ASSESSMENT WORK REPORT
ON THE
KELLY 1 - 5 AND TRISH 1 - 2
MINERAL CLAIMS

Located on Lang Creek, in the
Vancouver Mining Division
NTS 92F/16W
British Columbia
at
49° 48' N. Latitude
124° 25' W. Longitude

Owned by
Fargo Resources Limited

Operated by
Fargo Resources Limited

James A. Currie, P.Eng.

February 1988

FARGO RESOURCES LIMITED

Assessment Work Report

Lang Bay Property, B.C.

I N D E X

ILLUSTRATIONS

APPENDICES

1. INTRODUCTION

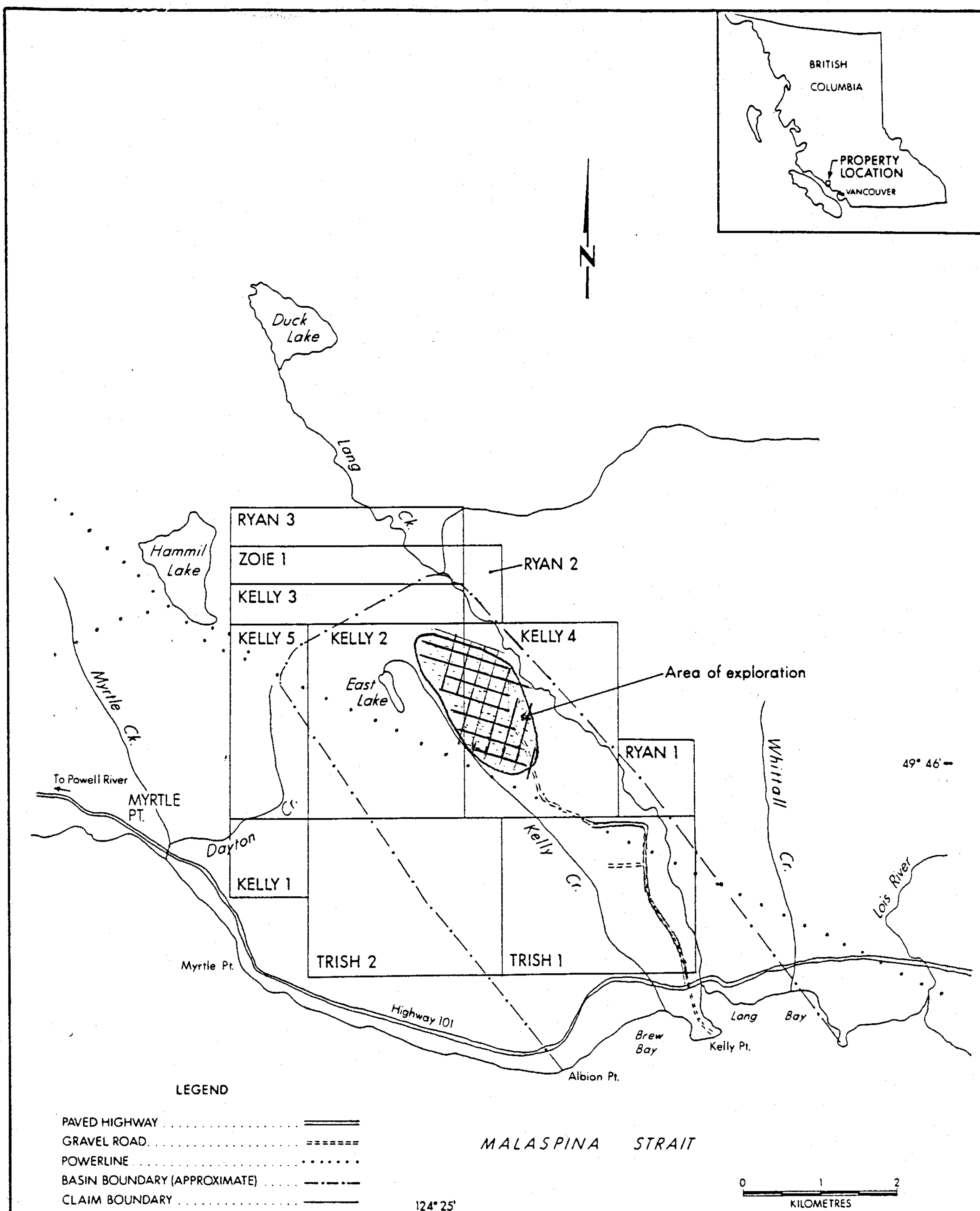
In 1981, Fargo Resources Limited acquired a group of claims near Lang Bay, British Columbia. These claims cover a sedimentary basin known to contain high values of gallium and germanium. Recent exploration programs on the property also show the presence of kaolinitic clays.

In the fall of 1986, tests carried out at The University of British Columbia identified the clay as high quality kaolin. Further testwork by Clayburn Refractories Ltd. of Abbotsford, British Columbia, indicated that the clay could be used for refractory grade products.

