### GRANULAR RESOURCE INVESTIGATION NORTHERN RICHARDS ISLAND, NWT (VOLUME II OF II) GEOPHYSICAL PROGRAM

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GRANULAR RESOURCE INVESTIGATION NORTHERN RICHARDS ISLAND, NWT (VOLUME II OF II) GEOPHYSICAL PROGRAM Part of the Northern Oil and Gas Action Program Project A4 - Granular Resource Inventory

### SUBMITTED TO:

Indian and Northern Affairs Canada Ottawa, Ontario

### PREPARED BY:

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#### **EXECUTIVE SUMMARY**

This report summarizes the results of a geophysical survey program on Northern Richards Island, NWT. The objectives of the geophysical program were to complement a concurrent geotechnical program with additional data and to provide some preliminary data in areas that were difficult to gain access with the drilling equipment. Both Ground Penetrating Radar (GPR) and electromagnetic (EM) conductivity measurements were taken. The results were analyzed for evidence of stratigraphy and the presence of massive ice. The GPR antennae were chosen to obtain information in the top 20 m and the EM systems were used to obtain data in the top 50 m.

A total of four sites were surveyed: Target Areas 1 (MR2 Island), 6C-1, 6C-2 and 4B-1. The GPR surveys were conducted using 50 and 100 MHz antennae and 1000 and 400 V transmitters. All GPR data were logged using a PC laptop, post-processed, and corrected for topography.

The GPR data did not indicate any significant stratigraphic or areal changes in material type on any of the lines surveyed in Target Areas 1, 6C-1, 6C-2. It is believed that massive sands with some silt were encountered within the penetration depth of the GPR system at all of these sites. At specific locations, based on the borehole logs, there was a gradual transition from a sand with some silt, to a till; however, the change was too gradual to register as a recognizable change in the GPR data. Evidence of massive ice was only encountered at one location in Target Area 6C-1. Airphotos and elevation data for the area suggest that the feature is associated with neighbouring lakes. The GPR data in Target Area 4B-1 showed both horizontal and vertical stratigraphic changes, but the contacts were not necessarily welldefined, indicating that the material transitions were graded.

Two EM conductivity systems were operated in this study; an EM-31 and an EM-34. The EM-31 was used at Target Area 6C-2 and the EM-34 was used at Target Areas 6C-1 and 6C-2. The EM-34 surveys were conducted with transmitter/receiver spacings of 10, 20 and 40 m in conjunction with respective step spacings of 10, 10 and 20 m. Vertical and horizontal magnetic dipole readings were taken for all EM readings.

The EM-31 did not detect any stratigraphic features and was not useful in this study as there was generally no change in electrical properties in the top 6 metres and the resistivity values were too high to be measured reliably.

The EM-34 data successfully identified the overall vertical stratigraphic sequence at the two sites where it was used. The results of the EM-34 surveys were consistent with the current published geological models proposed for the area.



Based on the geophysical data collected and interpreted during this program, the following recommendations are made for future geophysical work in the area.

- GPR data will only be useful in areas where sands and massive ice are present. Therefore, if massive ice is suspected from other sources (eg. airphotos), then GPR can be used to identify and delineate such hazards. If massive ice is not a concern, then GPR data are not recommended.
- GPR data should be used as a general survey tool at Target Area 4B-1 to delineate the extent of the surficial coarser material in the discontinuous glacial outwash plain south of Summer Bay.
- EM-34 data was effective in measuring overall layer thicknesses and for confirming whether the local geological models fit the site stratigraphy. For sites where massive sands are present, it is recommended that EM-34 data be collected if general stratigraphic unit information in the top 50 m is desired.
- Borehole data are required to confirm geophysical interpretations. Target Area 4B-1 in particular requires further ground truthing before accepting the geophysical interpretations postulated in this report..



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### **1.0 INTRODUCTION**

#### 1.1 BACKGROUND

EBA Engineering Consultants Ltd. (EBA) was retained by Indian and Northern Affairs Canada (INAC) to provide technical expertise for the planning of a combined winter arctic offshore-onshore geotechnical program and a concurrent geophysical program conducted in conjunction with one portion of the onshore program.

This study is part of the Northern Oil and Gas Action Program (NOGAP) – Project A4: Granular Resources Inventory and Management. In anticipation of hydrocarbon development in the Beaufort Sea, the objective of NOGAP – Project A4 was to compile a comprehensive granular resources inventory for the Beaufort – Mackenzie Region. The inventory currently includes a range of deposits, from prospective sites identified on the basis of geotechnical and other scientific information to significant proven borrow sources for which detailed information on the location, type, quantities and qualities of materials is known.

It is likely that initial development of offshore hydrocarbon resources in the Beaufort Sea will be from the Amauligak hydrocarbon discovery. North Point, Richards Island, NWT, has been targeted as the landing zone where oil and gas pipelines will begin their overland transport. However, North Point's northern coastal locality and peninsular geography combine to create a sensitive environment. Site specific designs, required to mitigate any potential environmental damage, are likely to be greatly influenced by the availability and type of local granular resources.

A geological consultant, Terrain Analysis & Mapping Services Limited (TAMSL), was contracted by INAC to identify specific geological targets in the area that are likely to contain granular resources (TAMSL, 1993). Select target areas were chosen as sites for this study.

This report, (Volume II of II) Geophysical Program, is a companion report to a geotechnical report entitled "Granular Resource Investigation Northern Richards Island, NWT (Volume I of II) Geotechnical Program". The following report summarizes the results of a geophysical program conducted at four separate sites on northern Richards Island, NWT. The geophysical program included the use of Ground Penetrating Radar (GPR) and two electromagnetic systems (EM-31 and EM-34). All geophysical data was collected between March 19 and March 27, 1994.



### 1.2 OBJECTIVES

The primary objective of the geophysical program was to provide additional data to complement a concurrent geotechnical program, the results of which are presented under separate cover. Specifically, the results of the geophysical surveys were used to optimize geotechnical borehole locations, interpolate conditions between holes, delineate stratigraphy, and identify massive ice features that may limit development of granular resources. The results of the geophysical surveys were also used to confirm the granular source targets identified by TAMSL (1993).

Two types of geophysical tools were used to achieve these objectives. The first system was a pulsed electromagnetic system called a pulseEKKO<sup>TM</sup> IV Ground Penetrating Radar (GPR) system with 50 MHz and 100 MHz antennae. These antennae were chosen to obtain information in the top 20 m. Additional information was provided by two electromagnetic conductivity systems, the EM-34 and EM-31. The EM-31 was used to obtain information in the top 6 m and the EM-34 to obtain data in the top 50 m. The combined information obtained from these data sets are used to develop a simplified model of the soil stratigraphy.

#### **1.3 AUTHORIZATION**

This study was authorized by Supply and Services Canada (SSC) under Contract No. A7134-3-0048/01-ST, awarded to EBA. The designated Scientific Authority for the project was Mr. R.J. Gowan, P.Geol., Geotechnical Advisor for the Natural Resources and Environment Branch of INAC.

#### 1.4 STUDY AREAS

The granular resource target areas investigated, located on northern Richards Island, are presented in Figure 1.





### 2.0 METHODOLOGY

The geophysical program involved using Ground Penetrating Radar (GPR) and electromagnetic (EM) systems. Field data were collected and interpreted by Mr. N.S. Parry of EBA. The field data were collected with the assistance of Mr. S. Traynor of INAC between March 19 and March 27, 1994. A brief daily activity log is attached as Appendix A. A total of four sites were surveyed: Target Areas 1 (MR2 Island), 6C-1, 6C-2, and 4B-1. Table 1 summarizes the type of data collected at each site and the surveyed line lengths. Survey control was established by placing survey stakes at the start and end points of each line. On longer lines, additional survey control points were placed at the top of hills, at the bottom of valleys and randomly along horizontal segments. The locations and elevations of the survey stakes placed were established during a post-mission survey using differential GPS techniques.

The GPR surveys were conducted with a pulseEKKO<sup>TM</sup> IV GPR system using 50 and 100 MHz antennas and 1000 and 400V transmitters. Table 2 lists the system configuration used at each site. The GPR data was collected using step mode and continuous mode. In step mode operation, the transmitter and receiver antennae were spaced one metre apart and manually moved along the survey line at one metre spacings. Measurements were recorded every metre. In continuous mode operation, the antennae were placed at a one metre separation on a wooden sled that was towed behind a skidoo. The sample rate and the skidoo speed were set to result in approximately a one-metre per scan travel rate, although in practice, due to variations in terrain conditions, this horizontal scan rate varied from 0.6-scans per metre to 2-scans per metre. Exact scan rates for each line are noted on the GPR header file data sheets in Appendix B.

GPR data was recorded using a PC laptop and subsequently processed in Edmonton. To best identify anomalies at depth, long time window lengths (between 400 and 700 nanoseconds) were used when collecting the field data. Between 4 and 64 stacks per trace were typically applied to the data set to maximize signal return strength and to obtain soundings as deep as possible.

GPR data was post-processed on a SUN IPC workstation using a variety of signal processing techniques written within Matlab and SU (Seismic Unix). Signal processing was applied to the data set to gain low level signals and to extract any reflection horizons that might be present. The processed data files have been printed as variable density plots to a printer and are included in Appendix C.



