

1978 HUDSON BAY WINTER SURVEY
PROJECT FILE NUMBER 5452-6110

P.V. DAVIES
HYDROGRAPHER-IN-CHARGE



FINAL FIELD REPORT
BELCHER ISLANDS AND SOUTHEAST HUDSON BAY
PROJECT FILE NUMBER 5452-6110

P.V. DAVIES

HYDROGRAPHER-IN-CHARGE

TABLE OF CONTENTS

Page

SUMMARY

LIST OF PERSONNEL

CHRONOLOGY OF EVENTS

CONTRACTORS (a) Terra Surveys (Geoterrex) Data Collection . . .

(b) Marinav Corp. Operation and Maintenance
of 6F Decca Chain

(c) Helicopters - Ministry of Transport
operated and DF & O owned

MAJOR EQUIPMENT

(1) Radios

(2) Sounders

(3) Gravity Meters

(4) Diesel Generators

(5) Major Electronic Equipment

(6) Major Camp Equipment

OPERATIONS - General

- Tide Gauges

- Decca Calibration

SURVEY STATISTICS

HELICOPTER STATISTICS

MAJOR EXPENDITURES

APPENDICES (1) Initial Calibration

(2) Final Calibration

(3) Decca Chain Parameters

(4) 1978 Decca Chain Layout and Survey Area

(5) Decca Green Site and Tide Gauge Location (1:250,000)

(6) Decca Master Site and Tide Gauge Location (1:250,000)

(7) Decca Red Site (1:250,000)

(8) Hudson Bay Decca Lattice Coverage - 1978 - Marinav

(9) Hudson Bay Decca Accuracy Contours (Metres) - Marinav

(10) Sample Daily Monitor Record

(11) Field Report Statistics

SUMMARY

The 1978 Hudson Bay Winter Survey was the fourth year in a continuing program which began in James Bay in 1975. The objectives were to obtain Gravity, Bathymetric and Oceanographic data over the ice. The depth data is of a reconnaissance nature only, as a 6 kilometre grid was used. No Oceanographic data was obtained in 1978. Two camps were set up. The main base camp was at Sanikiluaq, Belcher Islands and the other was at Inoucdjuac, P.Q.

Contract personnel collected the Gravity and Bathymetric data; and operated the Decca 6f positioning system. Supervisors from D.F.E. and E.M.R. managed the camp and ensured that the data meet the required specifications.

The survey work was performed using three (3) Bell 206B Jet Ranger helicopters equipped with Decca 6f receivers, Edo 9040 sounders and Lacoste Romberg gravimeters.

The six kilometre grid was predetermined by the Earth Physics Branch in Ottawa, primarily to suit regional reconnaissance gravity requirements.

There were 1210 soundings, 1240 gravity stations and 8% repeats collected, which met the quota for the survey.

The survey began January 23 (data collecting) and ended February 27, approximately one month early. Demobilization took about 9 days.

The survey was considered a total success.

LIST OF PERSONNEL

DEPARTMENT OF FISHERIES AND ENVIRONMENT (Ocean and Aquatic Sciences)

P. Davies	Hydrographer-in-Charge	January 22 - January 30 February 22 - March 8
R. Lewis	Hydrographer-in-Charge	January 12 - January 24
R. Gammon	Quartermaster	January 12 - January 27
R. Martin	Labourer (Ship)	January 12 - February 13
S. Marshall	Labourer (Ship)	February 22 - March 8
R. Solvason	Tidal Technician (T & W.L. Section)	January 15 - January 25 March 3 - March 8

ENERGY, MINES AND RESOURCES (Earth Physics Branch)

B. Hearty	Supervisor (Gravity)	January 20 - February 22
T. Lahaye	Labourer	February 13 - March 8

MINISTRY OF TRANSPORT (Flight Services)

T. Smits	Pilot	January 12 - January 31 February 20 - March 7
J. Crawford	Pilot	January 12 - January 31 February 20 - March 7
* H. Dale	Pilot	January 21 - February 13
H. Tingley	Pilot	February 1 - February 20
G. Brown	Pilot	February 1 - February 20
* A. Perley	Pilot	February 14 - March 3
C. Charles	Engineer	January 12 - March 7
M. Merritt	Engineer	January 12 - March 7
* K. Hull	Engineer	January 21 - March 3

TERRA SURVEYS (Geoterrex)

C. Nind	Field Supervisor	January 20 - February 28
K. McNabb	Data Collector	January 20 - February 28
K. Davidge	Data Collector	January 20 - March 8
* J. Couture	Data Collector	January 20 - February 28

* Based at Port Harrison, P.Q.. (Inoucdjuac)

MARINAV LTD.

Monitor (Sanikiluaq)

I. Tillmouth	Project Leader	January 13 - March 6
E. Presse	Air Technician	January 13 - March 6

Red Slave (Moore Island)

J. Allen	Technician	January 13 - March 3
J. Robillard	Jr. Technician	January 13 - March 3

Master (McTavish Island)

J. Keable	Technician	January 13 - March 3
T. Hind	Jr. Technician	January 13 - March 3

Green Slave (Anderson Island)

J. Burnett	Technician	January 13 - March 3
R. Croteau	Jr. Technician	January 13 - March 3

TRANSIENT PERSONNEL

M. Rowson	Marinav (Field Supervisor)	January 12 - January 24
J. Drént	Marinav (Diesel Mechanic)	January 24 - January 30
J. Peché	M.O.T. Avionics Technician	January 17 - January 27
E. Gibbons	D.F.E. Chief of Stores	March 3 - March 8

CHRONOLOGY OF EVENTS

The following list of events does not reflect the pre-survey work performed in September-October by J.H. Weller. It can be assumed that the time between events mentioned were spent on data collection.

- January 12 - R. Lewis to Great Whale River.
- CGR and CGL depart from Ottawa to Great Whale River (Smits and Crawford, pilots). Overnight at Matagami.
- January 13 - Marinav personnel arrive Great Whale River.
- Lewis, Gammon and Martin arrive Great Whale River.
- January 14 - Smits and Crawford (CGR and CGL) arrive Great Whale River.
- 2 Twin Otter trips to Belcher Island (Sanikiluaq) with personal and equipment.
- 1 Twin Otter trip to Port Harrison with R. Gammon, J. Allen and J. Robillard.
- January 15 - CGR to Port Harrison to support Red Slave installations.
- CGL to Anderson Island and McTavish Island to support installations.
- 22" of ice at Anderson Island.
- 18" of ice at McTavish Island.
- January 16 - P. Davies to Ottawa to give course to Geoterrex personnel on sounding techniques.
- R. Solvason to Great Whale River.
- Lewis, Martin, Tilmouth, Presse, Solvason to Sanikiluaq.
- CGL to Sanikiluaq.
- Decca Bed established.
- January 17 - Master Station parcoll placed too far from antenna, as

- a result, cable too short.
- DC3 (M.O.T.) arrives Sanikiluaq with first shipment of helicopter spares.
 - J. Peché arrives Sanikiluaq (Avionics technician).
- January 18
- R. Solvason (CGL) unsuccessful attempt at installing tide gauge.
 - Large cables for Master via CGR.
 - Moe Rowson (Marinav field supervisor) to McTavish Island from Anderson Island.
 - Monitor established at Sanikiluaq.
- January 19
- Unsuccessful attempt in installing tide gauge - auger U/S.
 - Gammon to Sanikiluaq.
 - Rowson from McTavish to Moore Island.
 - Generator at Moore Island U/S.
 - M.O.T. DC3 arrives Sanikiluaq with 2nd shipment helicopter spares.
 - Both Slaves and Master on the air.
- January 20
- B. Hearty (E.M.R.) and 4 Geoterrex personnel arrive Sanikiluaq.
 - Rowson to Port Harrison from Moore Island.
 - Fuel moved from area near old strip to nearer parcoll.
- January 21
- R. Solvason unsuccessful in attempt to install tide gauge, auger not working again.
 - CHK arrived Great Whale River (H. Dale and K. Hull).
- January 22
- Davies and new auger enroute to Sanikiluaq.
 - Lewis calibrated Decca chain in CGL.
 - CGL departed Port Harrison from Sanikiluaq.
 - Rowson to Sanikiluaq via scheduled Twin Otter Service.
 - CHK arrived Sanikiluaq to have airborne receiver set up.