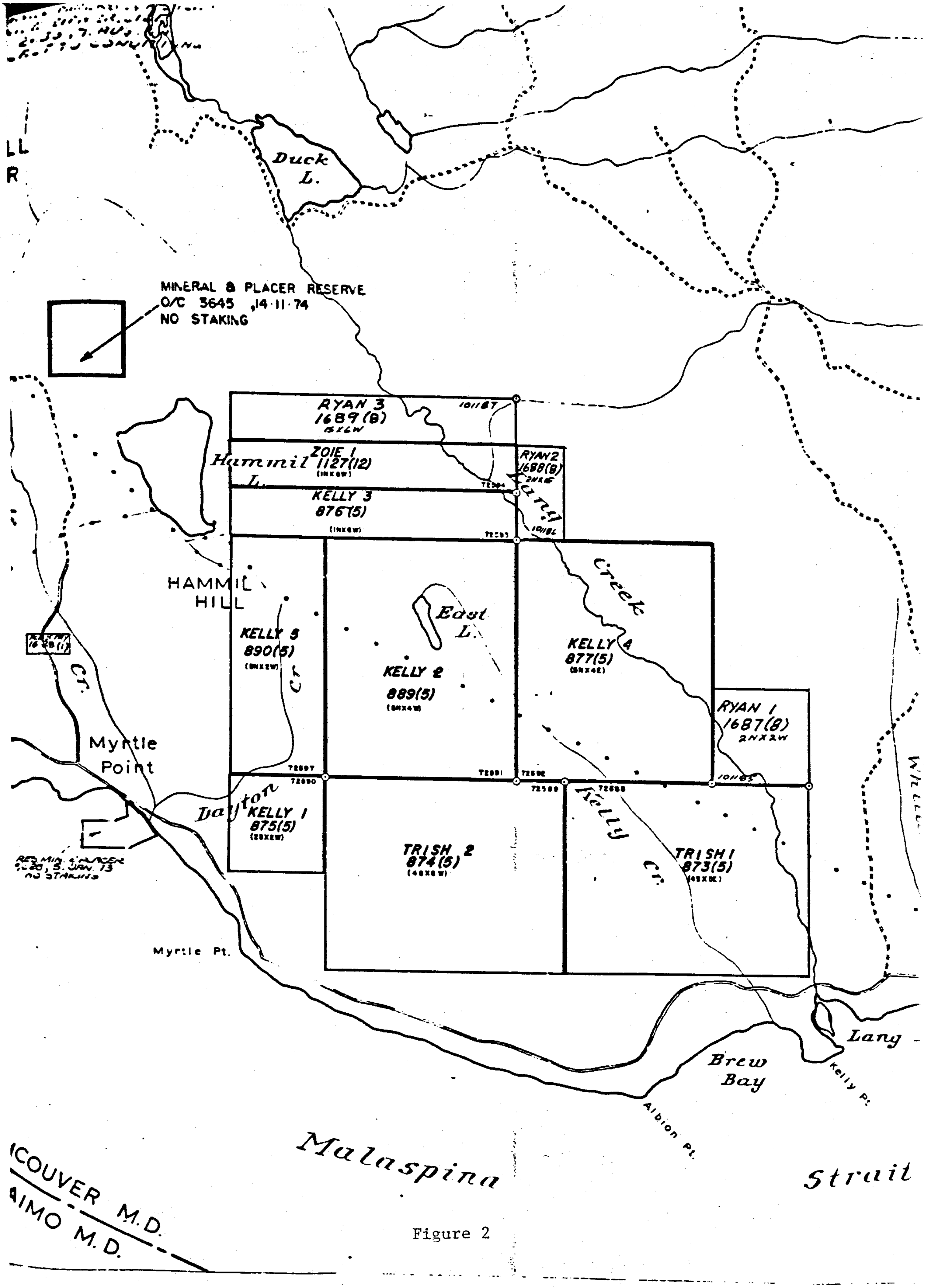
An extensive exploration program was initiated in September 1987 which consisted of the following:

- 6,700 meters of seismic refraction survey,
- 10,500 meters of magnetomer survey,
- 10,000 meters of Dipole-Dipole resistivity survey,
- 4 Schlumberger electrical soundings,
- 1,500 meters of reverse circulation drilling.

To test the amenability of these clays to standard beneficiation techniques, testwork was performed on four selected samples by F.W.A. Sutton of Cornwall, England.



FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
SITE PLAN	FIGURE I



Duck L.
MINERAL & PLACER RESERVE
O/C 3645 ,14·11·74
NO STAKING
RYAN 3
1689(8)
10118T
ZOIE 1
1127(12)
Hammil L.
RYAN 2
1688(8)
KELLY 3
876(5)
Lang
Creek
HAMMIL HILL
East L.
KELLY 5
890(5)
KELLY 2
889(5)
KELLY 4
877(5)
RYAN 1
1687(8)
Myrtle Point
Cr.
Dayton
KELLY 1
875(5)
TRISH 2
874(5)
Kelly Cr.
TRISH 1
873(5)
Myrtle Pt.
Brew Bay
Lang
Kelly Pt.
Albion Pt.
Malaspina
Strait
COUVER M.D.
AIMO M.D.