		GEOPH	YSICAL SURVE	EY SUMMARY	
	SURVEY RECORD DESIGNATION	LINE SEGMENT	SURVEY LINE	STATION	COMMENTS
	(ind. Typertaiger Areabula boy		(m)	(m)	
1	GPR/1/Line 1	LN1-1	512	0+00 - 0+09	Terminated, Cable Problems
		LN1-2		0+00 - 0+72	Terminated, Cable Problems
		LN1-3		0+00 - 0+27	Change to 1000V tx, Terminated Cable Problems
		LN1-4		0+20 - 0+30	Terminated, Cable Problems
		LN1-5		0+00 - 1+70	Terminated, Cable Problems, Used in Report
		LN1-6		1+61 - 5+12	Used in Report
6C-1	GPR/6C-1/Line 1	LN6C-1-1	580	0+00 - 5+80	Used in Report
	GPR/6C-1/Line 2	LN6C-1-2	2705	4+67 - 25+64	Used in Report
		LN6C-1-3		4+79 - 0+00	Used in Report
		LN6C-1-4		0+00 - 24+59	Used in Report, Line Terminated due to low batteries
		LN6C-1-5		13+18 - 25+89	Used in Report, Cable Problems
		LN6C-1-6		25+89 - 27+05	Cable problems, intermittent data
	GPR/6C-1/Line 3	LN6C-1-7	535	0+00 - 5+35	Used in Report
	GPR/6C-1/Line 4	LN6C-1-8	719	0+00 - 7+18	Used in Report
	GPR/6C-1/CMP 1	CM6C-1-1	17		Mid-Point, BH-25, GPR/6C-1/Line 2, Terminated due to low batteries
		CM6C-1-2	27		Used in Report, Mid-Point, BH-25,
	EM-34/6C-1/Line 1	EM6C-1-1	*225	0-00 - 2+30	Used in Report

\* Note: Interpreted profile line length



### TABLE 1, continued GEOPHYSICAL SURVEY SUMMARY

TARGET	SURVEY RECORD DESIGNATION (inst. Type/Target Area/Data Set)	LINE SEGMENT (Data File Name)	SURVEY LINE	STATION	COMMENTS
	, , <b>, , .</b>	•	(m)	(m)	
6C-2	GPR/6C-2/Line 1	LN6C-2-1	199	0+00 - 1+99	Used in Report
	GPR/6C-2/Line 2	LN6C-2-2	278	0+00 - 2+78	Used in Report
	GPR/6C-2/Line 3	LN6C-2-3	2243	0+00 - 3+88	Test Line Skidoo, Terminated Due to Poor Quality Data
		LN6C-2-4		0+00 - 22+56	Restart, Used in Report
	GPR/6C-2/CMP 1	CM6C-2-1	26		Mid-Point, 0+95, GPR/6C-2/Line 1
	GPR/6C-2/CMP 2	CM6C-2-2	24		Mid-Point, 1+27, GPR/6C-2/Line 2
	EM-31/6C-2/Line 1		190	0+00 - 1+90	Data not recorded as it was over-range
	EM-34/6C-2/Line 1	EM6C-2-1	*225	0-10 - 2+30	Used in Report
4B-1	GPR/4B-1/Line 1	LN48-1-1	715	0+00 - 5+13	Used in Report, Terminated due to Cable Problems
		LN4B-1-2		5+13 - 7+15	Used in Report
	GPR/4B-1/Line 2	LN4B-1-3	1857	0+00 - 1+69	Used in Report, Terminated due to Cable Problems
		LN4B-1-4		1+69 - 18+57	Used in Report

\* Note: Interpreted profile line length.



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		TABLE 2		
	GPR ANTEN	NAE/TRANSMITTE	R CONFIGURATIONS	
TARGET AREA	SURVEY RECORD DESIGNATION (Inst. Type/Target Area/Data Set)	LINE SEGMENT (Data File Name)	ANTENNA FREQUENCY (MHz)	TRANSMITTER VOLTAGE (V)
1	GPR/1/Line 1	LN1-1	100	1000
		LN1-2	100	400
		LN1-3	100	1000
		LN1-4	100	1000
		LN1-5	100	1000
		LN1-6	100	1000
6C-1	GPR/6C-1/Line 1	LN6C-1-1	100	400
	GPR/6C-1/Line 2	LN6C-1-2	100	1000
		LN6C-1-3	100	1000
		LN6C-1-4	50	1000
		LN6C-1-5	50	1000
		LN6C-1-6	50	400
	GPR/6C-1/Line 3	LN6C-1-7	50	1000
	GPR/6C-1/Line 4	LN6C-1-8	50	1000
	GPR/6C-1/CMP 1	CM6C-1-1	50	400
		CM6C-1-2	50	400
6C-2	GPR/6C-2/Line 1	LN6C-2-1	100	1000
	GPR/6C-2/Line 2	LN6C-2-2	100	1000
	GPR/6C-2/Line 3	LN6C-2-3	100	1000
		LN6C-2-4	100	1000
	GPR/6C-2/CMP 1	CM6C-2-1	100	1000
	GPR/6C-2/CMP 2	CM6C-2-2	100	1000
4B-1	GPR/4B-1/Line 1	LN4B-1-1	100	400
		LN48-1-2	100	400
	GPR/4B-1/Line 2	LN4B-1-3	100	400
		LN4B-1-4	100	400

ወ 8 Two EM instruments were operated in this study: an EM-31 and an EM-34. The EM-31 can normally provide subsurface information in the top 6 m, whereas the EM-34 can penetrate up to 50 m. The EM-34 surveys were conducted with transmitter/receiver spacings of 10, 20 and 40 m in conjunction with respective step spacings of 10, 10 and 20 m. Vertical and horizontal magnetic dipole readings were taken for all EM readings.

The EM-31 was only used at Target Area 6C-2 and based on the readings at this site it was decided that it would be ineffective at providing stratigraphic information in this study for two reasons:

- The resistivity values at all sites would likely be too high to be reliably measured with the equipment. No useful data were recorded.
- The electrical properties within the top 6 m did not vary significantly and, therefore, little information could be derived from the EM-31 data that could not be measured by the EM-34.

As a consequence, the EM-31 was used only along Line EM-31/6C-2/Line 1 within Target Area 6C-2. The EM-34, which operates at a lower frequency, successfully detected principal stratigraphic units and was used along Lines EM-34/6C-1/Line 1 and EM-34/6C-2/Line 1 within Target Areas 6C-1 and 6C-2, respectively.

Appendix D presents both the raw and interpreted data for the processed EM-34 profiles. The EM-34 data was interpreted using a commercial software package called EMIX 34P.

### 3.0 RESULTS AND DISCUSSION

The GPR data collected showed very few significant reflectors. Reflectors seen in the top 10 m are believed to represent localized variations in surficial moisture content, the presence or absence of a thin organic mat, and the presence of pockets of glacial till. No reflections were identified below 10 m on the GPR data. There are two possible explanations for this:

• Attenuation losses in the top 10 m prevented the collection of any useable data below this depth.



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• The material is quite homogeneous electrically and, within the top 20 to 30 m, does not have sufficient variation in its electrical characteristics to result in any significant reflections detectable using GPR.

Based on comparing the borehole logs with the GPR data and the EM-34 data, it is judged that the second explanation is more likely. This is based on the fact that the borehole logs show a profile that would be homogeneous from an electrical standpoint in the top 10 m. As well, the EM-34 data suggests that there are no dramatic changes in the electrical characteristics until 20 to 40 m below ground surface. As well the EM-34 data shows that the surficial material is fairly resistive, as would be expected for a frozen sand.

The material logged in the top 5 to 10 m and the EM-34 resistivity data suggest that attenuation due to material conductivities should not be an issue in the top 20 m at least.

#### 3.1 TARGET AREA 1 (MR2 ISLAND)

Target Area 1 was the first area surveyed, primary to calibrate and check the GPR equipment, due to its close proximity to the camp location. The start of the line was located by a remnant mounting platform from an abandoned radio navigation beacon. From this location, the line traversed downslope in a southeasterly direction, passing south of a small lake at the bottom of a swale, and then rising upslope to a high point approximately 512 m southeast of the starting point. This line was selected because it was considered to be representative of a typical transect, as described by TAMSL (1993); that being a profile consisting of Kittigazuit sands with one, possibly two horizontal transitions from surficial sand to an overlying till (TAMSL, 1993).

Figure 2 shows the orientation of the geophysical line and the boreholes that were drilled nearby during a concurrent drilling program (EBA, 1994). The processed GPR data is presented in Appendix C. Useful data was obtained from two line segments providing a composite line with a length of 512 m.

Some minor changes in the surface material reflection characteristics were seen at Station 2+10, suggesting that there is a change in surficial material at Station 2+10. Very few reflections were seen in the Kittigazuit sands and no evidence of a contact between the Kittigazuit and the underlying Kidluit sands was observed. No electromagnetic resistivity data was taken at this site and, therefore, no estimate of





material attenuation rates is possible. It is therefore unclear whether the lack of reflections is due to attenuation or a lack of contrasting dielectric conditions within the sand. There was no evidence of ice-rich soils at Target Area 1 based on the GPR data.

No EM data were collected at this site and no boreholes were drilled in the formations surveyed. All borehole data collected were from offshore drillholes and were not considered useful in correlating with the GPR data.

In conclusion, the GPR data at Target Area 1 was more homogeneous and featureless than expected. Provided the TAMSL (1993) model for the sand ridge is valid, the results suggest that the transition from exposed sand to till is gradual rather than abrupt from an electrical standpoint.

### 3.2 TARGET AREA 6C-1

Target Area 6C-1 was surveyed between March 24 and 26, 1994. A total of four lines were surveyed in eight segments using GPR. Line lengths were 580, 2705, 535, and 718 m, respectively. One line was surveyed using the EM-34. The EM data were collected along GPR/6C-1/Line 4, with EM Station 0+05 corresponding to GPR Station 0+00. All GPR data were profiled in continuous mode from a skidoo.

Figure 3 shows the alignment of the geophysical lines and the locations of boreholes. The processed GPR data are presented in Appendix C. As with the other sites, few coherent reflections were seen beyond the top 10 m. Some minor reflections were observed within the top 10 m, but it is judged that these reflections represent surficial variations in moisture contents and the presence of some surficial till and organics. The only exception to this is on Line GPR/6C-1/Line 2 between Station 2+290 and 2+350. A very strong reflection, approximately 60 m long, was seen at an elevation of +2 m. This location is at a point where the line traverses between two lakes. Ground truthing of similar data at other sites with sands have identified massive ice at these locations; therefore, this reflector has been tentatively interpreted as possible massive ice. There were no borehole data at this point to confirm this interpretation. Borehole data at other locations along the GPR lines indicate an electrically homogeneous sand with no features that would likely be identified in the GPR data.