- January 23 - P. Davies arrived Sanikiluaq, then to Port Harrison with J. Couture to get survey started.
- Lewis calibrating Decca.
 - Sounder training on ice off Sanikiluaq.
 - Red pattern on CGL giving problems.
 - Data collection began in CGR.
 - Generator at Anderson Island. U/S.
- January 24 - P. Davies check all sounders and equipment at Port Harrison.
- Talked to Inuit Council at Port Harrison.
 - Solvason has tide gauge in at McTavish Island.
 - J. Drent (Marine mechanic) called to repair generators at Slaves.
 - Lewis and Rowson depart for Ottawa and Toronto.
- January 25 - R. Gammon arrives Port Harrison.
- Solvason has tide gauge in at Anderson Island.
 - Solvason departed Great Whale River for Burlington.
 - Twin Otter contracted to fuel cache at Kidney Island.
- January 26 - Sounder checking device set in ice at Port Harrison.
- B. Hearty meeting with Inuit Council at Sanikiluaq.
- January 27 - P. Davies from Port Harrison to Sanikiluaq via regular Twin Otter service.
- R. Gammon departed for Burlington.
 - J. Drent to Moore Island from McTavish Island.
 - J. Peché to Ottawa.
- January 28 - Fuel moved to original site only further up on old strip.
- Noted 11 punctured fuel drums done by N.W.T. front end loader.
- January 30 - P. Davies departed for Burlington.

- January 31 - Pilots H. Tingley and G. Brown arrive Sanikiluaq.
- February 1 - Pilots T. Smits and J. Crawford depart Sanikiluaq for Ottawa.
 - CGL food supply to Master and Green.
- February 2 - Sounder checking device in at Sanikiluaq.
- February 3 - 100 hour check on CGL at night.
- February 5 - 100 hour check on CGR at night.
- February 6 - Request for spare sounder and transducer from Electronics in Burlington.
- February 7 - SBX-11 radio and sounder arrive Sanikiluaq.
- February 8 - No cooks at motel.
 - Weather out at Sanikiluaq.
- February 10 - CGR problems with cyclic hydraulics - parts arrived on flight from Timmins.
- February 11 - Weather out.
- February 12 - CHK arrives from Port Harrison for 100 hour check.
- February 13 - T. Lahaye (E.M.R.) arrived Sanikiluaq.
 - R. Martin (Ships) departs Sanikiluaq.
 - Worst storm to date began 1530 hours - high wind.
- February 14 - CGR to Anderson Island. Food supply.
 - Much open water north of Belcher Island.

- February 14 - Spare sounder arrived from Burlington.
- February 15 - White-out conditions prevail on ice.
 - 15 drums of Jet "B" fuel moved to Port Harrison from Sanikiluaq via Austin Twin Otter charter.
- February 16 - CGL food supply to Master.
 - Ice in bad condition.
- February 19 - No cooks at motel.
- February 20 - No cooks at motel.
- February 22 - B. Hearty departs Sanikiluaq for Ottawa.
 - G. Couture went through ice and lost transducer while trying to save himself.
- February 23 - P. Davies and S. Marshall arrive Sanikiluaq.
 - Meeting with "Hunting and Trapping Association".
- February 25 - Calibration of Decca.
 - Empty drums returned from Radar Island via CGL.
- February 26 - Austin Twin Otter chartered to remove 32 drums (empty) from Kidney and Driftwood Islands.
 - 6 drums Jet "B" fuel to Anderson, 16 empties back to Great Whale.
 - Food supply to Anderson and McTavish Islands.
 - Program finished from Port Harrison - clean up at Moore Island began.
 - 100 hour check on CGL.
- February 27 - C. Nind does gravity ties.
 - Decca officially off air at 1330 hours.

- February 28 - 100 hour check on CGR.
 - Breaking up camp at Sanikiluaq.

- March 1 - Austin 748 chartered to make 2 trips from Belchers to Great Whale River.

- March 2 - 4 Twin Otter trips to McTavish - all equipment to Great Whale River.
 - CGL/CGR off to Great Whale River.
 - Davies, Marshall, Lahaye and Davidge off to Great Whale via Austin 748 and equipment.
 - CHK to Great Whale from Port Harrison.
 - All staff out of Sanikiluaq.

- March 3 - CHK released to return to Ottawa.
 - R. Solvason arrived.
 - E. Gibbons arrived.
 - Last equipment from Belcher Islands arrived via 748.

- March 4 - All equipment from Anderson Island at Great Whale River.

- March 5 - P. Davies, E. Gibbons via CGR go to Port Harrison to conduct inventory.
 - Tide gauge at McTavish removed.

- March 6 - Inventory at Port Harrison complete.
 - P. Davies, E. Gibbons and CGR return to Great Whale River.
 - 8 drums of fuel to Port Harrison, returned to Great Whale with full load of equipment for storage.
 - Remainder of Marinav staff depart for Ottawa.

- March 7 - CGR and CGL released to return to Ottawa.
 - M.O.T. DC3 arrives for helicopter spares.

- March 8 - M.O.T. DC3 to Ottawa with remainder of spares.
 - E. Gibbons and S. Marshall to Burlington via Austin Air.
 - P. Davies and T. Layahe to Ottawa via Nordair.

CONTRACTORS

TERRA SURVEYS (Geoterrex)

Contracted by E.M.R. to collect gravity and hydrography at predetermined points. Their staff consisted of one field supervisor and three data collectors, commonly called "meter-readers". Their field performance was very satisfactory and they seemed to have an energetic approach to the survey work. One man was left to work in Port Harrison with a helicopter crew. His work was sent over to Sanikiluaq by Austin Air pilots who personally provided an excellent courier service.

MARINAV CORPORATION

Marinav Corporation was contracted by D.F.E. to operate and maintain the D.F. & O. owned Decca 6F hyperbolic positioning system. One project leader and seven technicians were employed to keep the system "on the air". The target date of January 23 was met and the system operated trouble free for the duration of the survey. A monitor was set up in a parcoll at Sanikiluaq and the patterns were kept at the required constants. By doing this, no corrections were necessary to be added or subtracted to the day's work. Due to insufficient power from the 110 V.A.C. local source, a 3.5 kw diesel generator was set up.

This year's Marinav personnel were kept on contract for a few extra days to take down the towers and help in the general dismantling of the camps. This worked out fairly well under the guidance of the Marinav project leader. A minimum of three men were required for the task of lowering the 150 foot Decca towers. An extra man from E.M.R. or D.F.E. was supplied to help.

HELICOPTERS (M.O.T., Flight Services)

The type of helicopter used this year as in past years was the Bell 206B Jet Ranger. This helicopter is dependable and cheap to operate compared to the bigger helicopters. It burns 22 gallons of jet fuel per hour. M.O.T. assigned helicopters CF-CGL, CGR and CHK to the winter survey. Mechanical problems were very minimal. Five (5) one hundred hour checks were performed at Sanikiluaq in an M.O.T. garage at the airport. CF-CHK was flown over from Port Harrison to use this facility. Most problems were minor snags that were repaired within an hour or could be done at night. CGR had a transmission seal on the main shaft fail. This was changed when received, with no downtime experienced.