Figure 2

2. CLAIMS

Fargo Resources Limited, 900 - 850 West Hastings Street, Vancouver, B.C. V6C 1E1, is the registered holder of the following mineral claims at Lang Bay:

Claim Name	Record Number	Number of Units	Record Date
Trish 1	873	20	May 4, 1988
Trish 2	874	20	May 4, 1988
Kelly 1	875	4	May 4, 1989
Kelly 2	889	20	May 8, 1988
Kelly 3	876	6	May 4, 1988
Kelly 4	877	20	May 4, 1989
Kelly 5	890	10	May 8, 1988
		100	
Zoie 1	1127	6	Dec. 15, 1988
Ryan 2	1688	2	Aug. 20, 1988
Ryan 3	1689	6	Aug. 20, 1988
		14	
Ryan 1	1687	4	Aug. 20, 1988
		118	

This report pertains to the Trish 1-2 and Kelly 1-5 mineral claims, known as the Kelly group.

3. LOCATION

The claim group lies 15 km southeast of the town of Powell River, British Columbia, and centered on Lang Creek. General physiographic boundaries are Malaspina Strait between Lang Bay and Myrtle Point to the south, Myrtle Creek and Hammil Lake to the west and northwest, Lang Creek to the north and Whittall Creek to the east. The approximate coordinates are 49° 48' N and 124° 25' W. The NTS map reference for the area is 92F/16W.

4. ACCESS

Highway 101 follows the coast from Saltery Bay to Powell River and passes very near to the southern border of the Kelly claim group. A good paved secondary road connecting to Highway 101 between Lang Creek and Kelly Creek extends north and then west where a tote road in useable condition, gives access to the area where the drilling was undertaken.

5. CLIMATE, TOPOGRAPHY AND LOCAL RESOURCES

The moderately undulating terrain has a maximum elevation of approximately two hundred and fifty meters above sea level near the northeast corner of the property. The ground slopes gently to the southeast. Lang Creek has cut its valley about fifteen to thirty meters below the general level of the surrounding area.

The area is covered with a mixed second growth forest consisting mainly of fir, hemlock, cedar and alder.

The water supply is plentiful due to the many streams and creeks on the property, the main ones being centrally located Lang creek and Kelly creek, both flowing southeasterly and to the west, Deighton Creek flowing southerly into Malaspina strait.

The climate is mild with an annual rainfall from 40 to 50 inches (100 - 125 mm) and minimal snowfall in the winter.

Dissecting the property in a northwest to southeast line is a high voltage power line.

The drilling program undertaken around the discovery hole (87-7) delineated the following:

7.1 Overburden

The overburden encountered ranges between 50' (15 m) with hole 87-18 and 170' (50 m) with hole 87-27. The superficial layer, 15' (4.5 m) to 25' (7.5 m) thick is composed of oxidized till with numerous boulders. This is underlain by a glacial deposit of grey sand, blue clay/clayey sand and a deposit of coarse grey washed sand, usually water saturated.

7.2 Brown Bed Formation

The formation contains dark brown horizons with germanium carrying coal lenses locally called the brown bed.

The brown bed formation is formed by a succession of thin bedded from 6" (0.15 m) to 30' (9 m) thick, shales, sandstones, clays and conglomerates with colours ranging from black, grey and purple grey for shales; grey, beige, white, brown and red for clays; to grey for sandstones and conglomerates.

Coal cuttings and organic fragments are present in brown, beige and black shale/clay horizons.

The dip trend is south westerly with a dip angle up to 20°.

7.3 Kaolin and Arkosic Formation

The formation encompasses four consecutive phases of kaolin formation from the basement upwards:

1. Feldspar alteration of the granitic rock in place, the other elements in the granitic structure remain undisturbed.

2. Arkosic sandstones, medium to coarse grained, consisting of reworked, quartz and feldspar. They are moderately to well endurated, interbedded with kaolinitic clay and their biotite content increases with depth.

3. Kaolin residual of primary deposit is found above the arkosic sandstones generally of colour white to light grey.

4. Kaolinitic clays of secondary deposit lay in the upper part of the formation. The colour is white, light grey or beige and the presence of sparse small rounded pebbles indicates some type of water transport.

Secondary kaolinitic clays are also found in the brown bed formation.

The kaolin deposit trend is along a structural feature oriented South-East, North-West and trending through the drill holes 87-9, 97-20, 87-30, and 87-33 (Fig. 2). The maximum thickness and the whitest kaolin found along this line of fracturation would suggest weathering of the underlying granitoid rock by hydrothermal processes.

The arkosic formation lays above the granitic bedrock with an average thickness of 45' (13.5 m) to 50' (15 m).

8. 1987 DRILLING PROGRAM

During the period between September 27 and November 11, 1987, 27 holes were drilled (87-8 through 87-34), totalling 4,912' (1,473 m); 1,060' (381 m) were sampled by air circulation drilling through the clay formations. The dry cuttings were bagged on 2' (0.6 m) intervals, then later split and stored on the property for further analysis. The holes were drilled by Cora-Lynn Drilling, Strathmore, Alberta.

The drill logs, figure and map showing the locations of these holes together with the different related cross-sections, are presented in the report of Christian Pilon dated December 1987 and attached hereto as Appendix A.

