41 a.m.	1	0.5
January 3/80	12:54 p.m.-8:22 p.m.	67	34.0
January 4/80	7:05 a.m.-7:53 a.m.	7	3.6
January 12/80	11:51 p.m.		
January 13/80	-5:48 a.m.	56	28.4
January 15/80	3:55 p.m.		
January 16/80	-4:17 a.m.	30	15.2
January 17/80	11:24 a.m.	1	0.5
January 17/80	12:48 p.m.	1	0.5
January 17/80	7:08 p.m.-10:30 p.m.	5	2.5
January 18/80	6:08 a.m.-10:42 a.m.	27	13.7
January 18/80	5:48 p.m.	1	0.5

ROSEMOUNT ICE DETECTOR

4-MILE POND (CONT'D)

DATE	TIME	NO. OF ICING SIGNALS	CALCULATED ACCUMULATION (MILLIMETRES)
January 19/80	1:00 a.m.-9:13 p.m.	98	49.8
January 20/80	8:10 a.m.-11:10 a.m.	11	5.6
January 24/80	8:58 a.m.-2:56 p.m.	73	37.1
January 30/80	1:24 a.m.	1	0.5
February 04/80	8:09 a.m.-8:19 a.m.	2	1.0
February 05/80	11:35 p.m.		
February 06/80	-7:53 a.m.	13	6.6
February 07/80	8:27 p.m.	1	0.5
February 11/80	6:08 p.m.	1	0.5
February 14/80	11:00 p.m.		
February 15/80	-7:55 a.m.	7	3.6
February 15/80	7:42 p.m.	1	0.5
February 17/80	2:24 a.m.-8:55 a.m.	44	22.4
February 17/80	10:12 p.m.-11:48 p.m.	5	2.5
February 20/80	11:20 p.m.		
February 21/80	-2:30 a.m.	7	3.6
February 21/80	6:10 p.m.-10:32 p.m.	4	2.0
February 23/80	10:20 p.m.-11:38 p.m.	17	8.6
February 24/80	2:52 a.m.-7:28 a.m.	14	7.1
February 26/80	10:12 a.m.	1	0.5
February 26/80	3:36 p.m.		
February 27/80	-11:48 a.m.	141	71.6
February 28/80	4:45 p.m.-6:08 p.m.	25	12.7
February 29/80	3:05 p.m.-5:03 p.m.	31	15.7
March 03/80	6:28 a.m.-9:30 a.m.	6	3.0
March 04/80	5:05 p.m.	1	0.5
March 04/80	7:50 p.m.	1	0.5

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ROSEMOUNT ICE DETECTOR

4-MILE POND (CONT'D)

DATE	TIME	NO. OF ICING SIGNALS	CALCULATED ACCUMULATION (MILLIMETRES)
March 05/80	9:12 p.m.-9:30 p.m.	2	1.0
March 06/80	4:35 p.m.-8:15 a.m.	25	12.7
March 17/80	2:30 p.m.	1	0.5
March 17/80	5:00 p.m.-5:36 p.m.	2	1.0
March 17/80	7:18 p.m.	1	0.5
March 17/80	10:55 p.m.	1	0.5
March 20/80	8:07 a.m.	1	0.5
March 20/80	7:03 p.m.-5:55 p.m.	4	2.0
March 21/80	9:36 p.m.		
March 22/80	-7:00 a.m.	45	22.9
March 22/80	2:50 p.m.	1	0.5
March 27/80	5:11 p.m.-11:12 p.m.	19	9.7
March 28/80	12:25 a.m.	1	0.5
April 4/80	1:06 p.m.-3:13 p.m.	3	1.5
April 5/80	7:36 p.m.-12:18 p.m.	25	12.7
April 9/80	6:40 a.m.-7:36 a.m.	3	1.5
April 12/80	12:12 a.m.-8:24 a.m.	80	40.6
April 13/80	12:30 a.m.-5:05 a.m.	4	2.0
April 14/80	12:05 a.m.-7:24 a.m.	26	13.2
April 14/80	10:23 a.m.- Noon	13	6.6
April 30/80	11:00 p.m.		
May 1/80	-3:55 a.m.	13	6.6
May11/80	7:05 a.m.	1	0.5

NOTE: Calculated Accumulation = number of icing signals X 0.02" X 25.4
Probe calibrated to detect 0.02" of ice.

ROSEMOUNT ICE DETECTOR

SUNNYSIDE

DATE	TIME	NO. OF ICING SIGNALS	CALCULATED ACCUMULATION (MILLIMETRES)
January 18/80	9:07 p.m.		
January 19/80	- 1:30 a.m.	3	1.5
January 19/80	6:32 p.m.	1	0.5
January 20/80	1:50 a.m.- 3:50 a.m.	6	3.0
April 4/80	4:08 p.m.- 7:33 p.m.	6	3.0
April 17/80	12:42 p.m.	1	0.5
April 19/80	7:15 a.m.	1	0.5

NOTE: Calculated Accumulation = number of icing signals X 0.02" X25.4.
Probe calibrated to detect 0.02" of ice.

ROSEMOUNT ICE DETECTOR

YANKEE POINT

DATE	TIME	NO. OF ICING SIGNALS	CALCULATED ACCUMULATION (MILLIMETRES)
December 11/79	3:40 a.m.	1	0.5
December 16/79	6:24 a.m.	1	0.5
December 16/79	11:26 a.m.	1	0.5
December 19/79	6:13 a.m.- 7:00 p.m.	2	1.0
December 28/79	10:20 p.m.		
December 29/79	- 4:10 a.m.	6	3.0
December 29/79	10:48 p.m.		
December 30/79	- 1:36 a.m.	10	5.1
December 30/79	12:48 p.m.- 4:48 p.m.	5	2.5
January 24/80	6:50 a.m.- 5:20 p.m.	30	15.2
January 24/80	7:20 p.m.	1	0.5
January 24/80	8:58 p.m.	1	0.5
February 1/80	9:47 a.m.-11:04 a.m.	4	2.0

NOTE: Calibrated Accumulation = number of icing signals X 0.02" X 25.4

Probe calibrated to detech 0.02" of ice.