The EM-34 data were profiled along Line GPR/6C-1/Line 4 between GPR Stations 0+00 and 2+30. The model used to interpret the data consisted of three layers. The vertical magnetic dipole and horizontal magnetic dipole data are consistent, although the vertical magnetic dipole data indicate a thicker first layer. The first layer has been interpreted to be a non-saline sand and has been tentatively labelled as Kittigazuit / Kidluit sands since there is no apparent geophysical distinction between these two sand units. The second layer has been interpreted as a conductive marine silt or clay approximately 8 m thick. This layer has been assumed to be the Hooper clays and silts. Under this layer, there is a resistive sand, although it is not as resistive as the surface sand. This layer is interpreted as the Kendall marine sand. The thicknesses of the first two layers is consistent with other EM data taken in the area and the geological model prepared by the Geological Survey of Canada (GSC, 1990). The interpreted profile is shown in Figure 4. No borehole data is available to confirm any of the EM interpretations as none of the boreholes were extended far enough to enter the second layer.

### 3.3 TARGET AREA 6C-2

The Target Area 6C-2 study site was surveyed between March 21 and 23, 1994. A total of three lines were surveyed in four segments using GPR, one line was surveyed using the EM-34, and one line was surveyed using the EM-31. The GPR line lengths were 199, 278 and 2243 m, respectively. The EM-34 and EM-31 line lengths were 225 and 190 m, respectively. GPR/6C-2/Line 1 and GPR/6C-2/Line 2 were profiled in step mode, while GPR/6C-2/Line 3 was profiled in continuous mode from a skidoo. After profiling GPR/6C-2/Line 3, a decision was made to collect all subsequent GPR data during the project in continuous mode for two reasons:

- To maximize areal coverage, it was necessary to increase the profiling speeds.
- From the results of the first two lines profiled at Target Area 6C-2 and the line profiled at Target Area 1, it was judged that deeper reflections were unlikely to be detected by the GPR. Therefore, the stacking number was reduced and the time window shortened, making continuous probing and the accompanying data storage requirements more reasonable.







Figure 5 shows the alignment of the geophysical lines and the locations of boreholes that were drilled within Target Area 6C-2 as part of the concurrent geotechnical program (EBA, 1994). As with Target Area 1, very few radar reflections were detected below 10 m at Target Area 6C-2. There were some indications of a change in the nature of the surficial soils as one moves off the peaks. This effect was most noticeable on GPR/6C-2/Line 2, where a number of strong, shallow reflections were noted between Station 1+35 and 2+50. This location corresponded to the lowest elevation along the line to the west and could be indicative of surficial till material or sandy soils with a higher organic content. Again, no deep reflections were identified on the radar data. Nor were dramatic differences identified on Line 6C-2-3 between Boreholes 11413-20 and 11413-22, despite changes in the soil gradation. Borehole 11413-20 shows sand at surface. Borehole 11413-22 shows till at surface. This suggests that the change from one surficial soil to the other was gradual and that the contrasts were not strong enough to detect in the GPR record.

The electromagnetic data collected at Target Area 6C-2 consisted of both EM-31 and EM-34 data. EM data was collected along GPR/6C-2/Line 1. The EM-31 data was not recorded or analyzed as the readings for both horizontal and vertical magnetic dipoles, for both ground and one metre above the ground, were consistently out of range and therefore unusable. Trial readings taken on the ice-road approaching the site confirmed that the EM-31 was working properly. As conditions were expected to be similar at the other sites, a decision was made to discontinue use of the EM-31 in order to make more effective use of field time.

The EM-34 data and interpreted profile are shown in Figure 6. A three-layer model was used in describing the data collected. In summary, the site surveyed has been interpreted to consist of a 40 to 50 m thick sand body overlying a more conductive marine (saline) sediment. Although the sand body has been interpreted as two separate layers between Stations 0+00 and 1+70, it is believed that there is little geological or geotechnical difference between the two other than the degree of ice bonding. What is notable from the results is that the high interpreted resistivities in Layer 2 indicate the likely presence of ice-bonded sands. From Stations 1+70 to 2+25, the data was better modeled using a two layer interpretation consisting of sands overlying marine clay. The end of the EM-34 line was approximately 50 to 75 m from the edge of a bluff overlooking the saline water of Wallace Bay. The base material has been interpreted as a marine clay or silt. From the resistivity data, the apparent resistivity increases as one proceeds north away from the bluff. This has been interpreted as a change from a marine clay to a marine silt but may also reflect salinity changes. There is little evidence of change in surficial material or till in the





	X 1 1 E 533 00		<u>N 7 724 0</u>	E 533 500 00			
Ŧ			<u>N 7 723 5</u>	00			N
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EB	VA Emg	jine	N 7 722 0 <b>ering</b> (	Gom	sultant	ts Ltd.	0 20 40 SCALE (metres) PROJECT GEOPHYSICAL INVESTIGATION OF SELECTED GRANULAR RESOURCE PROSPECT NORTHERN RICHARDS ISLAND, N.W.T.
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DATE	94-06-	22	DWN.	WMG	CHKD.	NSP	FILE NO. 11413M12B FIGURE 5
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resistivity data. The layers have been tentatively identified as the Kittigazuit / Kidluit sands and the Hooper clays and silts. The resistivity data show no distinction between the two sand types. This is expected since the major distinctions between the two sand types appear to be limited to colour and bedding characteristics. The interpreted thicknesses and burial depths appear to be consistent with the geologic models for the area proposed by GSC (1990). None of the borehole data collected at this site penetrate below the first layer; the data simply confirm the presence of a homogeneous sand from a resistivity standpoint.

### 3.4 TARGET AREA 4B-1

Target Area 4B-1 was surveyed on March 27, 1994. A total of two lines were surveyed in 4 segments using GPR. Line lengths were 715 and 1857 m. No EM-34 data were collected at this site due to poor weather and time constraints. All GPR lines were profiled in continuous mode from a skidoo.

Figure 7 shows the geophysical lines alignments and the location of the borehole. The results of the GPR data collected in Target Area 4B-1 were different in character from the other three sites. In general, the data showed low attenuation materials such as sands and gravels overlying more higher attenuation materials such as silts. Areas where surficial sands and gravels were present were localized and varied in length from 50 m to over 300 m. Maximum penetration depths seen in the gravels and sands were 12 m. In general, penetration was less than 10 m. In Target Area 4B-1, it is judged that the lower penetration depths achieved, as compared to the other three study areas, were possibly due to finer grained soils underlying the surficial material. The finer grained soils, if present, will act to attenuate the GPR data. Limited ground truthing was available at Target Area 4B-1 due to time and weather restrictions. One borehole was drilled, Borehole 11413-27. The borehole log shows gravelly sand at surface with sand at depth with more fine-grained material mixed in. The borehole was terminated at 10 m.





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	LEGEND - RADAR TRACE LINES - SURVEY POINT - BOREHOLE LOCATION
	0 250 500  SCALE (metres)
പ്പം	RESOURCE PROSPECT, NORTHERN RICHARDS ISLAND, N.W.T.
ADA	TLE SURVEY LINE LOCATIONS TARGET AREA 4B-1
6P	FILE NO. 11413M10B FIGURE 7

### 4.0 CONCLUSIONS

Conclusions from the geophysical program are as follows:

- The GPR data did not indicate any significant stratigraphic or areal changes in material type on any of the lines surveyed in Target Areas 1, 6C-1 and 6C-2. It is believed that this indicates that all sites consist of massive sands with some silt within the penetration depths of the GPR systems. At some specific locations such as between Boreholes 11413-20 and 11413-22 in Target Area 6C-1, there is probably a gradual transition from a sand with some silt to a till. However, even at these locations, the change was too gradual to register as a recognizable change on the GPR record.
- The GPR data in Target Area 4B-1 did show both horizontal and vertical stratigraphic changes although the contact was not necessarily a well-defined one, indicating some mixing of material at the interface.
- The EM-31 was not useful in the study area as there was generally no change in the stratigraphic properties within the top 6 m and resistivity values were too high to be measured reliably.
- The EM-34 data successfully identified the overall vertical stratigraphic sequence at the two sites where it was used.
- Site stratigraphy interpreted from the EM-34 data is consistent with current geological models proposed for the area.
- Evidence of massive ice was only encountered at one location at Target Area 6C-1. Airphotos and elevation data for the area suggest that the feature is associated with neighbouring lakes.



### 5.0 RECOMMENDATIONS

Based on the geophysical data collected and interpreted during this program, the following recommendations are made for future geophysical work in the area:

- GPR data will only be useful in areas where sands and massive ice are present. Therefore, if massive ice is suspected from other sources (eg. airphotos), then GPR can be used to identify and delineate such hazards. If massive ice is not a concern, then GPR data are not recommended.
- GPR data should be used as a general survey tool in the Target 4B-1 area to delineate the extent of the surficial coarser material in the discontinuous glacial outwash plain south of Summer Bay.
- The EM-34 was effective in measuring overall layer thicknesses and for confirming whether the local geological models fit the site stratigraphy. For sites where massive sands are present, it is recommended that EM-34 data be collected if general stratigraphic unit information in the top 50 m is desired.
- Borehole data are required to confirm geophysical interpretations. Target Area 4B-1 in particular requires further ground truthing before accepting the geophysical interpretations postulated in this report..



### 6.0 CLOSURE

The data presented in this report has been interpreted in conjunction with information contained in the references sited. These sources should be consulted if further information is required regarding the geophysical data setting. EBA hopes that the data presented is informative and acknowledges the cooperation and assistance provided by Mr. R. Gowan and Mr. S. Traynor or INAC.