9. GEOPHYSICS PROGRAMS

9.1 Seismic Refraction Survey

In September 1987, approximately 6,700 m (22,000') of seismic refraction survey was carried out by Foundex Geophysics Inc., over seven East-West oriented parallel lines, between Lang Creek and Kelly Creek. An EG and G Geometrics 12 channels instrument was used, with 30 m (100') spacing between geophones. The results are presented in their report dated October 1987, and attached hereto as Appendix B.

The seismic work gives a good understanding of the basement configuration and of the faulting involved.

Seismic results can still be improved upon through the use of tighter geophones spacing and grid profiling.

9.2 Bore Hole Logging

Bore logging was carried out in ten (10) drill holes (87-8, 9. 10, 14, 15, 17, 18, 20 and 87-21) by Foundex Geophysics with a Mount Sopris 1000-C logger equipped with a gamma ray - resistivity-SP probe.

Gamma ray readings were taken in all of the holes either through the casing or through the drill pipe.

Resistivity readings were only possible in hole 87-14.

The main obstacles to resistivity readings lay with the necessity of casing the overburden and the instability of the holes through the formation as they usually started collapsing when filled with water to assure conductivity for the electrical probe.

The absence of resistivity readings and reliable correlation to core samples prevented the logging to be used to its full extent for correlation between holes.

The bore hole logging consequently was stopped on October 16, 1987.

The gamma and resistivity logs have been reproduced to scale on the corresponding drill logs.

9.3 Magnetometer and Electrical Resistivity Surveys

During December 1987, resistivity and magnetometer surveys were carried out by Foundex Geophysics Inc. of Vancouver. The results presented in their report dated December 1987, are attached hereto as Appendix C.

Approximately 10.5 km of line were surveyed at 12.5 m intervals using a Gem Systems Lamontagne GSM - 18 rowing magnetometer and a GSM-18 with extended memory as a base station.

An ABEM SAS 300B resistivity meter was used to profile 11 km of line by Dipole-Dipole resistivity with a "a" spacing of 25 meters over 5 separations with "n" values ranging from 1 to 5 in shallower basement areas and 2 to 6 in the deeper south west grid areas.

The resistivity survey outlined three near surface conductive zones, one of which is centered around hole 87-7. A large conductive zone located about 1 km to the south east of the drilling area presents an excellent potential for extended kaolin reserves.

The magnetometer survey outlined a strong north westerly striking lineament separating high magnetic susceptibility material to the north east from low susceptibility to the south west likely representing a fault zone. In addition, a north south trending fault has also been confirmed by this survey.

10. TOPOGRAPHIC SURVEY

The topographic survey over the exploration area has been conducted by R.J. Durling and Associates, 4775 Joyce Avenue, Powell River, B.C. who established a survey map and provided elevation profiles for the seismic lines.

The drill holes were tied to the exploration grid and surveyed for their elevations.

A copy of Plan for Seismic Survey is included in Appendix "A" to this report.

11. KAOLIN TESTWORK

Beneficiation testing has been conducted by Mr. Frank W.A. Sutton, Processing Consultant of Cornwall, England.

Mr. Sutton selected 4 representative kaolin clay samples from the September - November 1987 drilling program to determine whether Lang Bay kaolin could be used as filler in the paper industry.

The four samples selected were as follows:

Code	Hole #	Depth Increment - Feet
Grey White (GW)	87-20	100 - 132
Green Grey (GG)	87-34	258 - 260
Light Brown (LB)	87-26	257 - 267
Grey Brown (GB)	87-27	252 - 264

Tests by Mr. F. Sutton have shown the "GW" material as very suitable in terms of particule size and abrasiveness for use as a filler in the paper industry.

Positive results were obtained in the beneficiation process using magnetic separation and hydrochloric treatment, improving the raw brightness by some 7 points. Mr. Sutton's tests on fired brightness and fired concentration showed the clay samples "GW" "GB" and "LB" as very suitable for ceramic use.

Mr. Sutton's report is presented in Appendix D.

12. CONCLUSIONS

The intention of the September - November drill program was to initiate more detailed exploration of the kaolin bearing formation and assess the position of Lang Bay kaolin in the paper and ceramic industry.

The drilling program outlined so far about 1 million tons of mineable clay material.

The geophysics surveys have shown large potential areas for discovery of further kaolin reserves, under shallow overburden. Testwork on the clay horizons has shown they contain kaolin suitable for use in the ceramic industry and, with beneficiation, as a filler grade in the paper industry.

Further exploration will be required to prove up reserves of marketable clay. Large-hole diamond core drilling supported by geophysics is recommended.

Testwork on samples from the drilling program should be pursued, including identification, quality, distribution and beneficiation of the clay materials.

James A. Currie, P.Eng.