APPENDIX IV

SUMMARY OF TEST TOWER DATA

TABLE OF DATA

SITE # 1 - Sheffield Lake

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-03-29	-	-	0	Large pennants of hard rime up to 6" at tower base and 10"-12" at tower top.	30^{o} NE

TABLE OF DATA

SITE #2 - Portland Creek

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
79-12-20	35-40	270^{o} West	-15	Large deposits of hard rime on tower and guys. 6"-8" pennants on tower top, 8"-10" pennants on rods, 6" pennants on lower end of guy.	270^{o} West
80-1-16	-	-	-15	Large deposits of soft rime on tower and guys. 9" pennants on lower tower leg, 15" pennantson rods and 6" pennants on guy consisting of hard and soft rime.	225^{o} SW
80-2-11	21-23	60^{o} NE	-12	Hugh deposits of soft rime. Tower completely encased and deposit measuring 3' across at eye level and 4½' at tower top. 1½' to 2' wing shaped formation on rods.	270^{o} West
80-3-29	-	-	-4	Trace of glaze on lower tower leg.	30^{o} NE
80-4-16	23	180^{o} South	+8	Bare	-

TABLE OF DATA

SITE #2a Portland Creek

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-16	14	270° West	-16	Small ½" pennant of hard rime on tower leg and approx. 1" pennant of soft rime on guys.	225° SW
80-2-11	5-7	60° NE	-13	6"-8" of soft rime clinging to tower top.	315° NW
80-3-29	-	-	-3	Tower bare - some signs of glaze on ground.	30° NE
80-4-20	18	150° SE	-2	Approx. 1" of hard rime at tower top.	280° West

TABLE OF DATA

SITE #2b - Portland Creek

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
79-12-20	29-35	270° West	-15	Some Pennants of hard rime on guys measuring 1" at lower end and approx. 3" at top.	270° West
80-1-16	12-16	218° SW	-16	5" - 6" of hard rime on bottom of tower and 10" at top all covered by soft rime. 6"-8" pennants on guys.	225° SW
80-2-11	12-14	60° NE	-13	Tower completely encased in a hugh deposit of soft rime. 1½' across at 5' level of tower and 2' - 2½' across at top.	270° West
80-3-29	-	-	-3	Large deposit of rime ice in 10" to 12" pennants at tower top.	60° NE
80-4-16	21-25	180° South	+5	Bare.	-

TABLE OF DATA

SITE #2c - Portland Creek

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-16	9	270^{o} West	-14	Hard rime 1¼" thick on tower leg and ½" pennant on guy.	225^{o} SW
80-2-11	16-21	60^{o} NE	-13	Tower Bare	
80-3-29	-	-	-3	Tower Bare	
80-4-20	18	150^{o} SE	+2	Tower Bare	

TABLE OF DATA

SITE #3 - Hills of St.John

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	30-32	270^{o} West	-19	1" of hard rime on tower leg covered by 1" of glaze, leading edge 1½" across. 1" pennant of glaze rime on guy.	90^{o} East
80-2-12	35-46	250^{o} West	-13	Some signs of glaze on tower. Samples measured 1 3/4" across.	70^{o} East
80-3-27	-	10^{o} North	-3	Hard rime pennants 5" deep and 1½" across leading edge formed on tower leg. Approximately 2" diameter rime on guy.	45^{o} NE

TABLE OF DATA

SITE #4 L'Anse Au Loup

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	39-44	270° West	-25	Large deposits of hard rime on tower leg 6" thick by 6" wide. Hard rime pennants on guy 5"X1". Tower top almost encased.	90° East
80-2-12	35	315° NW	-13	Hugh deposits of glaze covered by soft rime. Deposits on guy 7"-8" across by 10" deep. Tower almost encased.	135° SE
80-3-27	-	10° North	-3	Large deposit of rime measuring up to 6" across at lower end of tower. Tower almost encased.	10° North

TABLE OF DATA

SITE #4a L'Anse Au Loup

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	29-32	300^{o} NW	-25	Tower bare. 1" glaze pennants on guy.	90^{o} East
80-2-12	28-32	315^{o} NW	-12	Tower uniformly covered by glaze 2½" thick and 3½" across and overlaid by soft rime. Both glaze and rime on guy.	135^{o} SE
80-3-27	-	10^{o} North	-3	Tower Bare.	10^{o} North

TABLE OF DATA

SITE #5 Little Harbour Deep

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-17	7	330° NW	-5	Tower bare at time of visit. Samples measured 2½" across by 1" thick.	90° East
80-2-15	25	270° West	-8	Tower Bare.	-
80-3-27	-	30° NE	-2	Large deposits of glaze pennants 6" deep on 5' level of tower leg.	90° East

TABLE OF DATA

SITE #6 East of Blue Mountain

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	-	270° West	-18	Two deposits of hard rime from the west and the east. Total deposit on tower leg 7" wide with leading edge 2" across. Rime on guy 4" wide and 1½" across at leading edge.	270° West 90° East
80-2-12	-	270° West	-14	Two deposits observed, glaze from the east and rime from NW. Glaze 2" across and 3/4" thick. Rime 4" thick.	90° East 315° NW
80-3-27	-	330°	-4	Hard rime 2" thick on tower leg and approx. 1½" across leading edge.	45° NE
80-4-16	23-27	180° South	+6	Bare.	

TABLE OF DATA

SITE #7 Torrent River - Hawkes Bay

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	32-35	270^{o} West	-19	Large deposits of hard rime 6"-7" deep and 3" across leading edge. Pennants on guy $2\frac{1}{2}$" X 2".	280^{o} West
80-2-12	32-46	270^{o} West	-13	Soft rime on leg of tower ranging from 2" to 6" thick.	280^{o} West
80-3-27	-	330^{o} NW	-2	Tower bare but some signs of slight glaze deposits.	-
80-4-16	18-20	180^{o} South	+9	Tower Bare.	