Once again, as experienced in previous surveys, a helicopter (CGL) had a problem with the Decca receiver losing torque. An avionic technician (M.O.T.) and air technician (Marinav) isolated the trouble to the heater blower motor. Suppressors were added to the system which helped ease the problem but did not cure it 100%. With care on the part of the gravity technician and pilot it was workable.

See helicopter statistics for helicopter hours and fuel used.

EQUIPMENT

RADIOS

The working frequency for this survey was 5913.5 Khz. The SBX-11 radios worked very well. An inverted "V" type antenna was used which proved to be much better than the Whip antennas used last year. Communications this year were good throughout the survey. Being H.F., atmospheric noise affected them more in the morning and evening.

The P.T. 400 radios worked well for their intended use.

SOUNDERS

This year as in all previous years the Edo 9040 sounder was used. All sounders worked well, except in the initial week of the survey. Most of these problems (i.e., broken wires and loose connections from vibration), can be attributed to shipping, and handling in extreme cold weather. The power cord lead in connector at the sounder seemed to crack easily. More care in removing them could possibly remedy this problem.

One transducer, used at Inoucdjuac, was lost when the gravity technician fell through the ice. The cable was broken from the sounder and lost with the transducer. A report of loss was submitted for this piece of equipment.

Edo 9040 sounders used in 1978: Serial Numbers 2, 17, 18, 27, 28, 41, 43.

The sounders were shipped back to the electronics shop when servicing was required, at a cost of about \$250.00 round trip.

GRAVITY METERS

The gravity meters used in 1978 presented no particular problems. See report by B. Hearty, E.M.R. supervisor, for particulars.

DIESEL GENERATORS

A total of seven (7) generators were used for the project. Two (2) 6.5 kw generators were used at each Decca site, and a smaller 3.5 kw generator at Monitor for extra power in the Parcoll.

A diesel mechanic from Marinav Corporation came up to the survey in January and checked over all the six main generators for the sites. One at Moore Island required a new field coil, diode bridge assembly, a bearing and four brushes. A generator at Anderson Island required a brush gear assembly, a diode bridge, a bearing and four brushes.

These generators should have a complete check over and refurbishment to the electrical and mechanical components before the next survey season.

MAJOR ELECTRONIC EQUIPMENT

<u>Quantity</u>	
9	SBX 11 Spilsbury and Tindall HF radios (7- E.M.R., 2-D.F.E.).
10	PT400 FM radios
5	Edo 9040 sounding machines
1	Complete 6F Decca Hyperbolic positioning system including monitor and air borne receivers.

MAJOR CAMP EQUIPMENT

Quantity

7 Parcolls - 2 at Sanikiluaq, 2 at Port Harrison,
1 at Moore Island, 1 at McTavish Island, and
1 at Anderson Island.

1 Herman Nelson air craft heater at Port Harrison
owned by D.F.E.

1 Herman Nelson air craft heater at Sanikiluaq
owned by M.O.T.

1 Skidoo 300 at Port Harrison, owned by D.F.E.

1 Skidoo 340 at Sanikiluaq, rented.

Miscellaneous camp equipment as on inventory of P.V. Davies

7 Diesel generators: 2 at Moore Island - Lister 6.5 KW
2 at McTavish Island - Lister 6.5 KW
2 at Anderson Island - Lister 6.5 KW
1 at Sanikiluaq - Lister 3.5 KW

OPERATIONS

In the fall of 1977, positions for Master and Red on McTavish Island and Moore Island respectively, and a position for monitor were surveyed by Geo-Sat receivers borrowed from Geodetic Survey of Canada in Ottawa. Decca Green (Anderson Island) was Decca Green during the 1977 winter survey based at Poste-de-la-Baleine.

Two parcolls were set up at Sanikiluaq for a main base camp, one at Master, one at Red, and two at Port Harrison to be used as a base camp. All the appropriate camp equipment, including Arctic Diesel and Jet "B" fuel was ferried to each site to be ready for the January 1978 survey.

Some controversy was raised by the local Inuit Council at Sanikiluaq concerning the area of work north of the Belchers and that the community was "dry" (no alcoholic beverages). Most of this was a result of misunderstandings between both sides when explaining the survey area to the Council. The Council was fairly militant at first but calmed down as time went on. The vote was taken to be a "dry" community, but has not been passed by the territorial government as yet.

Land use permits were obtained prior to the field season for use of the Decca sites. All the islands of Hudson Bay are under the jurisdiction of the Northwest Territories Government.

The 1978 winter survey was started about two weeks earlier than in 1977. The main purpose of this earlier start was to get mobile quicker in order to take advantage of the better ice and generally better weather conditions of early winter. This approach worked out well, as very little down time was experienced due to weather and ice conditions. The survey work was completed about three weeks early, and demobilization of the sites enjoyed good weather also. This part of the survey took nine full days.

Fuel caches were put out at Kidney Island and Driftwood Island by Austin Air Twin Otter. All the Decca sites had jet fuel as well. The helicopters put out extra smaller caches at Radar Island, Gorden Island and Bartlett Island. The main camps at Sanikiluaq and Port Harrison had the bulk of the fuel with most of it at Sanikiluaq. A total of 310 drums of Jet "B" turbo fuel were used with approximately 40 remaining.

All of the gas caches have been used and the empty drums returned to Sanikiluaq, Great Whale or Port Harrison for disposal.

As stated previously the main camp was at Sanikiluaq, Belcher Islands, where two helicopters were based. The total complement of personnel there was nine (9). Three (3) staff and a helicopter worked out of Port Harrison. This probably benefitted the survey, but meant duplication of equipment and extra charters, etc., in getting outfitted, and cleaning up after. It also saved gas caching to the far north of the sheet.

The main survey area was north of the Belchers and east of a line through Sanikiluaq and the mainland. See sketch No. 4.

A sounder checking device and reference point for the Decca was located near each of the main camps. A plate was lowered through the ice and frozen into position at 50 metres. A 115.2 kHz crystal was used and it provided a velocity of 1440 metres per second. This agreed with previous years sounding velocity and keeps all soundings with a constant velocity.

The contract personnel recorded the soundings and read the gravity meters. Average days, 20-25 stations could be observed by each helicopter crew. This usually included refueling away from the main camp once during the day.

TIDE GAUGES

Two Aanderaa type tide gauges were installed near McTavish Island

and Anderson Island. See sketches of Slave sites for positions. The gauges were in the water for a full lunar cycle and the data appears to be of a good quality. The Tides and Water Levels Section at Burlington will have the records for this period if needed. A permanent gauge was installed at Port Harrison last year and could also be of value. It will be removed this summer.

DECCA CALIBRATION

This year the Decca 6f positioning system was phased in by the conventional method of baseline crossings and then calibrated by comparison of positions to known survey points along the shore and in the Belcher Island area. See tabulation of calibration for details. See Figure 9 for approximate accuracy lobes as drawn by Marinav Corporation. A speed of propagation of 299,500 km/sec was used.

SURVEY STATISTICS

JANUARY 12 - MARCH 8, 1978

Total Days on Project	56
Total Days Operational (Data Collecting)	26-1/2
Total Days Initial Set Up	11
Total Days Demobilization	8-1/2
Total Days Lost due to Weather	8-1/2
Total Days Lost due to Helicopters	1
Total Days Lost due to Electronic Failure (Sounders, Radios)	1/2
Total Days Lost due to Positioning Failure (Decca)	0
	<hr/>
Total No. of Gravity/Hydro Stations	1210
Total No. of Gravity (Land) Stations	30
Total No. of Repeats *	100 (approx. 8%)
	<hr/>
TOTAL	1340 Stations
	<hr/>

This works out to approximately 50 stations per operational day.

* A repeat is a duplication of a station as a quality check on the data (Hydro and Gravity readings). The checks were satisfactory.