Respectfully submitted, EBA Engineering Consultants Ltd.

ML

N.S. Parry Senior Geophysical Engineering Assistant

Reviewed by:





D.C. Cathro, P.Eng. Chief Engineer, Frontier Division

NSP/tr



0101-94-11413 September, 1995

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- Geological Survey of Canada, 1990. Geological, Geotechnical, and Geophysical Studies along an Onshore-Offshore Transect of the Beaufort Shelf. Geological Survey of Canada Open File Report 2408.
- Terrain Analysis and Mapping Services Ltd., 1993. Potential Granular Resources and Their Geological Constraints: Northern Richards Island. December, 1993.



# APPENDIX A

# DAILY LOG

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### APPENDIX A DAILY LOG

#### March 18, 1994

8:00 am Depart for Inuvik

- 1:00 pm Arrive in Inuvik Spend rest of afternoon picking up equipment Hear weather is bad and road is closed
- 8:00 pm Road being cleared Depart from Inuvik
- 11:00 pm Arrive at camp

### March 19, 1994

8:00 am to	
1:00 pm	Check equipment

1:00 pm to 6:00 pm Survey Lines 1 through 4 at Target Area 1

8:00 pm to 10:00 pm Review data

### March 20, 1994

8:00 am to 1:00 pm Survey Lines 5 and 6 at Target Area 1

1:00 pm to 8:00 pm Locate EM-31 and EM-34

### 8:00 pm to 10:00 pm Review data



# March 21, 1994

8:00 am	Travel to Target 6C-2
8:00 am to 2:00 pm	Survey Lines 6C-2-1, 6C-2-2, CM6C-2-1, and CM6C-2-2
2:00 pm to 3:00 pm	Review data
3:00 pm to 5:00 pm	Take EM-31 data on Line 6C-2-1
6:00 pm	Verify that EM-31 is working
8:00 pm to 10:00 pm	Review data
March 22, 1	994
8:00 am	Travel to Target 6C-2
8:00 am to 3:00 pm	Take EM-34 data on Line 6C-2-1
4:00 pm to 6:00 pm	Survey Line 6C-2-3
8:00 pm to 10:00 pm	Review data
March 23, 1	994
8:00 am to 1:00 pm	Construct sled from wooden pallets
1:00 pm	Travel to Target Area 6C-2
2:00 pm to 6:00 pm	Collect Line 6C-2-4
8:00 pm to 10:00 pm	Review data



### March 24, 1994

8:00 am	Travel to Target 6C-1
9:00 am to 2:00 pm	Survey Lines 6C-1-1, 6C-1-2, 6C-1-3
2:00 pm to 4:00 pm	Travel to Tuktoyaktuk and back for fuel
4:00 pm to 8:00 pm	Fix 1000 V transmitter and survey lines 6C-1-5, 6, 6C-1-7, 6C-1-8
11:00 pm to 12:30 pm	Review data
March 25, 19	994
8:00 am	Travel to Target 6C-1
8:00 am to 12:00 pm	Survey Lines 6C-1-4 and 6C-1-6
12:00 pm to 5:00 pm	Collect CMP6C-1-1 and CMP6C-1-2 Collect EM-34 data on Line 6C-1-4
5:00 pm	Travel to Skiff Point
6:00 pm to 7:00 pm	Arrive at Skiff Point Attempt to travel to Target Area 4B-1
8:00 pm to 12:00 pm	Review data
March 26, 1	994
8:00 am to 1:00 pm	Review data
1:00 pm to 4:00 pm	Collect LN4B-1-1 and LN4B-1-2 Return to camp – "white out"



# March 27, 1994

8:00 am to	Paview data
10.00 am	
10:00 am to	
1:00 pm	Finish off LN4B-1-1 and LN4B-1-2
1:00 pm to	
3:00 pm	Prepare demob to Inuvik
3:00 pm to	
6:00 pm	Demob to Inuvik
-	Return equipment
March 28, 1994	
9:00 am to	
2:00 pm	Pack gear, ship geophysical equipment out Arrange flight back to Edmonton

6:00 pm Return to Edmonton



# APPENDIX B

# **GPR HEADER FILE DATA SHEETS**
## TARGET AREA 1

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## **GPR HEADER FILE DATA SHEETS**

.

Data File 101-11413	Line1-1.dt1
Target Area 1 High bluff to east hill N. Parry, S. Traynor 19/03/94	

Number of Traces	=	9
Number of pts/trc	=	750
Timezero at point	=	130
Total time window	=	600
Starting position	=	0.0000
Final position	=	8.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	<del></del>	256
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking		1
Trace differencing		N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation		0.100 dB/m
Amount	=	100 Maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 9

### Data File 101-11413

#### Line1-2.dt1

Target Area 1 High bluff to east hill, restarted, 400 V transmitter, change number of stacks N. Parry, S. Traynor 19/03/94

Number of Traces	=	72
Number of pts/trc	=	750
Timezero at point	=	94
Total time window	=	600
Starting position	<u></u>	0.0000
Final position	=	71.0000
Stop gize used	_	1.0000
Begition units	_	metres
Nominal frequency	-	100.00
A standa apparetion	-	1.0000
Antenna separation	_	400
Pulsar voltage	-	16
Number of Stacks	=	Deflection
Survey mode	=	Kenechon
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	100 Maximum
Selection Time	Ξ	-75 to 525 ns
Trace	=	1 to 72
TIACC	—	

Data File 101-11413

Line1-3.dt1

Target Area 1 High bluff to east hill, restarted 1000 V transmitter N. Parry, S. Traynor 19/03/94

Number of Traces	=	27
Number of pts/trc	=	750
Timezero at point	=	128
Total time window	=	600
Starting position	=	0.0000
Final position	=	26.0000
Step size used		1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	16
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	<b>—</b> `	0.100 dB/m
Amount	=	100 Maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 27

Data File 101-11413

 Line1-4.dt1

Target Area 1 High bluff to east hill, continue Line 1-3.dt1 N. Parry, S. Traynor 19/03/94

Number of Traces	=	11
Number of pts/trc	=	750
Timezero at point	=	128
Total time window	=	600
Starting position	=	0.0000
Final position		10.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	16
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	<b></b>	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	100 Maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 11

Data File 101-11413

Line1-5.dt1

Target Area 1 High bluff to east hill, Restart Line at High Bluff, increase number of stacks N. Parry, S. Traynor 20/03/94

Number of Traces	=	170
Number of pts/trc	=	750
Timezero at point	=	109
Total time window	=	600
Starting position	=	0.0000
Final position	=	169.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	256
Survey mode	=	Reflection
Processing Selected		
Trace stacking	-	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	100 Maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 170
Distance : Scan Ratio		
0 to 170	:	1.0 m/scan

Data File 101-11413

Line1-6.dt1

Target Area 1 High bluff to east hill, continue Line 1-5.dt1 N. Parry, S. Traynor 20/03/94

Number of Traces	=	351
Number of pts/trc	=	750
Timezero at point	=	145
Total time window	=	600
Starting position	=	0.0000
Final position	=	350.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	256
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation		0.100 dB/m
Amount	=	100 Maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 351
Distance : Scan Ratio		
0 to 351	:	1.0 m/scan
-		

## TARGET AREA 6C-1

# GPR HEADER FILE DATA SHEETS

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Data File		CMP6C-1-1.dt1
101-11413		
CMP centred on BH 25	5 Target Area 6C-1	
N. Parry, S. Traynor		
25/03/94		-
Number of Traces	_	17
Number of nts/tro	=	750
Timozero et point	-	88
Total time window	=	600
Starting position	_	0.0000
Final position	=	16.0000
Sten size used		1.0000
Position units	=	metres
Nominal frequency	=	50.00
Antenna separation	=	1.0000
Pulsar voltage	=	400
Number of Stacks	=	1
Survey mode	=	CMP/WARR
our of mode		
Processing Selected		
_		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	AGC
Window	=	1.000 pulse windows
Amount	=	1.000 of full window
Region	=	1 to 750 points
Selection Time	=	-140 to 460 ns
Trace	=	1 to 17

### Data File 101-11413

### CMP6C-1-2.dt1

CMP centred on BH 25 Target Area 6C-1, restarted cmp, increase number of stacks N. Parry, S. Traynor 25/03/94

Number of Traces Number of pts/trc Timezero at point Total time window Starting position Final position Step size used Position units Nominal frequency Antenna separation Pulsar voltage Number of Stacks Survey mode	27 750 86 600 0.0000 26.0000 1.0000 metres 50.00 1.0000 400 1024 CMP/WARR
Processing Selected	
Trace stacking Points stacking Trace differencing Gain type Window Amount Region Selection Time Trace	1 1 N AGC 1.000 pulse windows 1.000 of full window 1 to 750 points -140 to 460 ns 1 to 27

Line6C-1-1.dt1

Data File 101-11413

Target Area 6C-1, access road to end of Line 6C-1-2 N. Parry, S. Traynor 24/03/94

Number of Traces	=	699
Number of pts/tro	_	625
Number of pis/itc	_	34
Timezero at point	-	500
Total time window		0 0000
Starting position	=	608 0000
Final position	=	1 0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	400
Number of Stacks	=	4
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Volocity	=	0.150 m/ns
A ttorustion	=	0.100 dB/m
Amount		1.000 of full window
Amount	-	-25 to 475 ns
Selection Time	_	1 to 699
Trace	=	
Distance : scan ratio		0.82 / 2007
0 to 600 ·		0.85 m / scan

0 to 699 :

Data File 101-11413

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Line6C-1-2.dt1

Target Area 6C-1, end of Line 6C-1-1 along north ridge N. Parry, S. Traynor 24/03/94