TABLE OF DATA

SITE #8 Hooping Harbour

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-17	0-6	-	-5	Tower primarily bare. Samples on ground 3" across by 1" thick.	60^{o} NE
80-2-15	28-30	315^{o} NW	-7	Glaze deposits 1½" thick by 2¼" across on tower leg. Pennant on guy 3/4" thick.	45^{o} NE
80-3-27	-	45^{o} NE	-2	Glaze on tower leg up to 2" thick by 1" across leading edge.	45^{o} NE

TABLE OF DATA

SITE #9 28 Mile Section

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-9	25	270°	-10	Hard rime 1" thick on tower leg (west face). Glaze 12" thick and covered by 1" snow on tower leg (east face). Both deposits on guy about 3" wide and ½" thick.	270° West 90° East
80-2-11	9-13	30° NE	-13	Bare	
80-3-27	calm	-	-2	Glaze on tower leg 2½" deep and 2" across leading edge. ¼" pennant on guy.	60° NE
80-4-19	5-7	225° SW	-2	Bare	

TABLE OF DATA

SITE #10 Main River

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-9	12-14	270^{o} West	-7	Tower Bare	-
80-2-11	Calm	-	-10	Tower Bare	-
80-3-27	Calm	-	-2	Tower Bare	-
80-4-19	2-4	225^{o} SW	0	Tower Bare	-

TABLE OF DATA

SITE #11 Cat Arm

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-17	-	-	+1	Large deposits of glaze observed on ground. Samples 3" across and 1½" thick.	45° NE
80-2-15	32-40	270° West	-8	Tower Bare	-
80-3-29	-	-	-1	Hugh pennants of hard rime on tower and bushes. Deposits 15" deep on tower and 18" deep on bushes.	60° NE

TABLE OF DATA

SITE #13 Parsons Pond

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-17	-	-	0	Tower Bare	-
80-2-11	7-9	30° NE	-12	Tower Bare	-
80-3-27	Calm	-	-3	Tower Bare	-
80-4-19	2-5	225° SW	-10	Tower Bare	-

TABLE OF DATA

SITE #14 Parsons Pond

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-16	23	270° West	-14	1½" pennant of hard rime on tower leg.	270° West
80-2-11	21-28	90°	-14	Hugh deposits of soft rime 9" - 12" across at 5' level of tower and increasing towards tower top.	270° West
80-3-27	-	270° West	-4	Glaze pennants 3" deep on tower leg and 2½" across on leading edge.	60° NE

TABLE OF DATA

SITE # PW 1

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	2	270^{o} West	-20	Tower bare. Samples on the ground measured 3/4" X 1.	-
80-2-12	25-28	315^{o} NW	-11	Tower Bare	-
80-3-27	-	350^{o} North	0	Tower Bare	-
80-4-20	12-14	90^{o} East	-1	Tower Bare	-

TABLE OF DATA

SITE # PW 2

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. °C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	28-30	270° West	-22	Traces of glaze. Samples on ground measured 1½" X 1½".	90° East
80-2-12	18-21	315°	-10	Tower bare. Samples on ground measured 1 3/4" X 1.	225° SW
80-3-27	-	350° North	-1	Tower Bare	-
80-4-20	12	90° East	0	Tower Bare	-

TABLE OF DATA

SITE # PW 3

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	35	270° West	-23	Tower Bare	-
80-2-12	32-39	315° NW	-11	Tower bare at time of visit but there were signs of glaze on ground.	225° SW
80-3-27	-	0° North	-2	Tower Bare	-
80-4-20	12	180° South	-2	Tower Bare	-

TABLE OF DATA

SITE # PW 4

DATE	WIND SPEED (MPH)	WIND DIR. (TRUE)	TEMP. ^{o}C	ACCUMULATION NOTED	DIRECTION OF ACCUMULATION
80-1-10	2	300^{o} NW	-24	Bare	-
80-2-12	9-12	315^{o}	-11	Tower bare but samples of glaze on ground measuring 1¼" thick.	135^{o} SE
80-3-27	-	0^{o} North	-2	Bare	-
80-4-20	7	120^{o} SE	-2	Bare	

APPENDIX V

SUMMARY OF SALT CONTAMINATION DATA

SUMMARY OF SALT CONTAMINATION DATA

Salt Deposit Density (mg/cm^2)

	Sally's Cove		Green Point			
	Site 11		Site 10		Site 9	
Date of Washing	Top	Bottom	Top	Bottom	Top	Bottom
3 Jan. 79	0.043	0.030	0.010	0.015	0.009	0.008
17 Jan. 79	0.087	0.075	0.039	0.043	0.020	0.020
31 Jan. 79	0.025	0.029	0.008	0.009	0.006	0.009
15 Feb. 79	0.015	0.028	0.009	0.019	0.007	0.011
5 Mar. 79	0.000	0.001	0.000	0.000	0.000	0.000
15 Mar. 79	0.000	0.005	0.000	0.000	0.000	0.000
25 Apr. 79	0.075	0.070	0.010	0.021	0.008	0.015
9 May 79	0.013	0.052	0.008	0.020	0.006	0.013
14 Jul. 79	0.006	0.027	0.005	0.009	0.003	0.010
28 Jul. 79	0.008	0.027	0.001	0.005	0.001	0.006
11 Aug. 79	0.050	0.080	0.012	0.019	0.005	0.009
25 Aug. 79	0.024	0.051	0.004	0.018	0.004	0.010
8 Sept. 79	0.005	0.017	0.001	0.004	0.001	0.002
22 Sept. 79	0.011	0.069	0.004	0.014	0.002	0.008
Total Avg.	0.033		0.011		0.007	
Distance from Sea	At Seashore		1km		1.4km	

Note: Each washing consists of washing 4 insulators at each site.