HELICOPTER STATISTICS

<u>HELICOPTER</u>	<u>HOURS</u>
CF-CGL	234 ^h 45 ^m
CF-CGR	203 ^h 5 ^m
CF-CHK	179 ^h 45 ^m
	<hr/>
TOTAL	617 ^h 35 ^m

Fuel used on Project: 310 x 45 gal = 13,950 gal.

Fuel Remaining: 24 drums (approximately)

Sanikiluaq, N.W.T.	6 drums
Port Harrison, P.Q.	6 drums
Great Whale River, P.Q.	8 drums
Anderson Island	2 drums
McTavish Island	2 drums

MAJOR EXPENDITURES

Terra Surveys (Geoterrex)	\$ 41,980.52 (Max.)
Marinav Corporation 110,957 max. (actual)	80,188.93
Diesel Generator Service (Marinav)	2,553.21
Spares for Decca Equipment (Marinav)	291.00
Accommodation	
Sanikiluaq	23,085.00
Port Harrison	7,377.00
Great Whale River	3,517.00
Staff Expenses	3,157.46
Staff Air Fares	3,672.00
Austin Air Charters, etc.	31,504.33
Cost Recovery - M.O.T. - DC3 use	3,633.32
Gas-oil skidoo parts	255.93
Rentals - loader, truck, jeep	2,779.00
Labourer - Terra Surveys	168.00
Gas	701.00
Expenses September/October - setting up Decca Sites, etc.	46,489.19
Sea Lift (Montreal to Hudson Bay) Fuel-lumber etc.	45,000.00
TOTAL	<u>\$ 296,352.89</u>

APPENDIX 1

INITIAL CALIBRATION

INITIAL CALIBRATION (JANUARY 23, 1978) - R. Lewis

STATION	OBSERVED		MONITOR		CORRECTED OBSERVED		COMPUTED		CO-C	
	R	G	R	G	R	G	R	G	R	G
INN	E14.51	H38.57			.51	.57	E14.49	H38.58	+0.02	-.01
TOOKCAROOK	D16.64	J35.24			.64	.24	D16.54	I35.28	+0.10	-.04
P. HARRISON BN.	D11.25	A38.03	.00	.00	.25	.03	B11.25	A38.05	.00	-.02
F181	D00.12	A39.49			.12	.49	D00.11	A39.47	+0.01	+0.02
64-A-7	I16.86	D41.94			.86	.92	I16.85	D41.92	+0.01	.00
								MEAN ERROR	+0.03	-.01
BASELINE CROSSINGS										
RED EXT.	E 4.52	-			.52	-	E 4.55	-	-.03	-
	E 4.52	-			.52				-.03	
MASTER/RED EXT.	A 0.00	-					A 0.00	-	-.00	-
	J23.98	-						-	-.02	-
			0.00	0.00				MEAN ERROR	-.02	
GREEN EXT.	-	C40.79			.79	.79	-	C40.80	-	-.01
	-	C40.79			.70	.79	-	C40.80	-	-.01
MASTER/GR. EXT.	-	J47.98			-	.98	-	A30.00	-	-.02
	-	J47.93			-	.93	-	A30.00	-	-.07
								MEAN ERROR		-.03

APPENDIX 2

FINAL CALIBRATION

FINAL CALIBRATION (FEBRUARY 25, 1978) - P. Davies

STATION	OBSERVED		MONITOR		CORRECTED OBSERVED		COMPUTED		CO-C	
	R	G	R	G	R	G	R	G	R	G
INN	E14.39	H38.59	+0.01	.00	.40	.59	E14.48	H38.59	-.08	.00
MANEE	E17.15	H43.02	+0.01	.00	.16	.02	E17.20	H43.04	-.04	-.02
MONITOR	E19.55	H35.39	+0.01	.00	.55	.39	E19.64	H35.38	-.09	+0.01
64A7	I16.72	D41.94	+0.01	.00	.72	.94	I16.84	D41.93	-.12	+0.01
								MEAN TOTAL	-.08	.00
MASTER RED EXTENSION CROSSINGS (FEBRUARY 25, 1978)										
	.57	-	+0.02	-	.59	-	E 4.55	-	+0.04	-