Number of Traces	=	1729
Number of pts/trc	=	625
Timezero at point	=	52
Total time window	=	500
Starting position	=	0.0000
Final position	=	1728.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	4
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	Ν
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region	=	1 to 750
Selection Time	=	-40 to 460 ns
Trace	=	1 to 1729
Distance · scan ratio		
0 to 172		0.92  m / scan
172 to 384	•	1.35  m/scan
384 to 614		1.43 m / scan
614 to 789	:	2.08 m / scan
789 to 1068	•	1.26 m / scan
1068 to 1319	•	0.88 m / scan
1319 to 1515	:	1.38 m / scan
1515 to 1728	:	1.76 m / scan

Line6C-1-3.dt1 Data File 101-11413 Target Area 6C-1, BH 24 to end of Line6C-1-1 N. Parry, S. Traynor 24/03/94 396 Number of Traces = 625 Number of pts/trc = 35 Timezero at point = 500 Total time window = 0.0000 Starting position = 395.0000 Final position = 1.0000 Step size used = metres Position units = 100.00 Nominal frequency ----1.0000 Antenna separation = 1000 Pulsar voltage = 4 Number of Stacks = Reflection Survey mode = **Processing Selected** 1 Trace stacking = 1 Points stacking = Ν Trace differencing = SEC Ħ Gain type 0.150 m/ns Velocity = 0.100 dB/m Attenuation = 1.000 of full window Amount = 1 to 750 = Region -25 to 475 ns Selection Time = 1 to 396 Тгасе = Distance : scan ratio 1.21 m / scan 0 to 396 :

Data File 101-11413

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Line6C-1-4.dt1

Target Area 6C-1, end of Line6C-1-1 along north ridge N. Parry, S. Traynor 25/03/94

Number of Traces	-	3342
Number of pts/trc	=	375
Timezero at point	=	27
Total time window	=	600
Starting position	=	0.0000
Final position	=	3341.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	50.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	1
Survey mode	<b>—</b>	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	. 1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region	=	1 to 750
Selection Time	=	-50 to 550 ns
Trace	=	1 to 3342
Distance : scan ratio		/
0 to 478	:	0.75 m / scan
478 to 997	:	0.23 m / scan
997 to 1193	:	0.81 m / scan
1193 to 1503	:	0.92 m / scan
1503 to 1896	:	0.84 m / scan
1896 to 2134	:	0.75 m / scan
2134 to 2346	:	0.88 m / scan
2346 to 2637	•	0.69 m / scan
2637 to 3024	:	0.96 m / scan
3024 to 3341	:	0.85 m / scan

Data File 101-11413

Line6C-1-5.dt1

Target Area 6C-1, continue Line6C-1-2 along north ridge N. Parry, S. Traynor 24/03/94

Number of Traces	=	722
Number of pts/trc	=	375
Timezero at point	=	1
Total time window	=	600
Starting position	=	0.0000
Final position	=	721.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	50.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	4
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity		0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region	<u></u>	1 to 750
Selection Time	=	0 to 600 ns
Trace	=	1 to 722
Distance : scan ratio		
0 to 350	:	-
350 to 494	:	1.76 m / scan
494 to 648	:	1.76 m / scan
648 to 722	•	1.76 m / scan
	-	

Data File 101-11413

Line6C-1-6.dt1

Target Area 6C-1, continue Line6C-1-4 along north ridge N. Parry, S. Traynor 25/03/94

Number of Traces	=	177
Number of pts/trc		375
Timezero at point	=	80
Total time window	=	600
Starting position	=	0.0000
Final position	=	176.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	50.00
Antenna separation	=	1.0000
Pulsar voltage	=	400
Number of Stacks	=	1
Survey mode		Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	Ν
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region	=	1 to 750
Selection Time	=	-130 to 470 ns
Trace		1 to 177

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Line6C-1-7.dt1

Data File 101-11413

Target Area 6C-1, Line 6C-1-2 from access road to end of south ridge N. Parry, S. Traynor 24/03/94

	_	901
Number of Traces	=	375
Number of pts/trc	<u>***</u>	1
Timezero at point	=	£00
Total time window		0.000
Starting position	=	0.0000
Final position	=	1 0000
Step size used	=	1.0000
Position units	=	
Nominal frequency	=	1 000
Antenna separation	=	1.000
Pulsar voltage	=	1000
Number of Stacks	=	
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region		1 to 750
Selection Time	=	0 to 600 ns
Trace	=	1 to 901
Distance : scan ratio		/
0 to 184	:	0.53 m / scan
184 to 354	:	0.35 m / scan
354 to 463	•	1.22 m / scan
463 to 612	:	0.48 m / scan
612 to 763		0.35 m / scan
763 to 900	:	0.88 m / scan

Data File 101-11413

Line6C-1-8.dt1

Target Area 6C-1, Line 6C-1-3 from south ridge to BH 25 N. Parry, S. Traynor 24/03/94

Number of Traces	=	764
Number of pts/trc	=	375
Timezero at point		43
Total time window	· · · =	600
Starting position	=	0.0000
Final position	=	763.0000
Stop size used	=	1.0000
Step size used	_	metres
Nominal fraguency	=	50.00
A starsa constion	_	1.0000
Antenna separation	-	1000
Puisar voltage	_	4
Number of Stacks	-	Reflection
Survey mode		
Processing Selected		
Trace stacking	<u></u>	1
Points stacking	=	1
Trace differencing	=	N
Gain type		SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.000 of full window
Region	=	1 to 750
Selection Time	F	-25 to 475 ns
Trace		1 to 764
11400		
Distance : scan ratio		
0 to 764	:	0.94 m / scan

# TARGET AREA 6C-2

# GPR HEADER FILE DATA SHEETS

Data File 101-11413 CMP6C-2-1.dt1

CMP centred on station 95 Line 6C-2-1 Target Area 6C-2 N. Parry, S. Traynor 21/03/94

=	26
=	750
=	69
=	600
=	0.0000
=	25.0000
=	1.0000
=	metres
=	100.00
=	1.0000
=	1000
=	256
=	CMP/WARR
=	1
=	1
=	N
=	AGC
=	1.000 pulse windows
=	1.000 of full window
=	1 to 750 points
=	-75 to 525 ns
=	1 to 26

Data File 101-11413 CMP6C-2-2.dt1

CMP centred on station 127 Line 6C-2-2 Target Area 6C-2 N. Parry, S. Traynor 21/03/94

Number of Traces	=	24
Number of pts/trc	=	750
Timezero at point	=	118
Total time window	=	600
Starting position	=	0.0000
Final position	=	23.0000
Step size used	= .	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	256
Survey mode	=	CMP/WARR
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	AGC
Window	=	1.000 pulse windows
Amount	=	1.000 of full window
Region	=	1 to 750 points
Selection Time	=	-75 to 525 ns
Trace	=	1 to 24

Data File 101-11413

Line6C-2-1.dt1

Target Area 6C-2, Line 6C-2-1 from BH 20 to BH 21 N. Parry, S. Traynor 21/03/94

Number of Traces	=	190
Number of pts/trc	=	750
Timezero at point	=	131
Total time window	=	600
Starting position	=	0.0000
Final position	=	189.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	256
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking		1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	100 maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 190
Distance : scan ratio		
0 to 190	:	1.05

Data File 101-11413

Line6C-2-2.dt1

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Target Area 6C-2, Line 6C-2-2 from BH 21 to west peak N. Parry, S. Traynor 21/03/94

Number of Traces	=	254
Number of pts/trc	±	750
Timezero at point	=	147
Total time window	=	600
Starting position	-	0.0000
Final position	=	253.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	1000
Number of Stacks	=	256
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	100 maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 254
Distance : scan ratio		
0 to 254	:	1.096 m / scan

Data File 101-11413

Line6C-2-3.dt1

Target Area 6C-2, Line 6C-2-3 from west peak to BH 20 and north ridge N. Parry, S. Traynor 22/03/94

Number of Traces	=	199
Number of pts/trc	=	625
Timezero at point	=	59
Total time window	=	500
Starting position	=	0.0000
Final position	Ŧ	198.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation		1.0000
Pulsar voltage	=	1000
Number of Stacks	=	1
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	<b>=</b>	1
Trace differencing		N
Gain type		SEC
Velocity	=	0.150 m/ns
Attenuation		0.100 dB/m
Amount	=	100 maximum
Selection Time	=	-75 to 525 ns
Trace	=	1 to 199
Distance · scan ratio		
$\Lambda$ to 100	•	1.951 m / scan
0 10 177	•	1.751 m / boun

Data File 101-11413 Line6C-2-4.dt1

Target Area 6C-2, Line 6C-2-3 from west peak to BH 20 and north ridge N. Parry, S. Traynor 23/03/94

Number of Traces	=	1558
Number of pts/trc	=	625
Timezero at point	=	22
Total time window	=	500
Starting position		0.0000
Final position	=	1557.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage	Ξ	1000
Number of Stacks	=	4
Survey mode	=	Reflection
Processing Selected		
Trace stacking		1
Points stacking	=	1
Trace differencing	<u></u>	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation		0.100 dB/m
Amount	=	100 maximum
Selection	=	Time = -20  to  480  ns
Trace	=	1 to 1558
Distance : scan ratio		
0 to 263	:	1.476 m / scan
263 to 564	:	1.554 m / scan
564 to 896	:	1.571 m / scan
770 to 896	:	0.580 m / scan
896 to 1151	:	1.207 m / scan
1151 to 1557	:	1.404 m / scan

## TARGET AREA 4B-1

# GPR HEADER FILE DATA SHEETS

Line4B-1-1.dt1 Data File 101-11413 Target Area 4B-1, Line 4B-1-1 N. Parry, S. Traynor 27/03/94 293 Number of Traces = 500 Number of pts/trc = 60 Timezero at point = 400 Total time window = 0.0000 Starting position = 292.0000 Final position = 1.0000 Step size used = metres Position units = 100.00 Nominal frequency ÷ 1.0000 Antenna separation = 400 = Pulsar voltage 1 Number of Stacks = Reflection Survey mode = **Processing Selected** 1 Trace stacking = 1 Points stacking = Ν Trace differencing = SEC = Gain type 0.150 m/ns Velocity = 0.100 dB/m Attenuation = 100 maximum Amount = -50 to 350 ns Selection Time = 1 to 293 Trace = Distance : scan ratio 1.75 m / scan 0 to 293 :