Each salt deposit density shown represents the highest of the 4 results which were obtained.

SUMMARY OF SALT CONTAMINATION DATA

Salt Deposit Density (mg/cm^2)

	Daniel's Harbour		Zinc Mine Road							
Date of Washing	Site 4		Site 5		Site 6		Site 7		Site 8	
	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
3 Jan. 79	0.051	0.039	0.006	0.006	0.034	0.009	0.003	0.003	0.007	0.005
17 Jan. 79	0.139	0.080	0.040	0.028	0.015	0.014	0.016	0.012	0.010	0.010
31 Jan. 79	0.011	0.033	0.009	0.018	0.007	0.011	0.007	0.011	0.004	0.005
15 Feb. 79	0.009	0.026	0.008	0.018	0.014	0.020	0.014	0.008	0.006	0.008
5 Mar. 79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15 Mar. 79	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
25 Apr. 79	0.034	0.056	0.007	0.014	0.007	0.009	0.009	0.007	0.006	0.008
9 May 79	0.013	0.037	0.005	0.022	0.004	0.009	0.003	0.006	0.006	0.006
14 Jul. 79	0.003	0.012	0.001	0.010	0.001	0.006	0.001	0.004	0.001	0.004
28 Jul. 79	0.003	0.007	0.001	0.005	0.001	0.002	0.001	0.003	0.001	0.001
11 Aug. 79	0.074	0.046	0.007	0.011	0.003	0.005	0.003	0.004	0.003	0.004
25 Aug. 79	0.035	0.047	0.004	0.019	0.002	0.009	0.002	0.007	0.002	0.008
8 Sept. 79	0.002	0.008	0.001	0.003	0.001	0.002	0.001	0.002	0.000	0.003
22 Sept. 79	0.021	0.038	0.002	0.011	0.001	0.007	0.001	0.004	0.001	0.005
Total Avg.	0.032		0.010		0.008		0.005		0.005	
Distance from Sea	500m		0.5km		1.5km		2.15km		2.5km	

Note: Each washing consists of washing 4 insulators at each site.

Each salt deposit density shown represents the highest of the 4 results which were obtained.

APPENDIX VI

SUMMARY OF SALT CORROSION DATA

CLIMAT - SALT CORROSION DATA

DISTANCE FROM SEA	SITE	DEC. 78 TO MARCH 79		MARCH 79 TO JUNE 79		JUNE 79 TO OCT. 79		OCT. 79 TO JAN. 80	
		A.C.I.	M.C.I.	A.C.I.	M.C.I.	A.C.I.	M.C.I.	A.C.I.	M.C.I.
150 m	1.6 km from Daniels Hr.	0.17	12.8	0.15	12.5	0.11	17.5	0.28	10.9
1.6 km	4.5 km from Daniels Hr.	0.10	3.8	0.06	2.1	0.04	5.0	0.06	4.0
4.0	7 km from Daniels Hr.	0.11	3.1	0.06	4.0	0.04	5.7	0.12	3.9
7.5 km	10.5 km from Daniels Hr.	0.06	1.6	0.04	0.84	0.01	2.9	0.08	2.5
800 m	800 m from Flowers Cove	0.08	3.9	0.06	0.53	0.02	6.7	0.11	4.1
800 m	1.6 km from Sunnyside	0.07	4.6	0.03	3.2	0.03	7.8	0.08	4.6

RECOMMENDATIONS FOR POWER LINES BASED ON CLIMAT DATA

Marine Corrosivity Index	Classification	Significance	General Remarks	Conductors (see Notes)	Line Hardware
<2	Negligible	Average habitable area	No precautions	Use any type of conductor.	Standard galvanized steel hardware is adequate where the galvanizing is 0.001 in. (0.025 mm) thick.
2 - 5	Moderate	Seaside	Guard against galvanic attack	If ACSR, use greased cores.	
5.1-10	Moderately severe	Seaside and exposed	Guard against galvanic attack and moisture in crevices	If ACSR, use greased cores. If all-aluminium construction, or ACSR/AW or ACSR/AZ, and if wire size is below 2.5 mm, use grease on inner wires.	Galvanized steel hardware with galvanized coating of 0.002 in. (0.05 mm) thick should be used.
10.1-20	Severe	Very exposed	Eliminate chance of galvanic attack and crevice attack from moisture in crevices.	Avoid small sizes of ACSR (6/1) and those with only one layer of aluminium wires. Use grease in all conductors. Use wire sizes above 2.5 mm.	Here aluminium or stainless ste hardware should be used, since galvanized steel hardware, even with a galvanized coating of 0.002 in. (0.05 mm) will have a limited life.
>20	Very severe	Wind-swept, sand-swept & very exposed	Same as above, but also allow for some pitting	Avoid using ACSR or ACSR/AZ. Use grease in all conductors. Use wire sizes above 3 mm.	

Note (1): The choice of conductors can be made from:

All-Aluminium Constructions

- ASC Aluminium Stranded Conductor
- AASC Aluminium Alloy Stranded Conductor
- ACAR Aluminium Stranded Conductor, Alloy core.