APPENDIX 3

DECCA CHAIN PARAMETERS

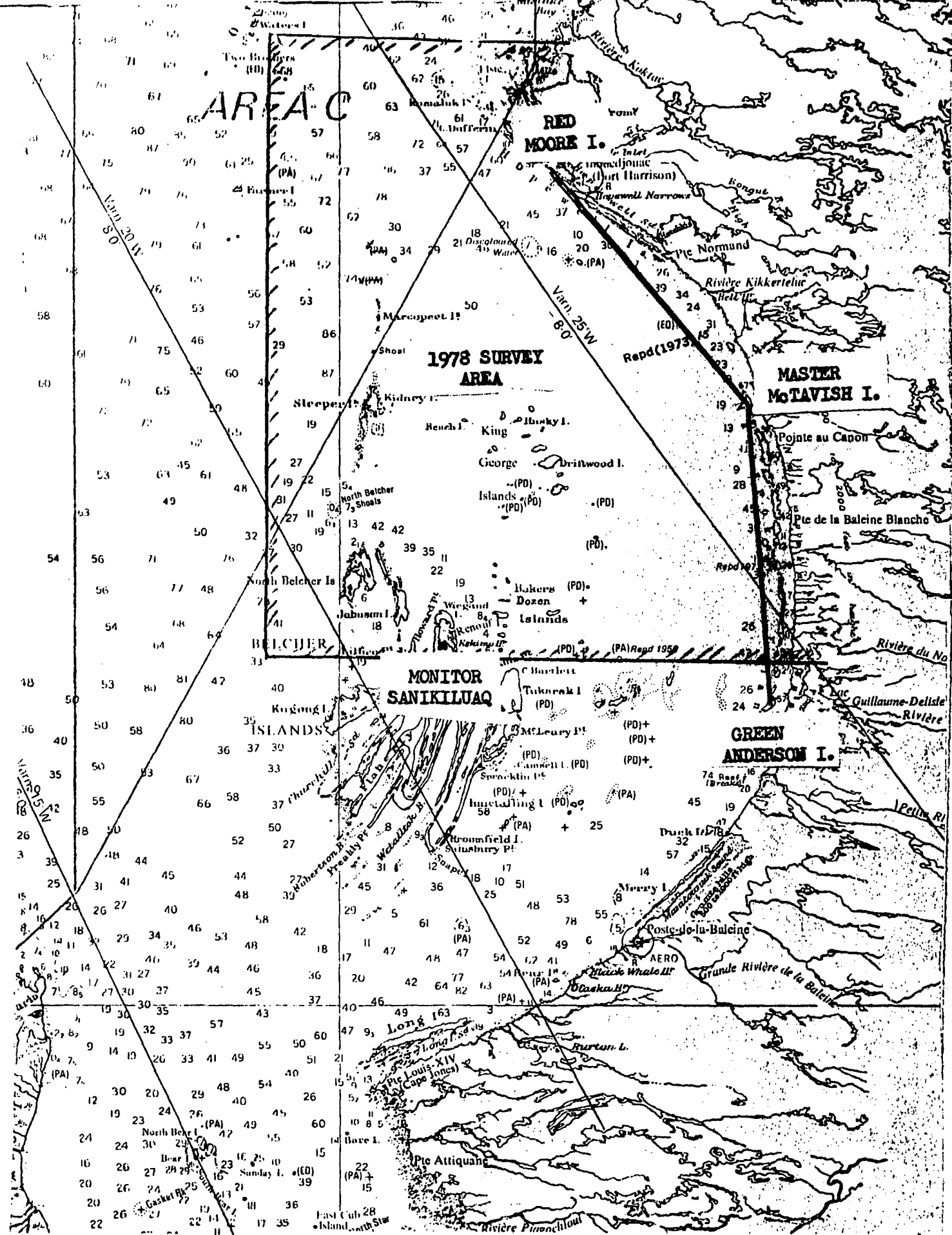
DECCA CHAIN PARAMETERS
HUDSON BAY 1978

		MASTER	RED	GREEN
		MCTAVISH IS.	MOORE IS.	ANDERSON IS.
GEOGRAPHIC	LAT	57 31 39.377	58 33 21.146	56 19 57.602
CO-ORDS	LONG	76 52 39.639	78 31 48.718	76 40 46.967
U.T.M.	N	6,383,402.36	6,495,790.84	6,251,277.68
CO-ORDS	E	746,786.81	294,627.70	767,039.98
ZONE		17	18	17
BASELINE LENGTH			150,471.01	133,613.19
TRANSMITTED FREQ. KHZ		84.730	112.973	127.095
COMPARISON FREQ. KHZ			338.920	254.190
SPEED OF PROPAGATION KM/S			299,500	299,500
LANE WIDTH			441.845	589.126
TOTAL NUMBER OF LANES			340.55	226.80
FIRST LANE			A00	A30
LAST LANE			E4.55	C40.80
MONITOR STN. SANIKILUAQ	LAT LONG	56 32 29.859 79 13 27.535		

FIGURE OF THE EARTH: CLARKE 1866

APPENDIX 4

1978 DECCA CHAIN LAYOUT AND SURVEY AREA



AREA C

RED MOORE I.

1978 SURVEY AREA

MASTER MOTAVISH I.

BELCHER I.

MONITOR SANIKILUAQ ISLANDS

GREEN ANDERSON I.

Pie Attiquah

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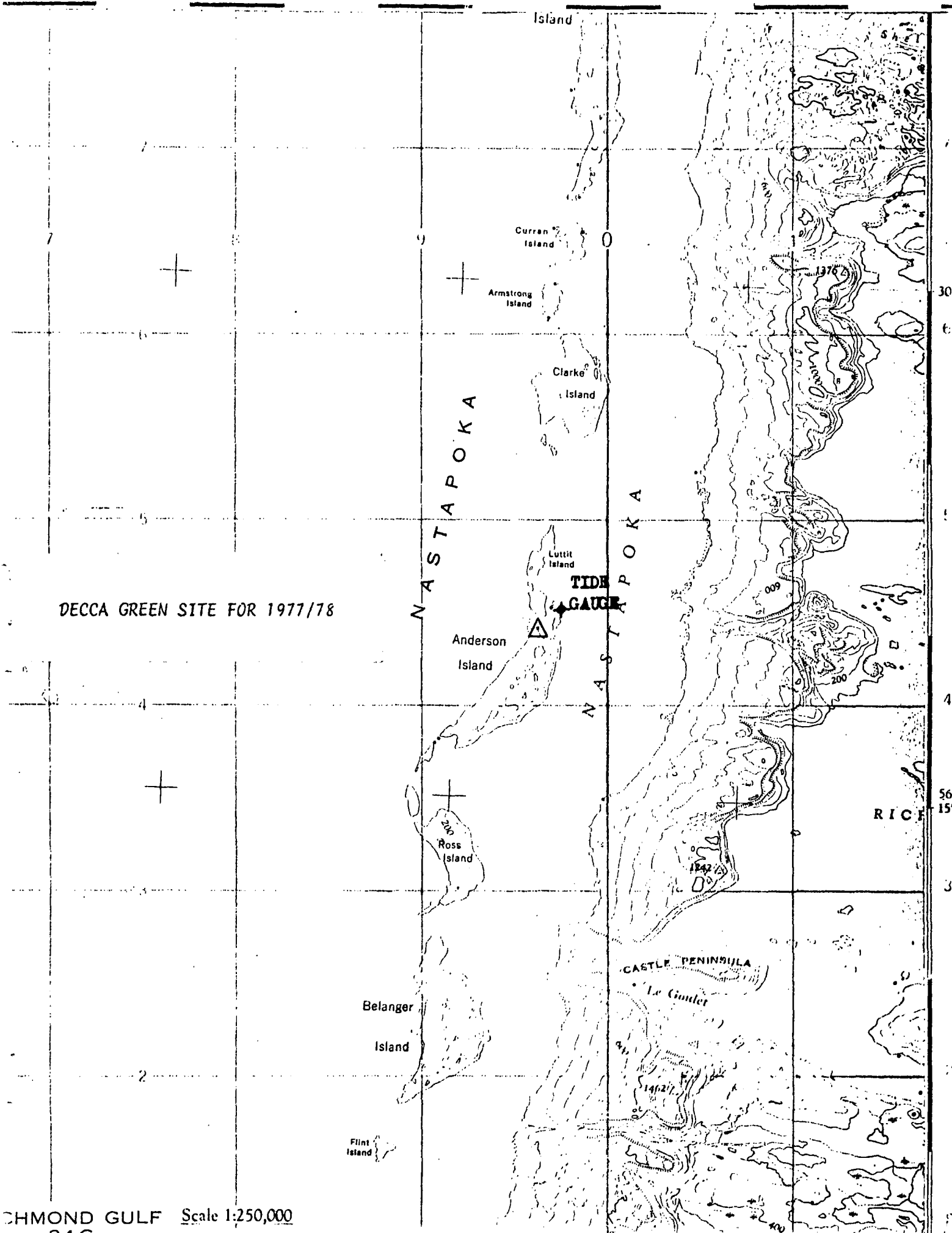
20°N