Data File 101-11413

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Line4B-1-2.dt1

Target Area	4B-1, Line 4B-1-1 continued
N. Parry, S.	Traynor
27/03/94	

Number of Traces	=	515
Number of pts/trc	=	500
Timezero at point	<del></del>	34
Total time window		400
Starting position	=	0.0000
Final position	=	514.0000
Step size used		1.0000
Position units	=	metres
Nominal frequency	=	100.00
Antenna separation	=	1.0000
Pulsar voltage		400
Number of Stacks		1
Survey mode	=	Reflection
Processing Selected		
Trace stacking	=	1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.00 of full window
Region	=	1 to 750
Selection Time	=	-50 to 350 ns
Trace	=	1 to 515
Distance : scan ratio		
0 to 87	:	1.05 m / scan
87 to 401	:	0.74 m / scan
401 to 514	:	0.98 m / scan

Line4B-1-3.dt1 Data File 101-11413 Target Area 4B-1, Line 4B-1-2 N. Parry, S. Traynor 27/03/94 176 Number of Traces = 500 Number of pts/trc ----37 Timezero at point = 400 Total time window = 0.0000 Starting position = Final position 175.0000 = 1.0000 Step size used = Position units metres = 100.00 Nominal frequency = 1.0000 Antenna separation = 400 Pulsar voltage ÷== 1 Number of Stacks = Reflection Survey mode = **Processing Selected** 1 Trace stacking = Points stacking 1 = Ν Trace differencing = SEC Gain type = 0.150 m/ns Velocity -----0.100 dB/m Attenuation = 1.00 of full window Amount = 1 to 750 Region = -50 to 350 ns Selection Time = 1 to 176 Trace = Distance : scan ratio 0 to 176 0.96 m / scan :

Data File 101-11413

Line4B-1-4.dt1

Target Area 4B-1, Line 4B-1-2 continued N. Parry, S. Traynor 27/03/94

Number of Traces	=	893
Number of pts/trc	=	500
Timezero at point	=	1
Total time window	=	400
Starting position	=	0.0000
Final position	=	892.0000
Step size used	=	1.0000
Position units	=	metres
Nominal frequency	<b>#</b>	100.00
Antenna separation	=	1.0000
Pulsar voltage	=	400
Number of Stacks	=	8
Survey mode	=	Reflection
Processing Selected		
Trace stacking		1
Points stacking	=	1
Trace differencing	=	N
Gain type	=	SEC
Velocity	=	0.150 m/ns
Attenuation	=	0.100 dB/m
Amount	=	1.00 of full window
Region	=	1 to 750
Selection Time	=	-50 to 350 ns
Trace	-	1 to 893
Distance : scan ratio		
0 to 128	:	2.96 m / scan
128 to 448	:	0.67 m / scan
448 to 531	:	2.46 m / scan
531 to 893	:	2.46 m / scan

## APPENDIX C

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## PROCESSED GPR PROFILE DATA

## TARGET AREA 1

## PROCESSED GPR LINES

# TARGET AREA 6C-1

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## PROCESSED GPR LINES



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e	BA Engine	90rin(	g Cons	ultant	s Li
CLIENT	INDIAN	NORTH	ERN AFF	AIRS CA	NAD
DATE	95-04-03	DWN.	AJH	CHKD.	NS

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Led.	PROJECT GEO	OPHYSICAL INVESTIGATION O ES PROSPECT, NORTHERN R	F SELECTED GRANULAR ICHARDS ISLAND, N.W.T.	
DA	TITLE	TARGET AREA 6C-1 GPR/6C-1/LINE 1 ANTENNA FREQUENCY 100MHz		
NSP	FILE NO.	0101-95-11413	FIGURE C.2	






EBA Engineering Consultants Ltd.	PROJECT GEOPHYSICAL INVESTIGATION OF SELECTED GRANULAR RESOURCES PROSPECT, NORTHERN RICHARDS ISLAND, N.W.T
INDIAN NORTHERN AFFAIRS CANADA	TARGET AREA 6C-1 GPR/ 6C-1/ LINE 2, (CONT.), 2000 TO 2459m, ANTENNA FREQUENCY 100MHz
DATE 95-03-30 DWN. AJH CHKD. NSP	FILE NO. 0101-95-11413 FIGURE C.5

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Læd.	PROJECT GEI RESOURC	OPHYSICAL INVESTIGATION OF ES PROSPECT, NORTHERN RI	F SELECTED GRANULAR CHARDS ISLAND, N.W.T.
ADA	TARGET AREA 6C-1 GPR/ 6C-1/ LINE 2, (CONT.) 2000 TO 2589m, ANTENNA FREQUENCY 50MHz		
NSP	FILE NO.	0101-95-11413	FIGURE C.8

CHKD.



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d.	PROJECT GEOPHYSICAL INVESTIGATION OF RESOURCES PROSPECT, NORTHERN RI	SELECTED GRANULAR	
A	TARGET AREA 6C-1 GPR/ 6C-1/ LINE 3 ANTENNA FREQUENCY 50MHz		
;Р	FILE NO. 0101-95-11413	FIGURE C.9	



DATE 95-03-29 DWN.

d.	PROJECT GEO RESOURCI	OPHYSICAL INVESTIGATION C	OF SELECTED GRANULAR RICHARDS ISLAND, N.W.T.
4	ΠΤLΕ	TARGET ARE GPR/ 6C-1/ ANTENNA FREQUE	A 6C-1 LINE 4 ENCY 50MHz
P	FILE NO.	0101-95-11413	FIGURE C.10



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95		
)0m.ns )0 ≅ 0.154 ≌ 3.80	n/ns	•
eg"	PROJECT GEOPHYSICAL INVESTIGATION OF RESOURCES PROSPECT, NORTHERN RI	F SELECTED GRANULAR CHARDS ISLAND, N.W.T.
<b>A</b>	TARGET AREA GPR/6C-1/CMP 1 ANTENNA FREQUE	A 6C-1 AND CMP 2 NCY 50MHz
SP	FILE NO. 0101-95-11413	FIGURE C.11

## TARGET AREA 6C-2

# PROCESSED GPR LINES



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		1
බේ.	PROJECT GEOPHYSICAL INVESTIGATION OF RESOURCES PROSPECT, NORTHERN RIG	SELECTED GRANULAR CHARDS ISLAND, N.W.T.
A	TARGET AREA GPR/ 6C-2/ LINE 1 ANTENNA FREQUEN	6C-2 , AND LINE 2 ICY 100MHz
SP	FILE NO. 0101-95-11413	FIGURE C.12





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	EBA Engineering Consultants Ltd.			PROJECT	GEOPHYSICAL INVESTIGATION OF	SELECTED GRANULAR			
			6	,			RESOU	RCES PRUSPECT, NURTHERN RIG	CHARDS ISLAND, N.W.I.
C	LIENT	INDIAN M	NORTHI	ERN AFF	AIRS CA	NADA	ΠTLE	TARGET AREA GPR/ 6C-2/ LINE 3, ( 2243m, ANTENNA FREC	6C-2 CONT.) 2000 TO QUENCY 100MHz
٥	ATE	95-03-30	DWN.	AJH	CHKD.	NSP	FILE NO.	0101-95-11413	FIGURE C.15







DIRECT WAVE VELOCITY, AIR ≈ 0.300m/ns DIRECT WAVE DIELECTRIC, AIR ≈ 1.00 DIRECT WAVE DIELECTRIC, AIR = 1.00 DIRECT WAVE VELOCITY, GROUND = 0.169m/ns DIRECT WAVE DIELECTRIC, GROUND = 3.13 REFLECTED WAVE VELOCITY, FIRST LAYER = 0.136m/ns REFLECTED WAVE DIELECTRIC, FIRST LAYER = 4.83 DIRECT WAVE, AIR REFLECTED WAVE, FIRST LAYER

Ed.	PROJECT GEOPHYSICAL INVESTIGATION RESOURCES PROSPECT, NORTHERN	I OF SELECTED GRANULAR I RICHARDS ISLAND, N.W.T.
DA	GPR/ 6C-2/ CM ANTENNA FREQU	REA 6C-2 P 1 AND CMP 2 JENCY 100MHz
ISP	FILE NO. 0101-95-11413	FIGURE C.16

# TARGET AREA 4B-1

### PROCESSED GPR LINES



LINE 1



E	BA Engine	ooring	j Cons	ultant	s Ltd.	I
CLIENT	INDIAN NORTHERN AFFAIRS CANADA					
DATE	95-03-29	DWN.	AJH	СНКО.	NSP	









zd.	PROJECT RESOL	GEOPHYSICAL INVESTIGATION OF	F SELECTED GRANULAR
A	ΠኪΕ	TARGET ARE GPR/ 4B-1/ LINE 2, ( 1857m, ANTENNA FRE	A 4B-1 (CONT.), 1000 TO QUENCY 100MHz
SP	FILE NO.	0101-95-11413	FIGURE C.19

# APPENDIX D

5

## **EM-34 PROFILE DATA**

# TARGET AREA 6C-1

# FIELD DATA AND PROCESSED MODEL DATA EM-34

SURVEY RECORD DESIGNATION: ELECTRONIC DATA FILE: EM-34/6C-1/Line 1 EM6C-1-1

### DATA SET: DIAND

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CLIENT:	Indian & Northern Affairs	DATE:	March 25, 1994
LOCATION:	Hansen Harbour	LINE:	6
COUNTY:	Richards Island, NWT	<b>AZIMUTH:</b>	North - South
PROJECT:	0101-94-11413	EQUIPMENT:	GEONICS EM-34
		,	