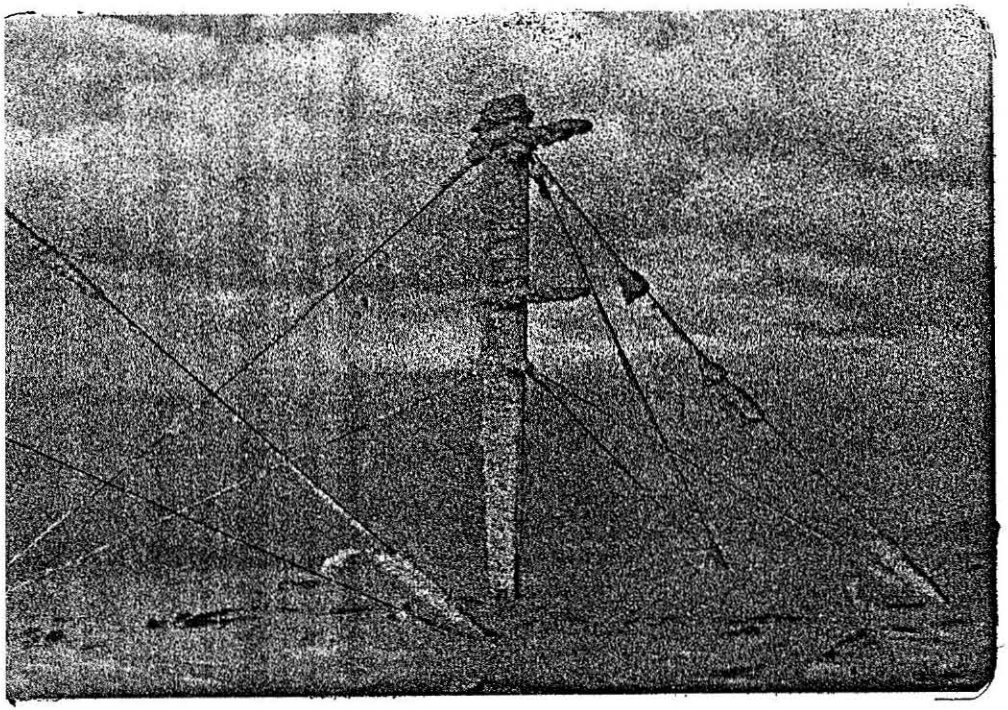
Steel Reinforced Constructions

- ACSR/AW or AWAC Aluminium Conductor, Alumoweld Steel core.
- ACSR/AZ Aluminium Conductor, Aluminized Steel core.
- ACSR Aluminium Conductor, Galvanized Steel core.

Note (2): Two types of grease protection are entailed; fc the "moderate" and "moderately severe" classifi cations only the core wires are greased, but fc the "severe" and "very severe" classifications all interstices in the conductor are filled wi grease.