15°N

20°N

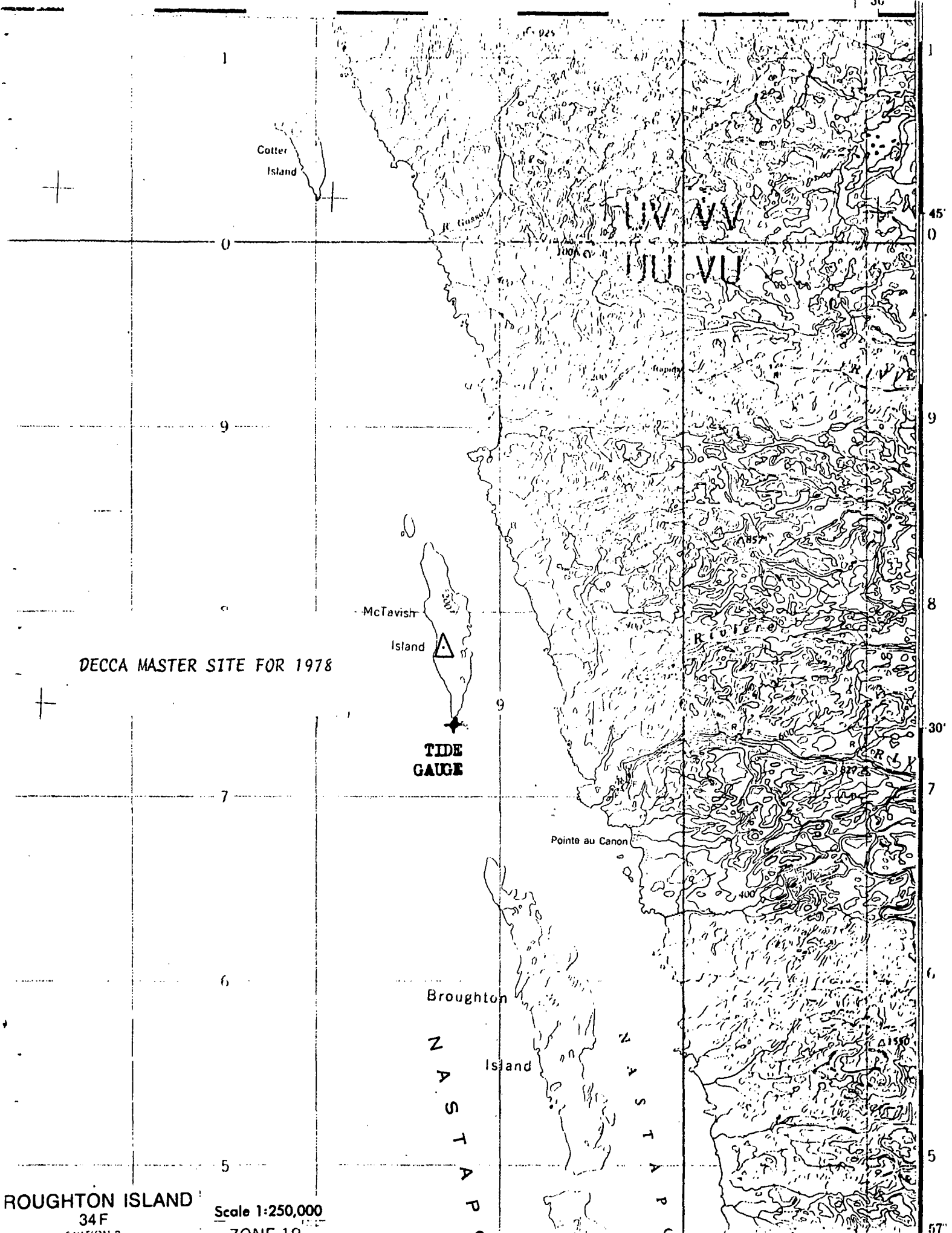
APPENDIX 5

DECCA GREEN SITE AND TIDE GAUGE LOCATION (1:250,000)



APPENDIX 6

DECCA MASTER SITE AND TIDE GAUGE LOCATION (1:250,000)



DECCA MASTER SITE FOR 1978

TIDE GAUGE

ROUGHTON ISLAND
34F
EDITION 2

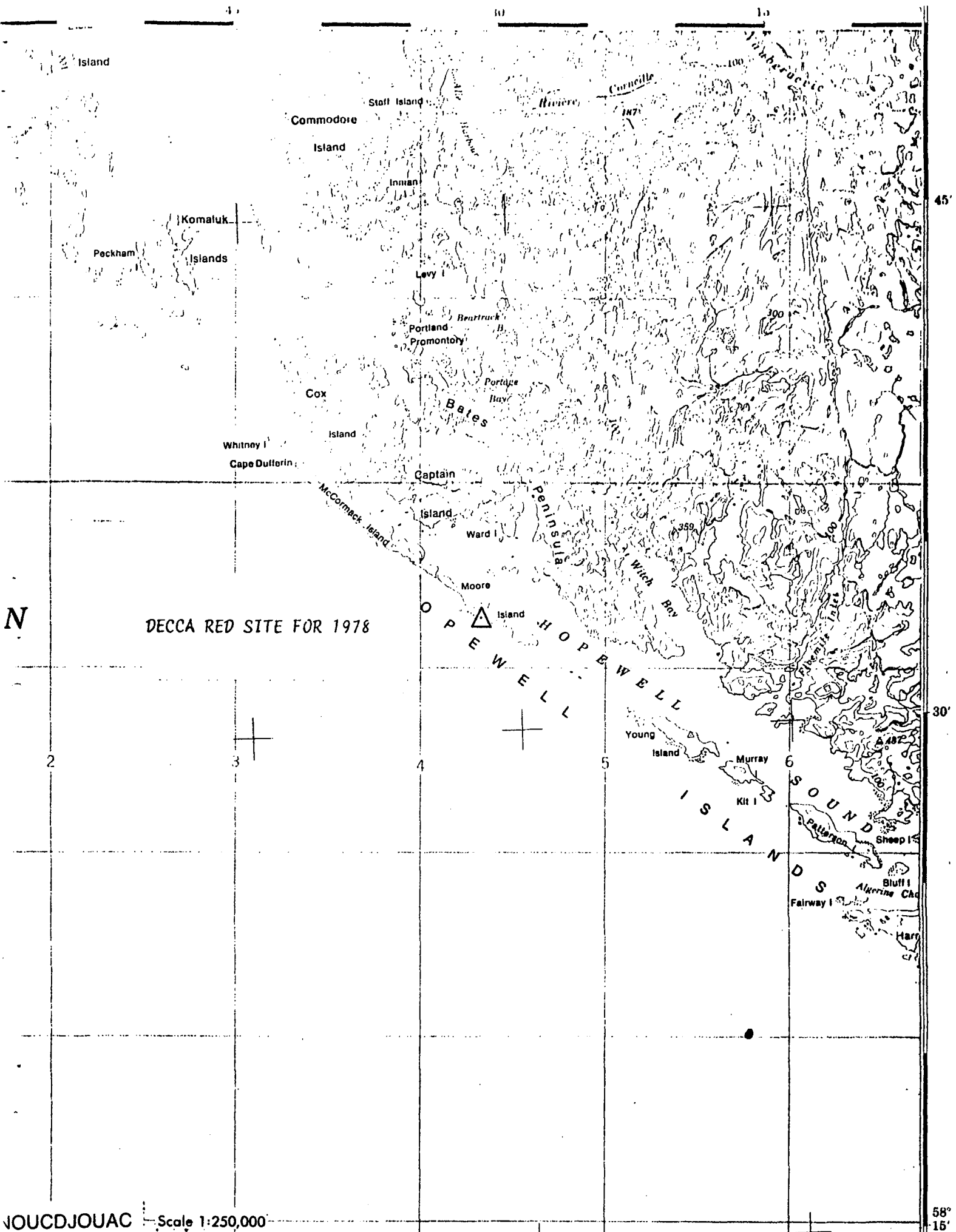
Scale 1:250,000
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APPENDIX 7

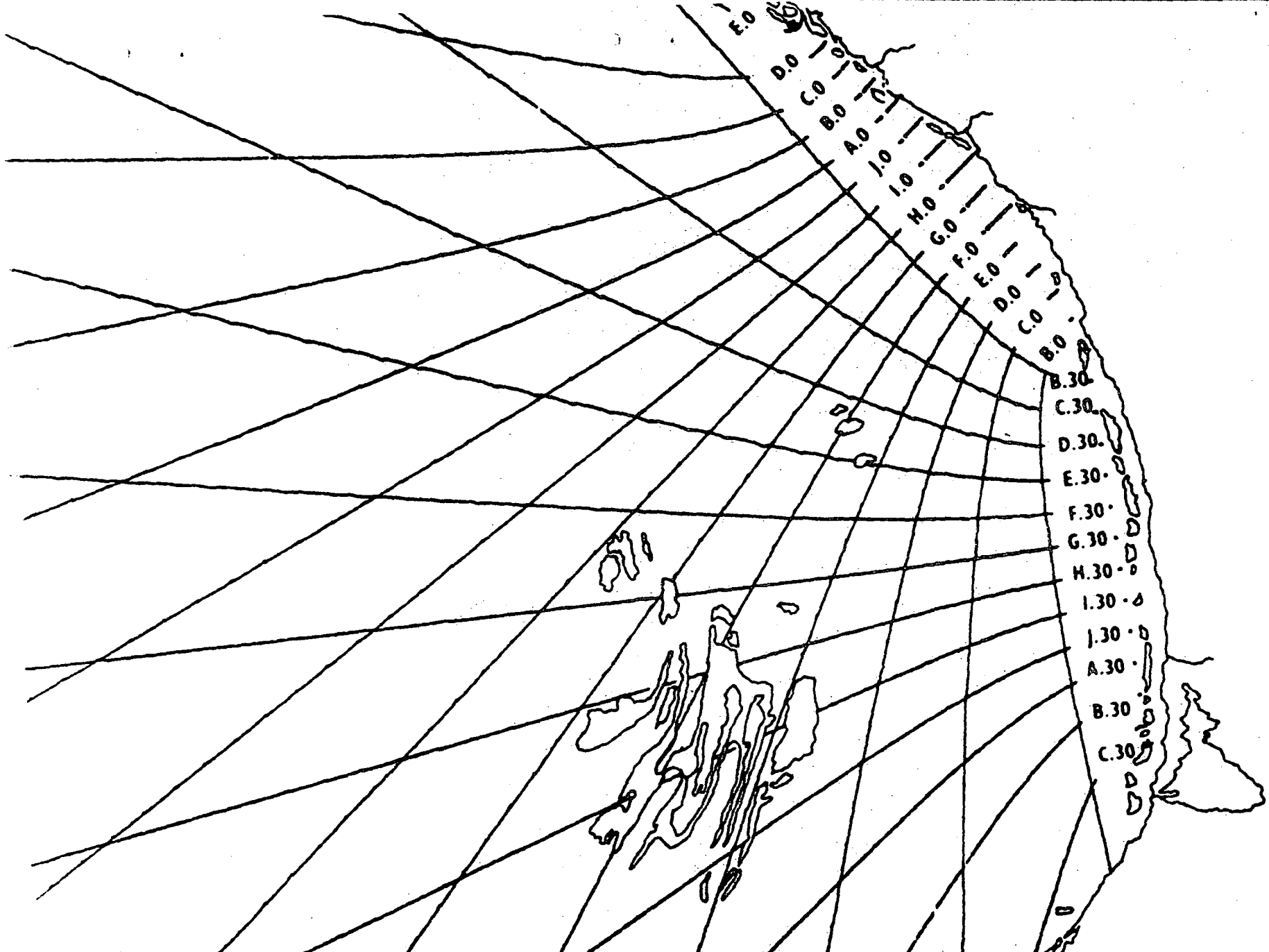
DECCA RED SITE (1:250,000)