February 23, 1988

STATEMENT OF COST

Drilling		$ 94,288.68
Geological Supervision		21,775.00
Consulting		6,437.77
Preparation of Report		1,925.40
Seismic Survey:		
Refraction Survey - Field Program	$14,821.44	
- Interpretation	10,208.98	
Borehole Geophysical Investigation	6,364.68	
Resistivity and Magnetometer Survey	16,600.00	
		47,995.10
Accommodation, Meals, Travel		8,134.36
Equipment Rental - Truck		3,140.32
Line Cutting		4,237.14
Land Survey		7,598.28
Field Assistant		4,276.03
Materials and Supplies		1,177.09
Road Construction - on property - access to drill sites - drill site preparation		17,732.50
	TOTAL	$218,717.67

BIBLIOGRAPHY

Simon Mak and A.C.D. Chaklader - University of British Columbia - Department of Metals and Materials Engineering, October 1987 - "Investigation on the Kaolin at the Lang Bay Deposit".

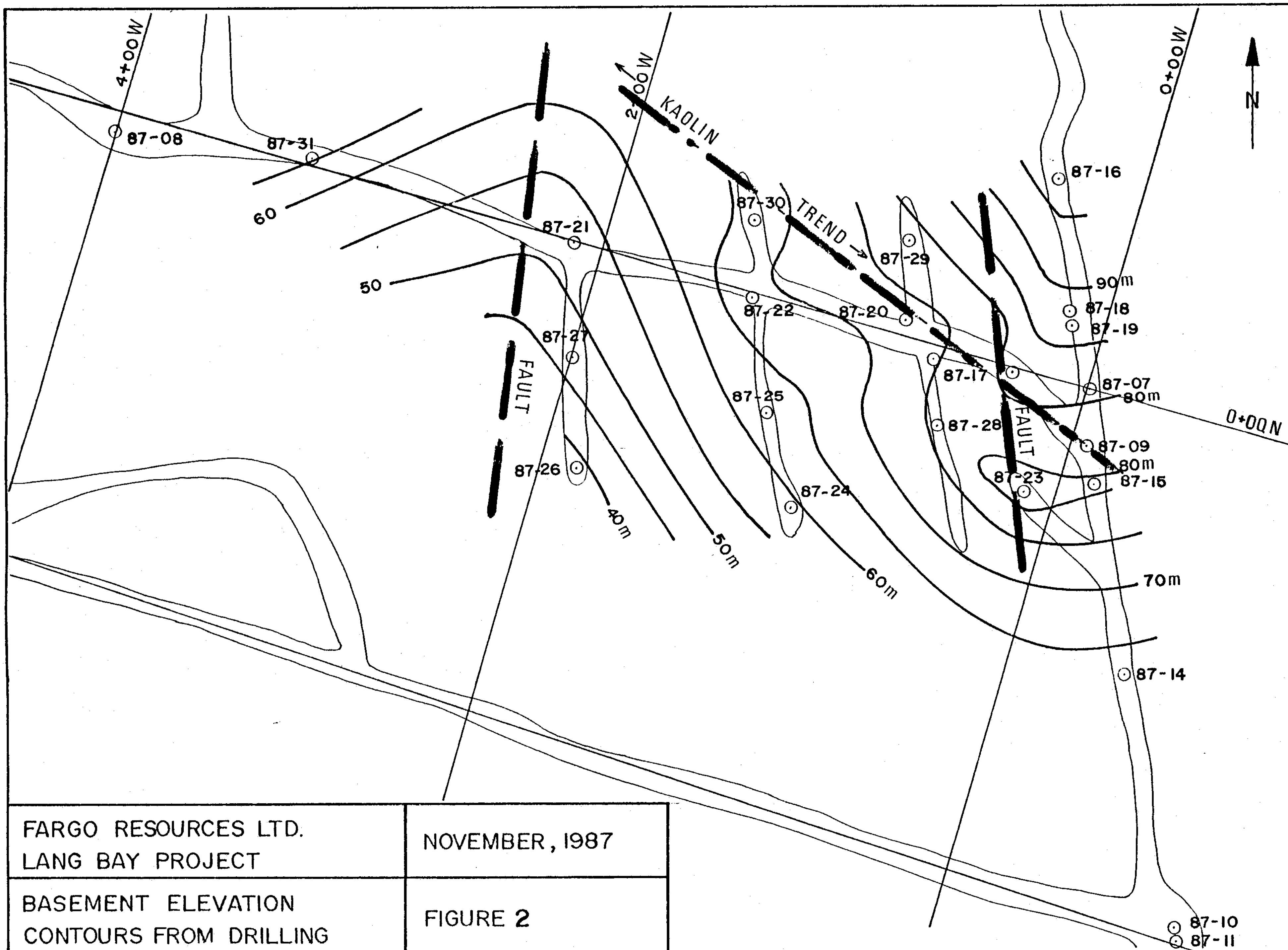
Hilchey, G.R., "1986 Assessment Report Kelly, Trish Claims"

Hilchey, G.R., "1985 Assessment Report Kelly, Trish Claims"

G.V. White, Ministry of Energy, Mines and Petroleum Resources Paper 1986-1 - "Preliminary Report, Lang Bay Germanium Project 92F/16W"