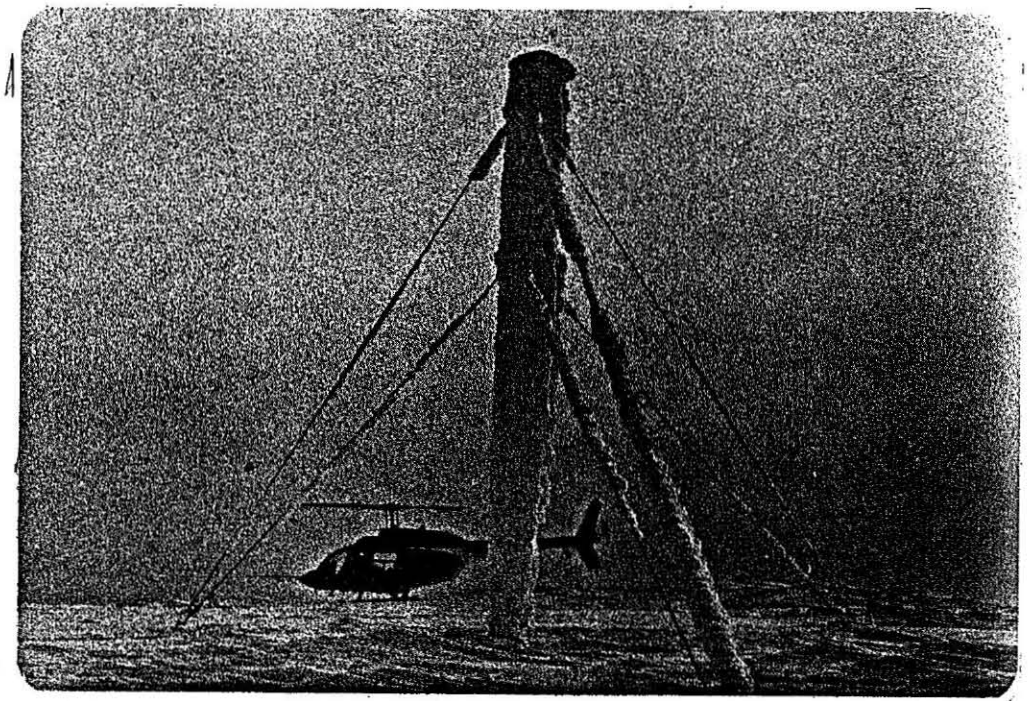
PHOTOGRAPHS

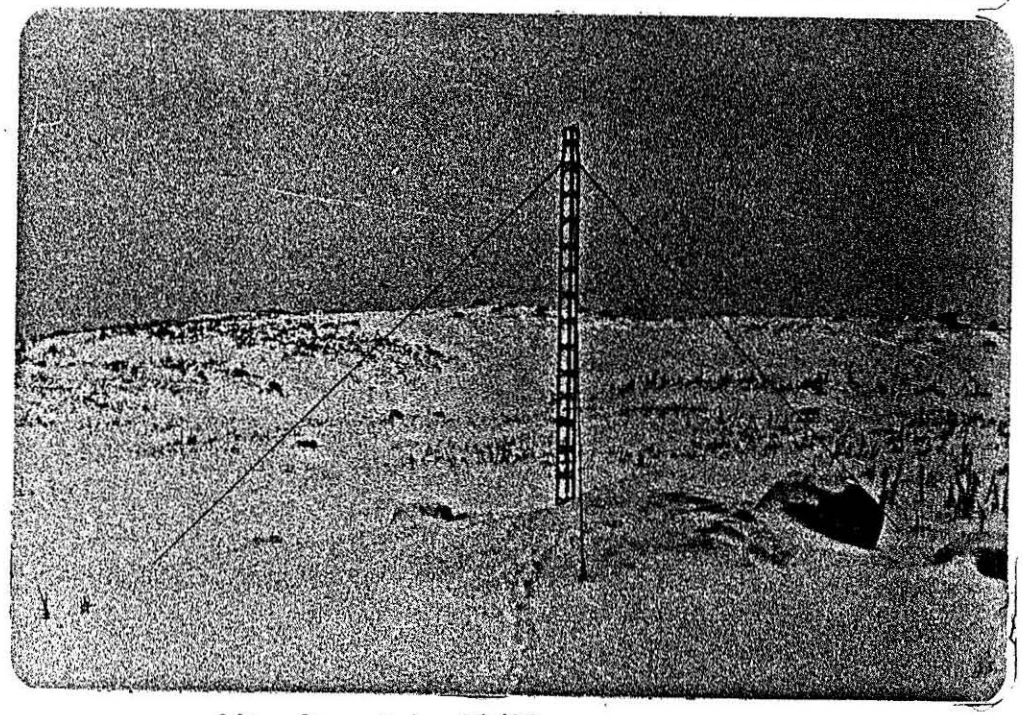
Site 2 Feb. 11/80



Site 2a Feb. 11/80

Site 2b Feb. 11/80