DECCA RED SITE FOR 1978

APPENDIX 8

HUDSON BAY DECCA LATTICE COVERAGE - 1978 - MARINAV



HUDSON BAY DECCA LATTICE - 1978

SCALE 1 / 2000000



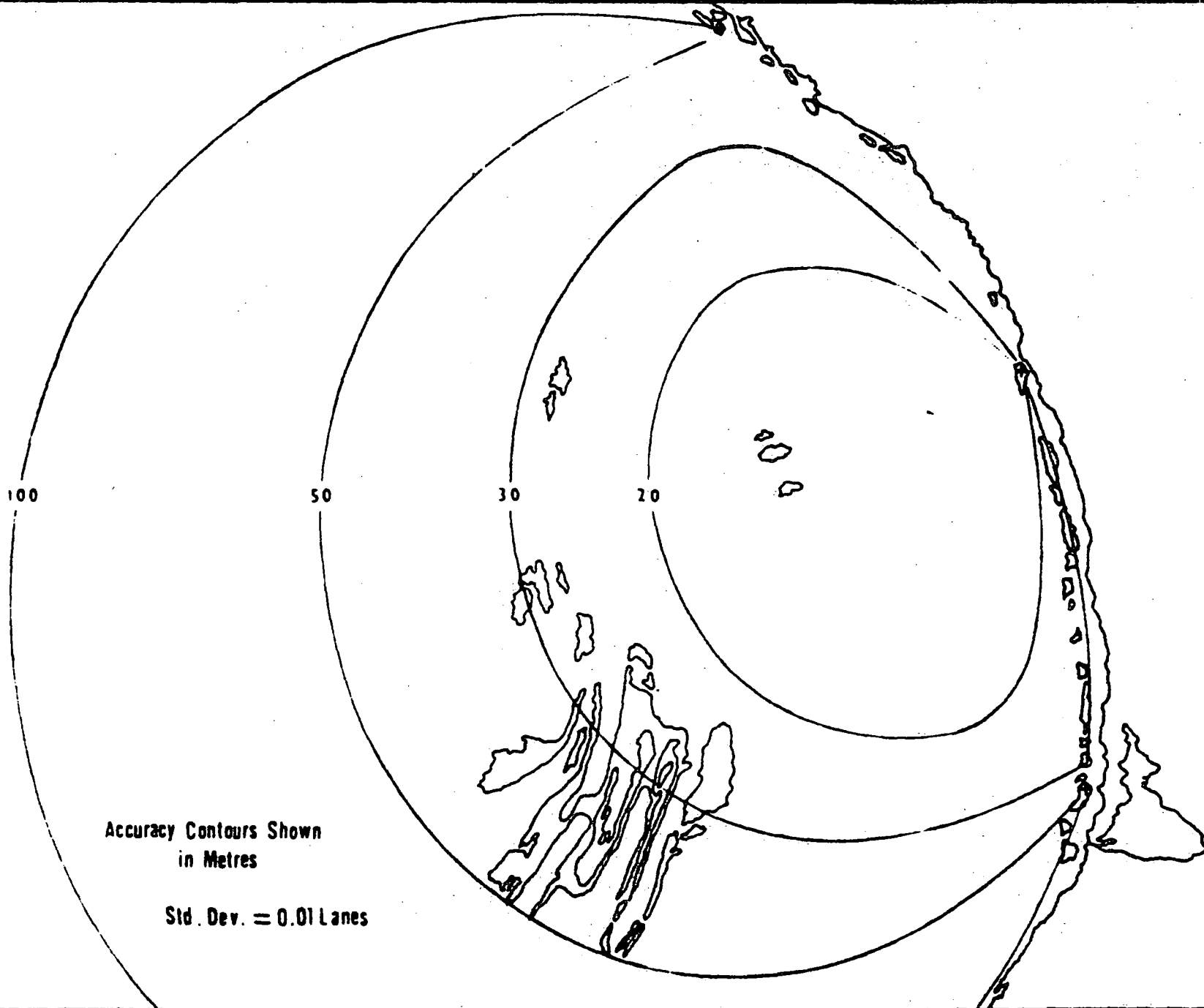
MARINAV CORPORATION

11Z 380000
11Z 010000

MIN 010000

APPENDIX 9

HUDSON BAY DECCA ACCURACY CONTOURS (METRES) - MARINAV



Accuracy Contours Shown
in Metres

Std. Dev. = 0.01 Lanes

HUDSON BAY DECCA ACCURACY CONTOURS (METRES)