APPENDIX A

DRILLING LOGS AND CROSS SECTIONS

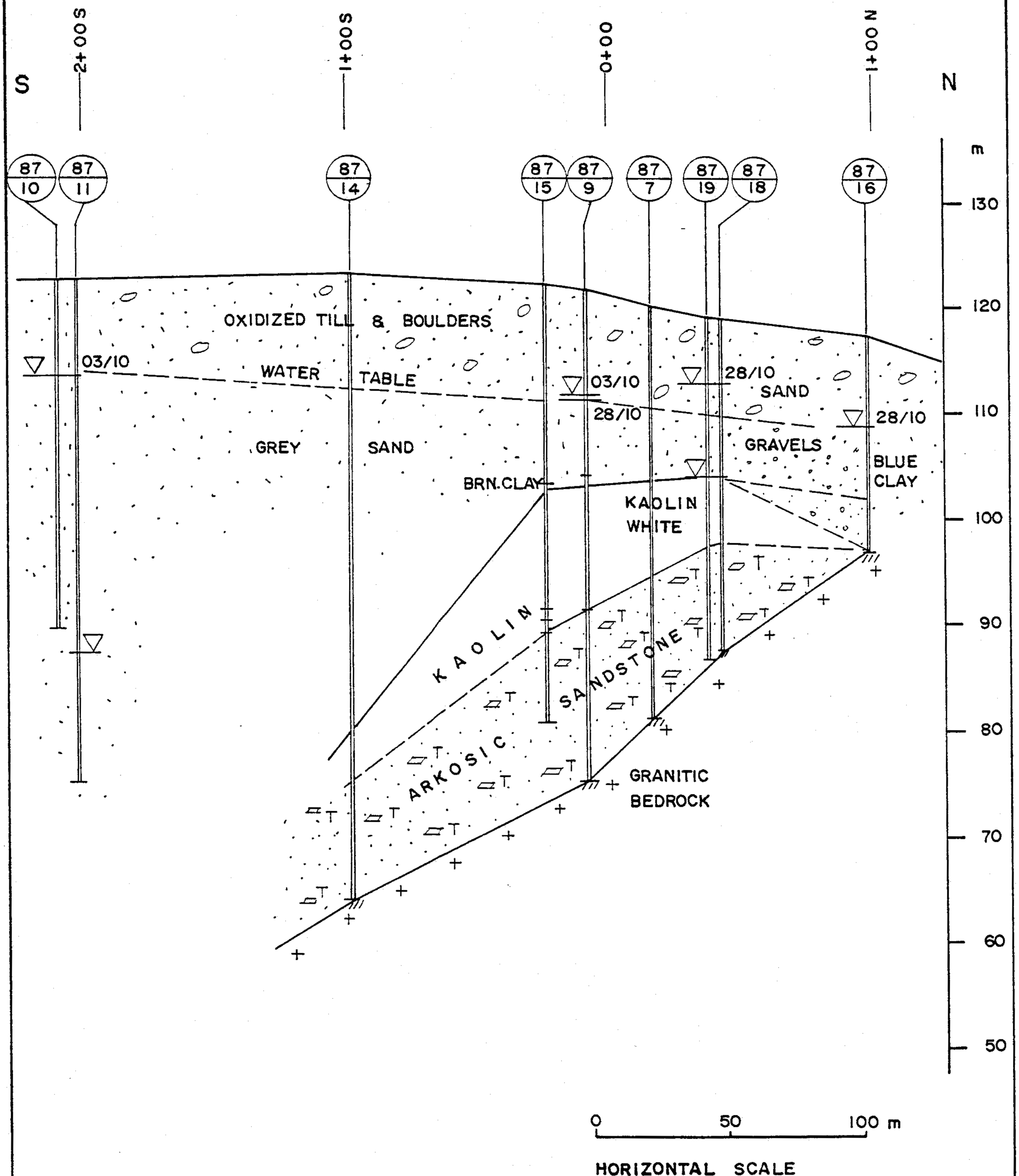


FARGO RESOURCES LTD.