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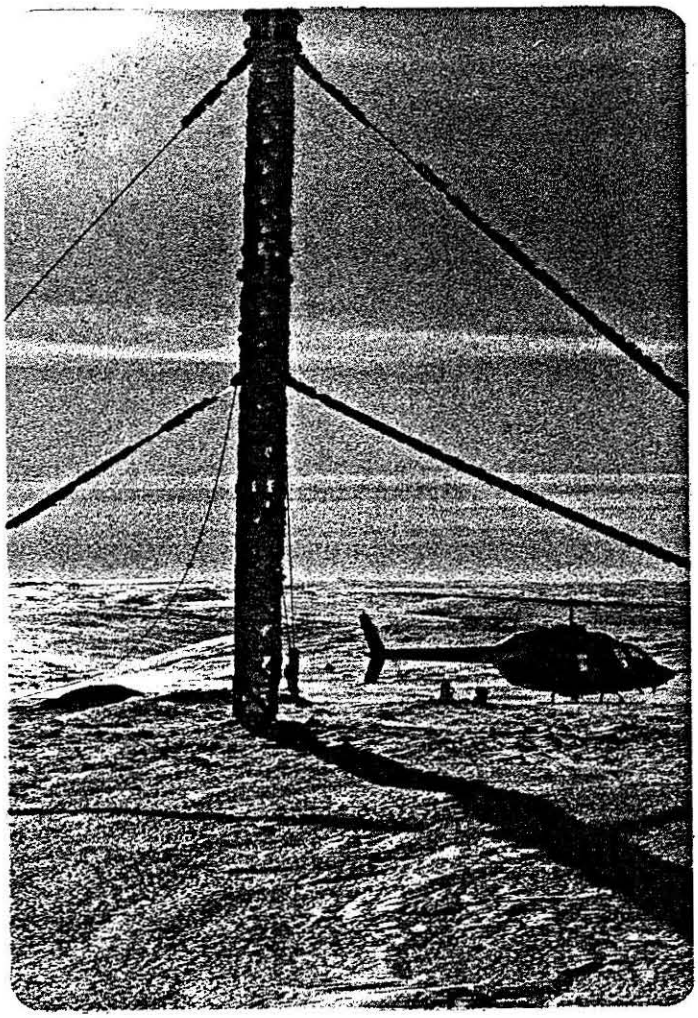
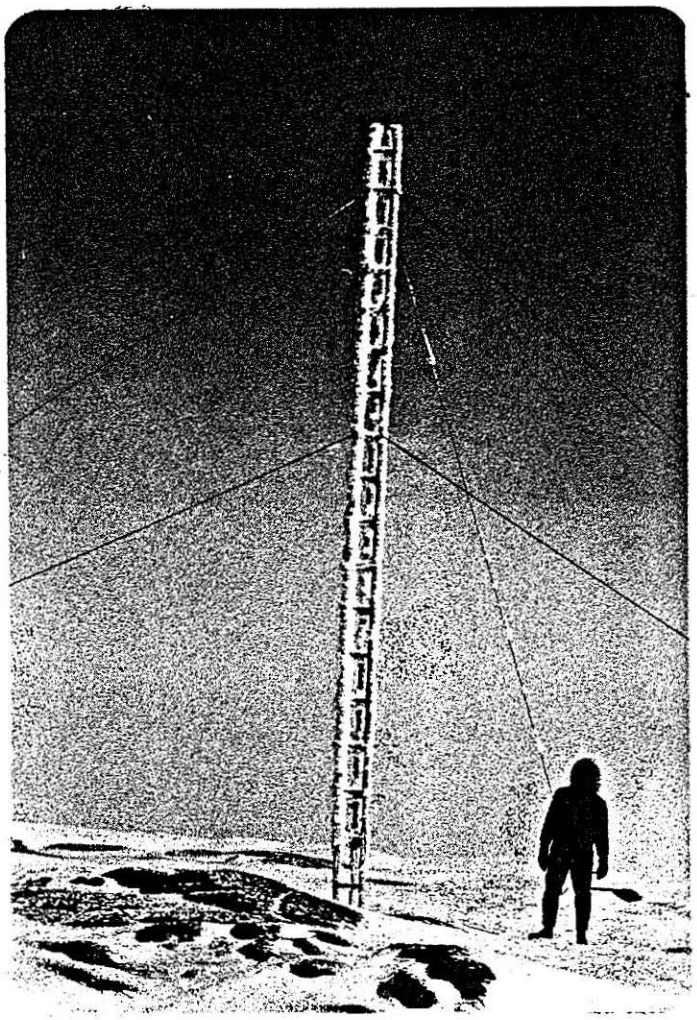
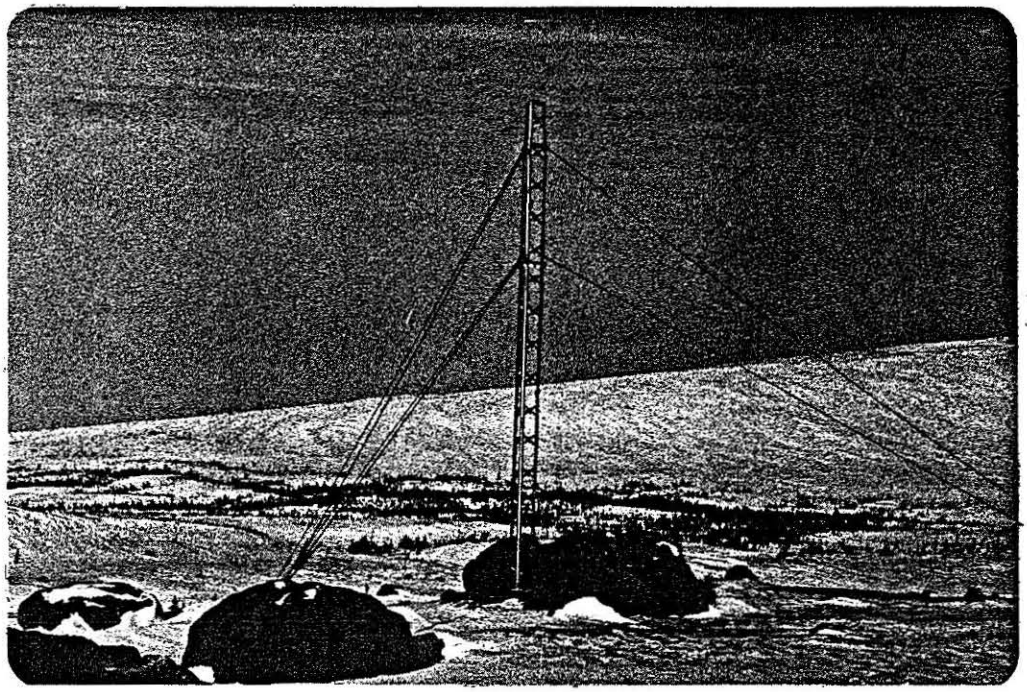