### THERE ARE 46 STATIONS WITH DATA

COMI	?.	LOCATION			- DATA	AT	SPACING	(m)	
			10.00	20.00	40.00				
VMD HMD	data data	5.0 5.0	1.7 NONE	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 10.0 : 10.0	NONE NONE	4.7 1.0	9.3 NONE				
VMD HMD	DATA DATA	: 15.0 : 15.0	1.5 1.3	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	20.0 20.0	NONE NONE	6.1 1.2	NONE NONE				
VMD HMD	DATA DATA	25.0 25.0	1.3 1.1	NONE NONE	NONE NONE				
VMD HMD	data Data	: 30.0 : 30.0	NONE NONE	NONE NONE	NONE 6.7				
VMD HMD	data Data	35.0 35.0	1.6 1.1	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	40.0 40.0	NONE NONE	5.8 2.4	NONE NONE				
VMD HMD	DATA DATA	45.0 45.0	1.8 1.1	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	50.0 50.0	NONE NONE	4.9 1.5	9.4 7.0				
VMD HMD	DATA DATA	55.0 55.0	1.9 1.2	NONE NONE	NONE NONE				

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COM	?.	LOCATION			DATA	AT	SPACING	(m)	
			10.00	20.00	40.00			•••	
VMD	DATA	60.0	NONE	NONE	NONE				
HMD	DATA	: 60.0	NONE	NONE	NONE				
VMD	DATA	: 65.0	1.6	NONE	NONE				
HMD	DATA	: 65.0	1.0	NONE	NONE				
VMD	מידעת	• 70 0	NONE	5 6	<u>م</u> ۵				
HMD	DATA	70.0	NONE	2.4	NONE				
			410414	2.17	MOHL				
VMD	DATA	: 75.0	1.7	NONE	NONE				
HMD	DATA	: 75.0	0.8	NONE	NONE				
				<i>c</i>					
VMD	DATA	80.0	NONE	6.3	NONE				
HMD	DATA	80.0	NONE	1.7	NONE				
VMD	מידעם	85.0	1.7	NONE	NONE				
HMD	DATA	85.0	1.0	NONE	NONE				
			110	nond	NOND				
VMD	DATA	90.0	NONE	NONE	NONE				
HMD	DATA	90.0	NONE	NONE	7.7				
VMD	DATA	95.0	1.7	NONE	NONE				
HMD	DATA	\$ 95.0	1.1	NONE	NONE				
VMD	משמת	100 0	NOND	6 5	NONE				
HMD	DATA		NONE	1 8	NONE				
	211111	. 10010	NOUT	1.0	NONE				
VMD	DATA	: 105.0	1.7	NONE	NONE				
HMD	DATA	: 105.0	1.1	NONE	NONE				
VMD	DATA	: 110.0	NONE	6.1	9.4				
HMD	DATA	: 110.0	NONE	2.6	7.4				
37MD	מידע מ	115 0	17	NONE	NONE				
HMD	DATA	115.0	1 2	NONE	NONE				
11112	<i>D</i> 11111		1+2	NONE	NONE				
VMD	DATA	: 120.0	NONE	NONE	NONE				
HMD	DATA	: 120.0	NONE	NONE	NONE				
		<b></b> .							
VMD	DATA	: 125.0	1.8	NONE	NONE				
HMD	DATA	: 125.0	1.2	NONE	NONE				
TAND	אמשערו	120 0	NONE	<u> </u>	0 1				
TWA	DATA	5 130.0	NONE	0.2	y.l None				
mu	DUTU	, T20.0	NONE	2.1	NONE				

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COME	<b>,</b>	ТОСАТТОН				አጥ	SDACTNG	(m)	
COM	•	LOCATION	10.00	20.00	40.00	Π	DFACING	()	
VMD	DATA	: 135.0	1.7	NONE	NONE				
HMD	DATA	: 135.0	1.2	NONE	NONE				
VMD	DATA	: 140.0	NONE	7.2	NONE				
HMD	DATA	140.0	NONE	3.1	NONE				
		. 145 0							
	DATA		1.0	NONE	NONE				
	211211		1.0	NONA	nonii				
VMD	DATA	: 150.0	NONE	NONE	NONE				
HMD	DATA	: 150.0	NONE	NONE	7.3				
VMD	DATA	: 155.0	1.5	NONE	NONE				
HMD	DATA	155.0	1.1	NONE	NONE				
		1.60 0							
VMD	DATA		NONE	6.9	NONE				
HMD	DATA	: 160.0	NONE	3.0	NONE		1		
VMD	DATA	: 165.0	1.7	NONE	NONE				
HMD	DATA	: 165.0	1.1	NONE	NONE				
VMD	DATA	: 170.0	NONE	8.2	9.6				
HMD	DATA	170.0	NONE	2.8	7.6				
VMD	DATA	: 175.0	1.9	NONE	NONE				
HMD	DATA	: 175.0	1.3	NONE	NONE				
VMD	DATA	: 180.0	NONE	NONE	NONE				
HMD	DATA	180.0	NONE	NONE	NONE				
VMD	DATA	: 185.0	1.8	NONE	NONE				
HMD	DATA	: 185.0	1.3	NONE	NONE				
VMD	DATA	: 190.0	NONE	8.0	10.1				
HMD	DATA	: 190.0	NONE	4.0	NONE				
		105 0	1 0						
VMD	DATA	195.0	1.9	NONE	NONE				
HMD	DATA	192.0	۲.٦	NONE	NONE				
VMD	DATA	: 200.0	NONE	7.5	NONE				
HMD	DATA	: 200.0	NONE	4.0	NONE				
VMD	משמח	. 205 0	2 0	NOND	NONP				
HMD	DATA	205.0	1.3	NONE	NONE				

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COME	<b>?</b> .	LOCATION			- DATA	AT	SPACING	(m)	
			10.00	20.00	40.00			• •	
VMD	DATA	: 210.0	NONE	NONE	NONE				
HMD	DATA	: 210.0	NONE	NONE	6.5				
VMD	DATA	: 215.0	1.6	NONE	NONE				
HMD	DATA	: 215.0	NONE	NONE	NONE				
VMD	DATA	: 220.0	NONE	7.8	NONE				
HMD	DATA	: 220.0	NONE	NONE	NONE				
VMD	DATA	: 225.0	NONE	NONE	NONE				
HMD	DATA	: 225.0	NONE	NONE	NONE				
VMD	DATA	: 230.0	NONE	NONE	10.0				
HMD	DATA	: 230.0	NONE	NONE	8.6				

THERE ARE 46 LAYERED INTERPRETATIONS

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LOCATION	SIG-1	SIG-2	SIG-3	H-1	H-2	FIT
(m)	(mmho/m)	(mmho/m)	(mmho/m)	(m)	(m)	(୫)
5.00	2.12	30030.	1.00	28.0	6.96	.000113
10.00	1.96	29838.	1.00	27.9	6.96	.0158
15.00	1.67	26031.	1.00	26.8	6.91	.0439
20.00	1.35	22937.	1.00	25.8	6.85	.00421
25.00	1.20	23012.	1.00	25.9	6.90	.0764
30.00	1.51	23449.	1.00	26.0	6.87	.106
35.00	1.80	23934.	1.00	26.2	6.87	.0139
40.00	1.97	24357.	1.00	26.4	6.88	.150
45.00	2.21	26379.	1.00	27.0	6.92	.116
50.00	2.42	28584	1.00	27.8	6.94	.0152
55.00	2.55	28097.	1.00	27.7	6.93	.0389
60.00	2.27	27223.	1.00	27.3	6.92	.0420
65.00	1.98	26396.	1.00	27.0	6.91	.0458
70.00	1.99	25843.	1.00	26.8	6.89	.0506
75.00	1.94	24062.	1.00	26.3	6.82	.0713
80.00	1.87	22517.	1.00	25.7	6.74	.0229
85.00	1.89	22317.	1.00	25.6	6.73	.0236
90.00	1.90	22110.	1.00	25.6	6.72	.0223
95.00	1.90	21914.	1.00	25.5	6.71	.0444
100.00	1.86	21662.	1.00	25.4	6.69	.0723
105.00	1.90	22389.	1.00	25.7	6.73	.121
110.00	1.93	23220.	1.00	25.9	6.77	.0259
115.00	1.91	23201.	1.00	25.9	6.77	.0459
120.00	1.96	23282.	1.00	25.9	6.73	.0361
125.00	2.01	23360.	1.00	25.8	6.70	.0279

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LOCATION	SIG-1	SIG-2	SIG-3	H-1	H−2	FIT
(m)	(mmho/m)	(mmho/m)	(mmho/m)	(m)	(m)	(୫)
130.00	1.92	23257.	1.00	25.8	6.77	.0503
135.00	1.70	21197.	1.00	25.2	6.82	.0934
140.00	1.46	19488.	1.00	24.7	6.87	.0541
145.00	1.39	19520.	1.00	24.8	6.94	.115
150.00	1.31	19577.	1.00	24.9	7.03	.126
155.00	1.24	19688.	1.00	25.0	7.12	.137
160.00	1.45	19989.	1.00	25.0	6.93	.107
165.00	1.45	18260.	1.00	24.3	6.74	.0133
170.00	1.43	16813.	1.00	23.6	6.59	.00110
175.00	1.65	17057.	1.00	23.7	6.42	.0247
180.00	1.58	17075.	1.00	23.7	6.47	.0280
185.00	1.52	17037.	1.00	23.8	6.51	.270
190.00	1.67	17251.	1.00	23.9	6.43	.0153
195.00	1.88	17875.	1.00	24.1	6.38	.000619
200.00	2.08	18537.	1.00	24.4	6.34	.00405
205.00	2.18	18435.	1.00	24.3	6.27	.00703
210.00	1.74	17926.	1.00	24.2	6.47	.00935
215.00	1.30	17399.	1.00	24.1	6.73	.0198
220.00	1.27	17226.	1.00	24.0	6.73	.0821
225.00	1.27	17233.	1.00	24.0	6.73	.0818
230.00	1.27	17226.	1.00	24.0	6.73	.0109