MIN 380000
MIN 810000

SCALE 1 / 2000000



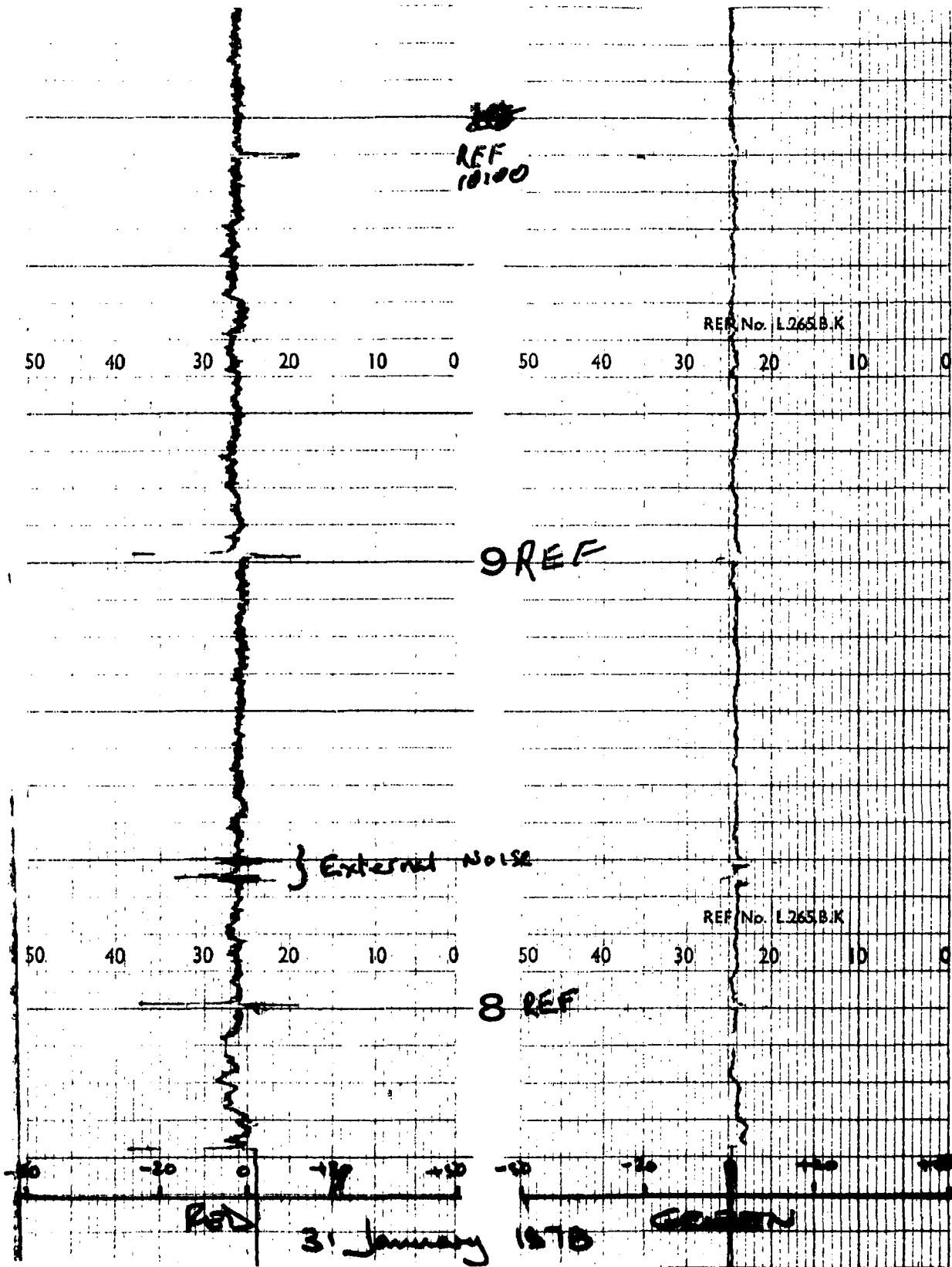
MARINAV
CORPORATION

APPENDIX 10

SAMPLE DAILY MONITOR RECORD

SAMPLE DAILY MONITOR RECORD

(Sanikiluaq, N.W.T.)



APPENDIX 11

FIELD REPORT STATISTICS

FIELD REPORT STATISTICS:- MONTHLY..... PROJECT..... FINAL FIELD. X...

YEAR 1978		FROM JANUARY 12		TO MARCH 8 (INCLUSIVE)	
Establishment <u>HUDSON BAY (WINTER)</u>					
H.I.C. <u>P.V. DAVIES</u>					
		Project Number	Project Number	Project Number	Project Number
Project Name <u>BELCHER I. (SOUTHEAST</u>		5452-6110			
<u>HUDSON BAY)</u>					
Project Name _____					
Project Name _____					
Project Name _____					
Resources:					TOT.
Number of Hydrographers } SHARED *		1/35			
Number of Scientists } SUPERVISORY CAPACITY *		1/21			
Number of Electronic Technicians *		Equipment was sent to Burlington for repair			
No. of Student Assistants and Casuals *		-			
No. of Support Personnel (Ship's Crew, Etc.) *		3/61			
Total Personnel (INCLUDES CASUAL VISITORS* AND CONTRACT PERSONNEL)		31/1164			
Number of Ships		-			
Number of Launches		-			
Number of Land Vehicles		-			
Number (and type) of Aircraft		3	206B Jet Ranger Helicopters		
Number of Minor Support staff		-			
Other (specify)					
1 Skidoo owned by D.F.E.					
1 Skidoo (rented)					
1 4-wheel drive (rented)					
1 stake truck (rented)					
Twin-Otter and H.S. 748 aircraft chartered when necessary					

* Should provide two figures separated by a slash. The first figure being the average number on strength and the second being the man days. e.g. number of Hydrographers: 5/100 (an average of 5 Hydrographers spent 100 man days on the project).

FIELD REPORT STATISTICS:- MONTHLY PROJECT FINAL FIELDX.....

YEAR 1978 FROM JANUARY 12 TO MARCH 8 (INCLUSIVE)

Establishment	Project Number	Project Number	Project Number	Project Number
HUDSON BAY (WINTER)				
H.I.C. P.V. DAVIES				
Time:				
Total operational days	56			
Days actual field work	26½			
Days lost (weather)	8½			
Days lost (Sat., Sun., Holidays)	-			
Days lost (equipment failure)	1½			
Days lost in transit	-			
Days lost in port for supplies, bunker, etc.	-			
Days lost - other causes Initial set up and demobilization	19½			
Total man days in period (staff)	224			
Total man days worked (staff)	224			
Man days: - (staff) includes contract data collectors				
(a) Sounding (Spot Soundint)	80			
(b) Shoal Examinations	-			
(c) Wharf Surveys	-			
(d) Oceanography	-			
(e) Geophysics	-			
(f) Tides & Water Levels	16			
(g) Collecting bottom samples	-			
(h) Horizontal Control	-			
(i) Shorelining & Low Watering	-			
(j) Data Processing & Office Admin.	121	H.I.C. and Contract	Supervisor	
(k) Sailing Directions	-			
(l) Place Names	-			
(m) Current Observations	-			
(n) Photo-Ident.	-			
(o) Others (specify) Calibration	3			

YEAR

1978

FROM JANUARY 12

TO MARCH 8 (INCLUSIVE)

Establishment	HUDSON BAY (WINTER)	Project Number	Project Number	Project Number	Project Number
H.I.C.	P.V. DAVIES				
<u>Sounding (Linear Nautical Miles/KM):</u>					
Ship Sounding	(Spot) by Helicopter	1310			
Launch Sounding		-			
Other (specify)	Gravity	30			
Total Sounding	Gravity/Hydro	1340			
Reconnaissance (track) sounding		-			
Area Sounded (N.M. ²) (Km ²)		11,700	NM ²		
(Covered on a 6 km grid)					
<u>Shoals Examined:</u>					
Shoal Examinations (ship)		-			
Shoal Examinations (launch)		-			
Shoal Examinations (sweep)		-			
Shoal Examinations (other) specify		-			
Shoal Examinations (total)		-			
<u>Navigational Aids:</u>					
Shore Aids Positioned (including ranges)		-			
Floating Aids Positioned		-			
Navigational Ranges Sounded		-			
Navigational Ranges Drifted		-			
Sector Ranges Positioned		-			
Navigational Aids Established		-			

YEAR 1978

FROM JANUARY 12

TO MARCH 8 (INCLUSIVE)

Establishment <u>HUDSON BAY (WINTER)</u> H.I.C. <u>P.V. DAVIES</u>	Project Number	Project Number	Project Number	Project Number
<u>Bottom Samples:</u>				
Number of Bottom Samples (grab)	-			
No. of Bottom Samples (underway)	-			
No. of Bottom Samples (armed lead)	-			
No. of Cores	-			
No. of Samples Retained	-			
<u>Miscellaneous:</u>				
No. of Dangers to Navigation, rocks, ruins, pilings, etc., fixed	-			
Shoreline Checked (N.M.) (KM)	-			
Wharves Surveyed	-			
No. of Reference Buoys Streamed	-			
No. of Reference Buoys Recovered	-			
No. of Shore Stations Established	-			
Lambda, Hi-Fix	-			
<u>Helicopter Flying Hours</u>	618			