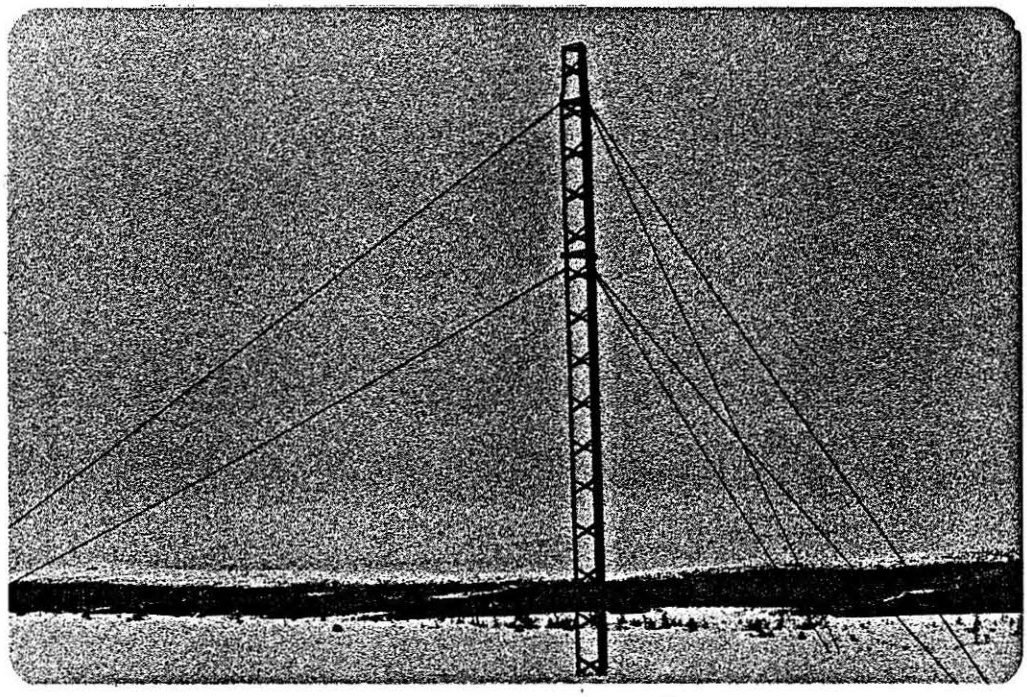
Site 4 Feb. 12/80



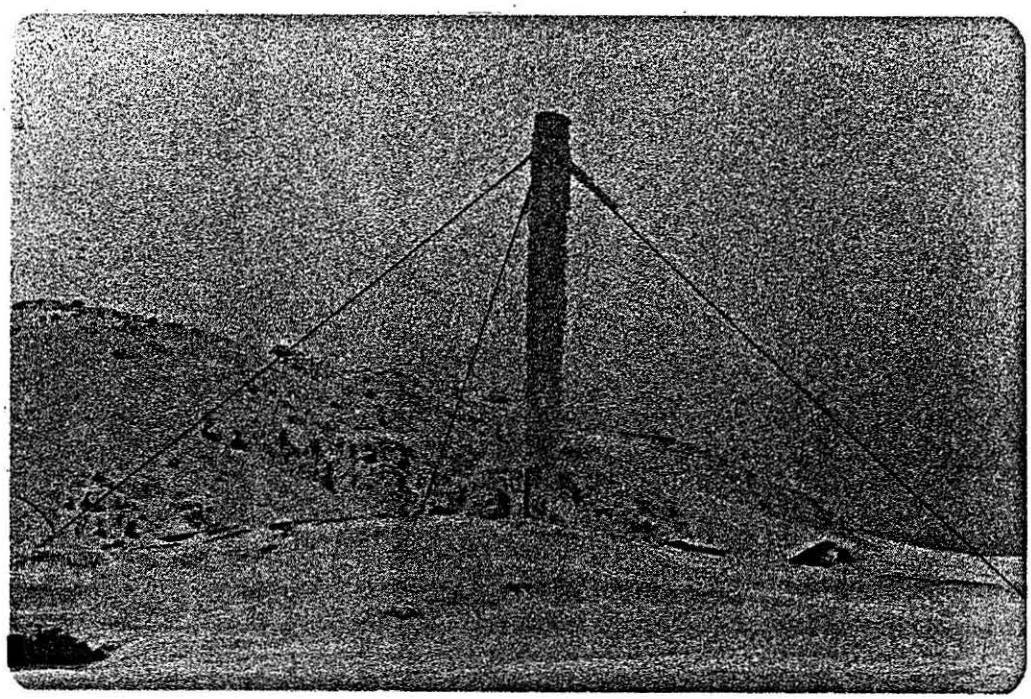
Site 4a Feb. 12/80



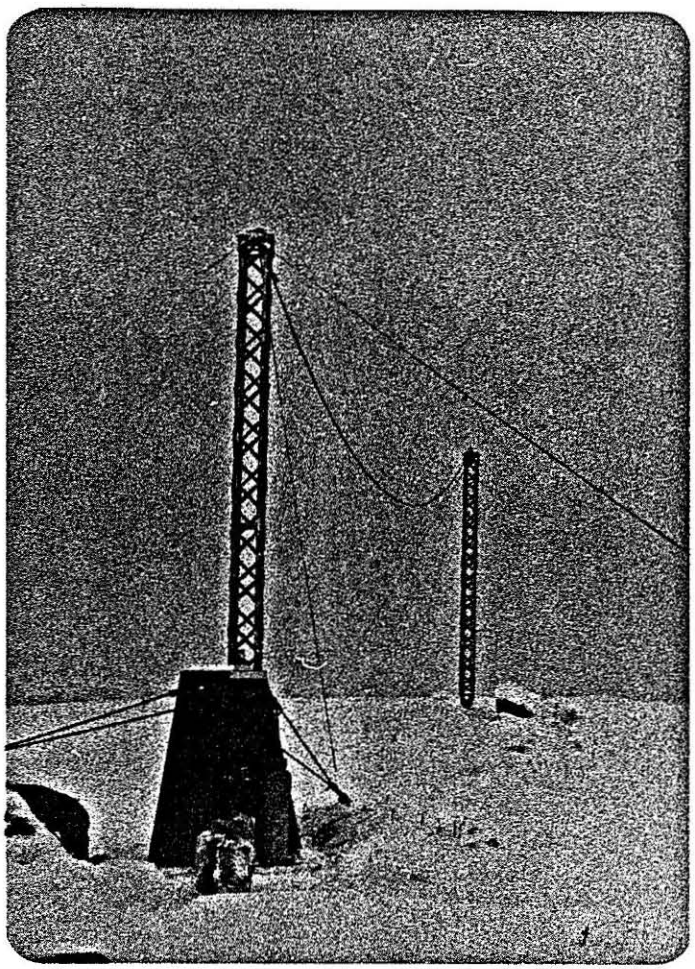
Site PW1 Feb. 12/80



Site 13 Feb. 11/80



Site 14 Feb. 11/80

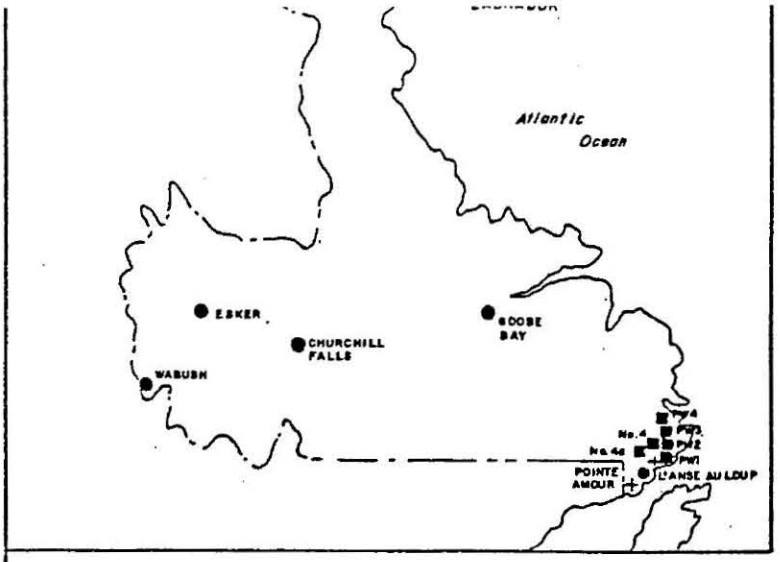


Brian's Pond Test Span

F I G U R E S


BRIAN'S POND ROUTE
BRIAN'S POND TEST SPAN
INNER POND TEST SPAN
INNER POND ROUTE
PARSONS POND ROUTE
ORIGINAL ROUTE
PARSONS POND TEST SPAN
Daniel's Harbour
Portland Creek
Portland Creek Pond
Brian's Pond
Parsons Pond
Inner Pond
SNC LAVALIN ROUTE & TEST SPAN LOCATIONS
MAP No. 1


Daniel's Harbour
Cliffy Point
Portland Creek
Eastern Head
Portland Cove
Portland Creek
Portland Creek Pond
Brian's Pond
Inner Pond
Parsons Pond
BRIAN'S POND TEST SPAN
INNER POND TEST SPAN
PARSONS POND TEST SPAN
No. 2
No 2b
No 2a
No 2c
No.14
No.13
No.8
No.10
GAP ALTERNATIVES AND TEST TOWER SITES
MAP No. 54



LEGEND

- ■ TEST TOWER SITES
- ● PASSIVE ICE METER SITE
- ▲ ROSEMOUNT-ANEMOMETER SITE
- ✱ CLIMAT UNIT LOCATION
- \+ SALT CONTAMINATION TEST

CLIMATOLOGICAL MONITORING SITES MAP No. III