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# TARGET AREA 6C-2

# FIELD DATA AND PROCESSED MODEL DATA EM-34

SURVEY RECORD DESIGNATION: ELECTRONIC DATA FILE: EM-34/6C-2/Line 1 EM6C-2-1

### DATA SET: DIAND

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CLIENT:	Indian & Northern Affairs	DATE:	March 23, 1994
LOCATION:	Wallace Bay	LINE:	1
COUNTY:	Richards Island, North Head	<b>AZIMUTH:</b>	North - South
PROJECT:	0101-94-11413	EQUIPMENT:	GEONICS EM-34

### THERE ARE 46 STATIONS WITH DATA

COM	Ρ.	LOCATION			- DATA	AT	SPACING	(m)	
			10.00	20.00	40.00				
VMD	DATA	: 0.0	NONE	1.5	NONE				
HMD	DATA	: 0.0	NONE	0.5	NONE				
VMD	DATA	: 5.0	-0.3	NONE	NONE				
HMD	DATA	5.0	2.1	NONE	NONE				
	<u>ה</u> מתאם	10 0	NONE	- <b>1</b> /	0 2				
HMD	DATA	10.0	NONE	0.7	6.7				
	DATA:		2.0	NONE	NONE				
111-113				NONE	NONE				
VMD	DATA	20.0	NONE	1.7	NONE				
HMD	DATA	20.0	NONE	0.3	NONE				
VMD	DATA	25.0	0.4	NONE	NONE				
HMD	DATA	25.0	1.9	NONE	NONE				
VMD	DATA	30.0	NONE	1.5	9.7				
HMD	DATA	30.0	NONE	0.6	5.8				
	איזאמ	35.0	1 0	NONE	NOND				
HMD	DATA:	35.0	1.0	NONE	NONE				
·							·		
	DATA:		NONE	1.5	NONE				· · · ·
iinb	<i>D4</i> 34 <i>6</i> 10	40.0	NONE	1.0	NONE				
VMD	DATA	45.0	2.1	NONE	NONE				
HMD	DATA	45.0	1.4	NONE	NONE				
VMD	DATA	50.0	NONE	1.4	8.7				
HMD	DATA	50.0	NONE	0.9	7.7				

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	COMP.	LOCATION	 10.00	20.00	- DATA 40.00	АТ	SPACING	(m)	
1	VMD DATA	A: 55.0	2.1	NONE	NONE				
	VMD DATA	A: 60.0	NONE	1.5	NONE				
1	VMD DATA	A: 65.0	2.2 1.7	NONE	NONE				
	VMD DATA	A: 70.0	NONE	1.6	8.7 7 9				
	VMD DATZ	A: 75.0 A: 75.0	2.1	NONE	NONE				
	VMD DATA	A: 80.0 A: 80.0	NONE	1.4	NONE				
	VMD DATA	A: 85.0 A: 85.0	2.0	NONE NONE	NONE				
	VMD DATA HMD DATA	A: 90.0 A: 90.0	NONE NONE	1.6 0.6	9.3 7.3				
	VMD DATA HMD DATA	A: 95.0 A: 95.0	2.1 1.4	NONE NONE	NONE NONE				
	VMD DATA HMD DATA	A: 100.0 A: 100.0	NONE NONE	1.7 0.8	NONE NONE				
	VMD DATZ HMD DATZ	A: 105.0 A: 105.0	2.3 1.4	NONE NONE	NONE NONE				
	VMD DATA HMD DATA	A: 110.0 A: 110.0	NONE NONE	1.8 1.0	9.1 6.5				
	VMD DATA HMD DATA	A: 115.0 A: 115.0	2.1 1.2	NONE NONE	NONE NONE				
	VMD DATA HMD DATA	A: 120.0 A: 120.0	NONE NONE	1.8 0.7	NONE NONE				
	VMD DATA HMD DATA	A: 125.0 A: 125.0	2.0 1.2	NONE NONE	NONE NONE				

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COMP	<b>·</b> ·	LOCATION	10.00	20.00	- DATA 40.00	АТ	SPACING	(m)	
VMD HMD	DATA DATA	: 130.0 : 130.0	NONE NONE	1.5 -0.3	9.4 8.2				
VMD HMD	DATA DATA	: 135.0 : 135.0	2.1 1.5	NONE NONE	NONE NONE				
VMD HMD	data data	: 140.0 : 140.0	NONE NONE	1.6 1.2	NONE NONE				
VMD HMD	data data	: 145.0 : 145.0	2.1 1.7	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 150.0 : 150.0	NONE NONE	1.6 1.1	9.2 7.0				
VMD HMD	DATA DATA	: 155.0 : 155.0	2.1 1.8	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 160.0 : 160.0	NONE NONE	1.7 4.9	NONE NONE				
VMD HMD	DATA DATA	: 165.0 : 165.0	2.2 1.6	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 170.0 : 170.0	NONE NONE	1.9 3.8	10.5 7.1				
VMD HMD	data Data	: 175.0 : 175.0	2.1 1.2	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 180.0 : 180.0	NONE NONE	4.9 4.7	NONE NONE				
VMD HMD	DATA DATA	: 185.0 : 185.0	1.7 1.4	NONE NONE	NONE NONE				. •
VMD HMD	DATA DATA	: 190.0 : 190.0	NONE NONE	4.8 5.1	8.7 8.3				
VMD HMD	DATA DATA	: 195.0 : 195.0	2.1 1.6	NONE NONE	NONE NONE				
VMD HMD	DATA DATA	: 200.0 : 200.0	NONE NONE	4.9 4.8	NONE NONE				

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COMI	?.	LOCATIO	<b>NN</b>	10.00	20.00	- DATA 40.00	AT SP	ACING	(m)			
VMD HMD	DATA: DATA:	205 205	. 0 . 0	1.9 1.1	NONE NONE	NONE NONE						
VMD HMD	DATA: DATA:	210 210	0	NONE NONE	4.9 4.9	9.1 5.8						
VMD HMD	DATA: DATA:	215 215	0	1.6 0.6	NONE NONE	NONE NONE						
VMD HMD	DATA: DATA:	220 220	.0.0	NONE NONE	1.7 5.0	NONE NONE						
VMD HMD	DATA: DATA:	225 225	.0	2.1 1.2	NONE NONE	NONE NONE						
	THER	E ARE	46	LAYEREI	) INTEF	PRETAT	IONS					
-	LO	CATION (m)	(1	SIG-1 mmho/m)	SIC (mmh	5-2 no/m)	SIG-3 (mmho/	; 'm )	H-] (m)	L	H-2 (m)	FIT (%)
	·	0.00		1.53 4.74	.002	200	9260. 9260.		2.66	5	44.6 45.9	7.25
		10.00 15.00 20.00		1.56 10.9 1.96	.002	200 200 200	9260. 9260. 9260.		9.21 3.52 11.2	2	41.0 45.8 38.3	.407 .359 .0877
		25.00 30.00		2.48 2.58	.002	200	9260. 9260.		2.75	5 3 7	43.8 42.1 45.7	6.56 .244 .419
		40.00		11.8	.002	200	9260. 9260.	, , ,	3.29	2	46.2	.369
		50.00 55.00 60.00		13.7 12.2 10.5	.002 .002 .002	200 200 200	9260. 9260. 9260.		3.18 3.47 3.86	3 7 5	47.4 47.1 46.8	.315 .0836 .188
		65.00 70.00		9.89 8.14	.002	200	9260. 9260.		4.07	7 L	46.5	.0414 .386
		80.00		23.0 13.6	.002	200	9260. 9260. 9260.	) ) · · · ·	2.31	, l 7	47.3	.0558
		90.00 95.00 100.00		10.9 9.40 8.49	.002	200 200 200	9260. 9260. 9260.	•	3.61 4.10 4.56	L D 5	45.8 45.4 45.1	.270 .0632 .430
		105.00		7.31	.002	200	9260. 9260.	•	5.3	7	44.4	.223
		120.00		5.29	.002	200	9260. 9260.	•	6.6	3	43.0 43.0	.120

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LOCATION	SIG-1	SIG-2	SIG-3	H-1	H-2	FIT
(m)	(mmho/m)	(mmho/m)	(mmho/m)	(m)	(m)	(୫)
125.00	8.05	.00200	9260.	4.43	44.9	.487
130.00	25.1	.00200	9260.	2.21	46.4	.0538
135.00	13.5	.00200	9260.	3.18	45.8	.364
140.00	8.75	.00200	9260.	4.32	45.0	.490
145.00	10.0	.00200	9260.	3.98	45.4	.0689
150.00	10.0	.00200	9260.	3.92	45.5	.0725
155.00	8.28	.00200	9260.	4.41	44.5	.488
160.00	8.69	.00200	9260.	4.38	43.8	.494
165.00	8.54	.00200	9260.	4.61	42.9	5.81E-6
170.00	6.58	.00200	9260.	5.53	41.5	.0174
175.00	2.81	9260.	37345.	32.6	.816	.000511
180.00	2.50	9260.	31809.	27.3	.170	.00144
185.00	2.21	9260.	33128.	27.1	.109	.0132
190.00	2.57	9260.	35449.	27.1	.0567	.00663
195.00	2.91	9260.	35325.	27.2	.0559	.00168
200.00	2.73	9260.	34437.	27.1	.0563	.00495
205.00	2.70	9260.	1.20E5	19.7	.0570	.0202
210.00	2.29	9260.	33269.	27.1	.0550	.00301
215.00	2.23	9260.	44338.	30.9	.0554	.000197
220.00	2.08	.00200	9260.	53.0	.144	8.90
225.00	2.27	.00200	9260.	53.3	.182	11.2

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