LANG BAY PROJECT

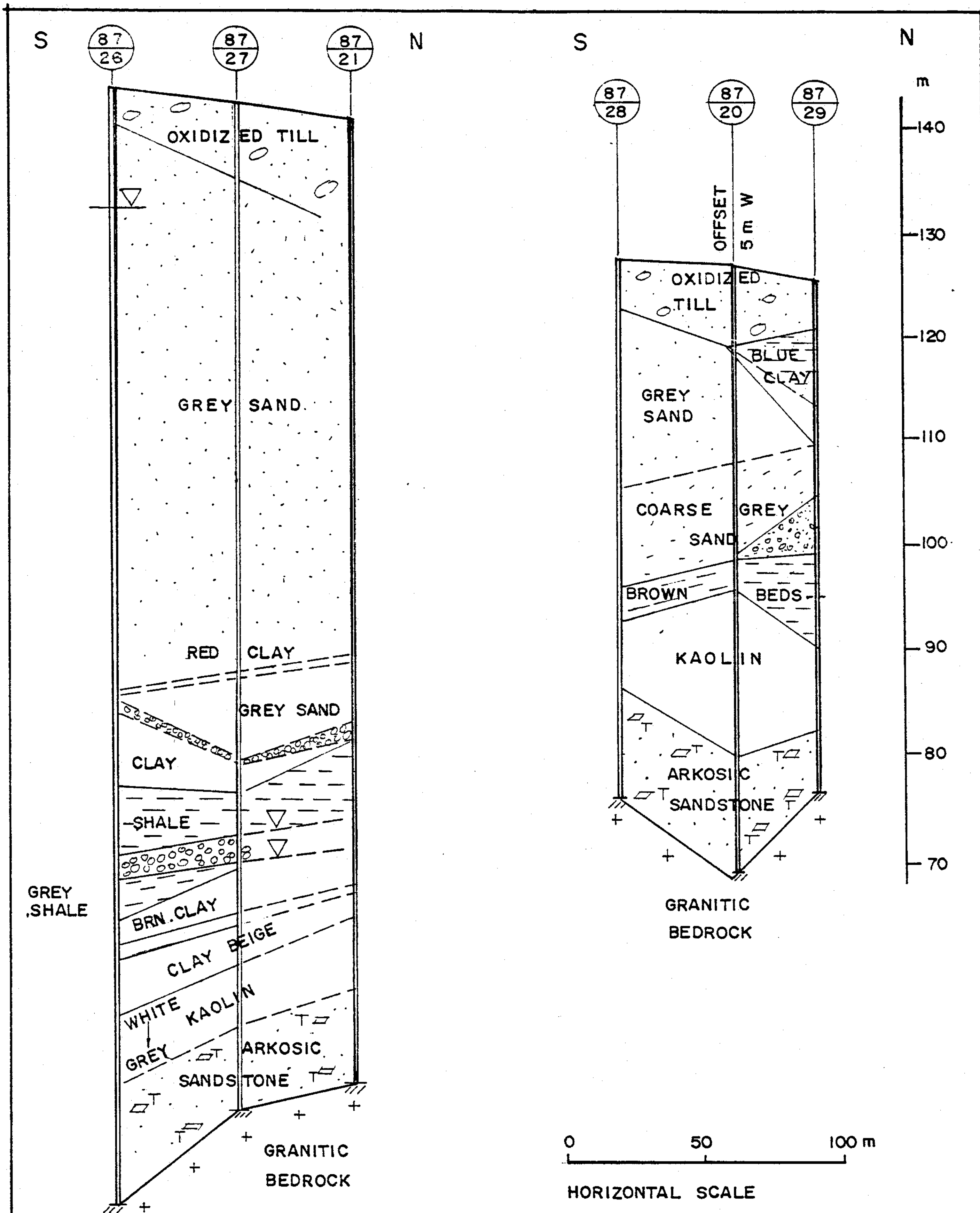
BASEMENT ELEVATION
CONTOURS FROM DRILLING

NOVEMBER, 1987

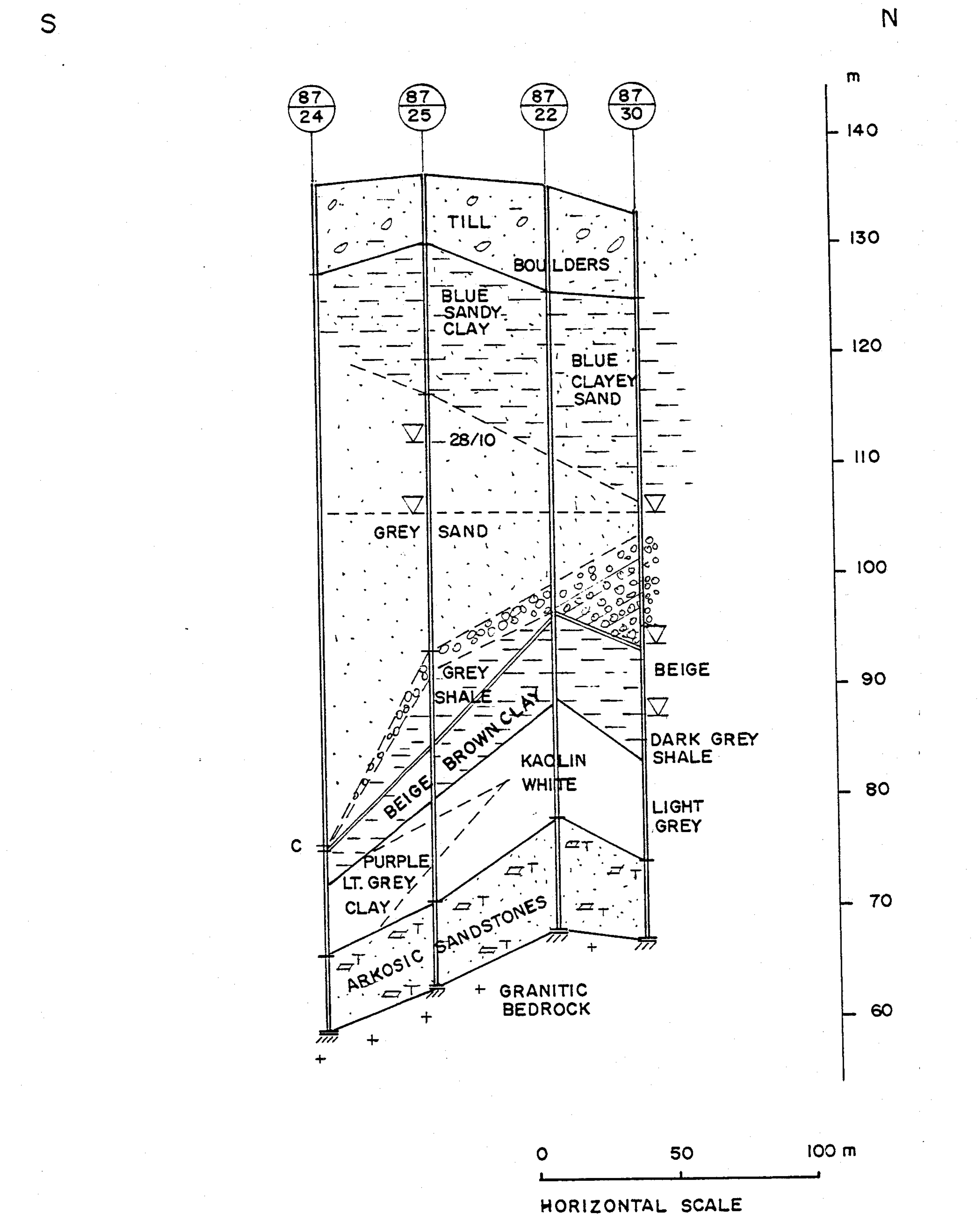
FIGURE 2



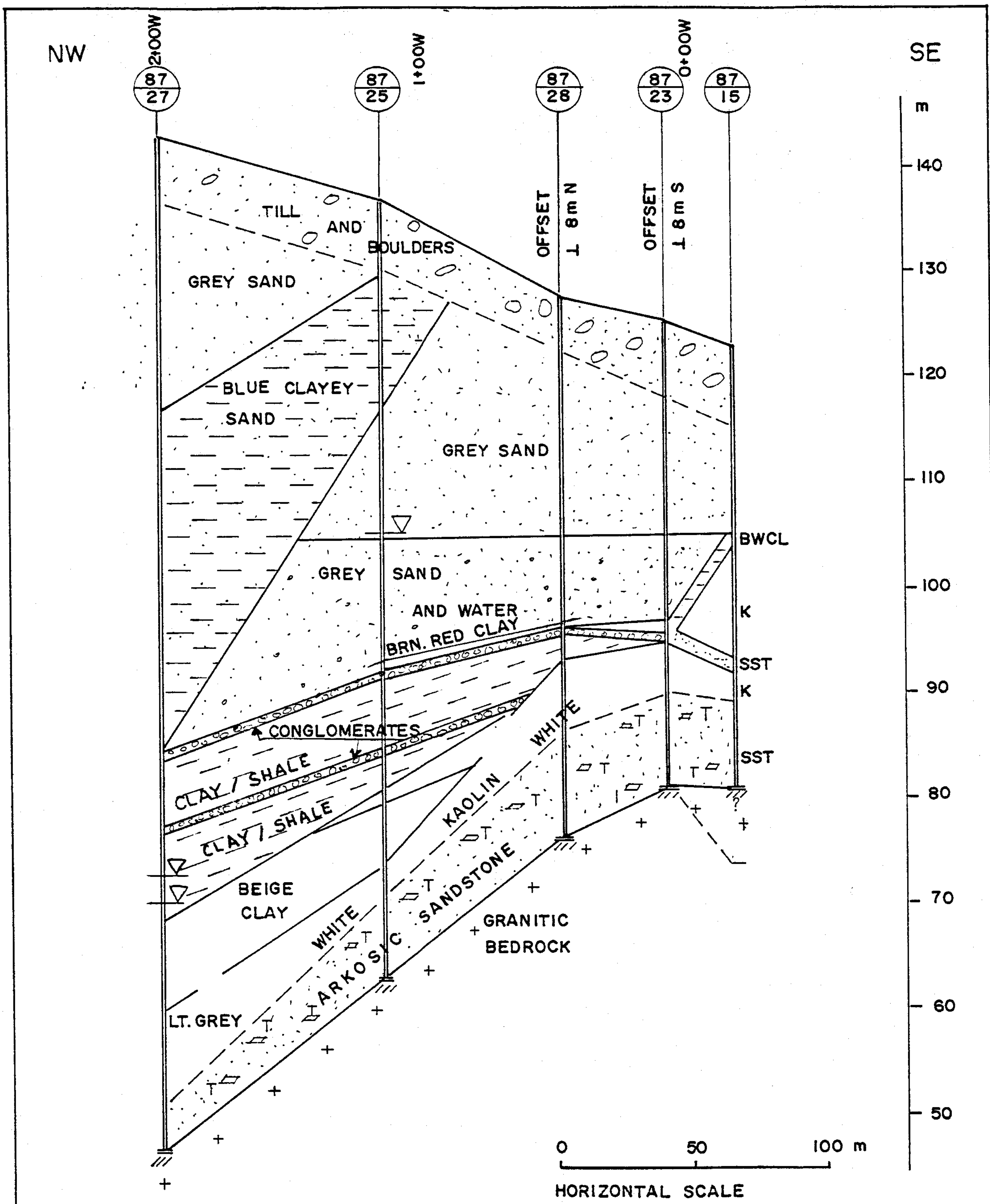
FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
CROSS SECTION - ACCESS ROAD	FIGURE 3



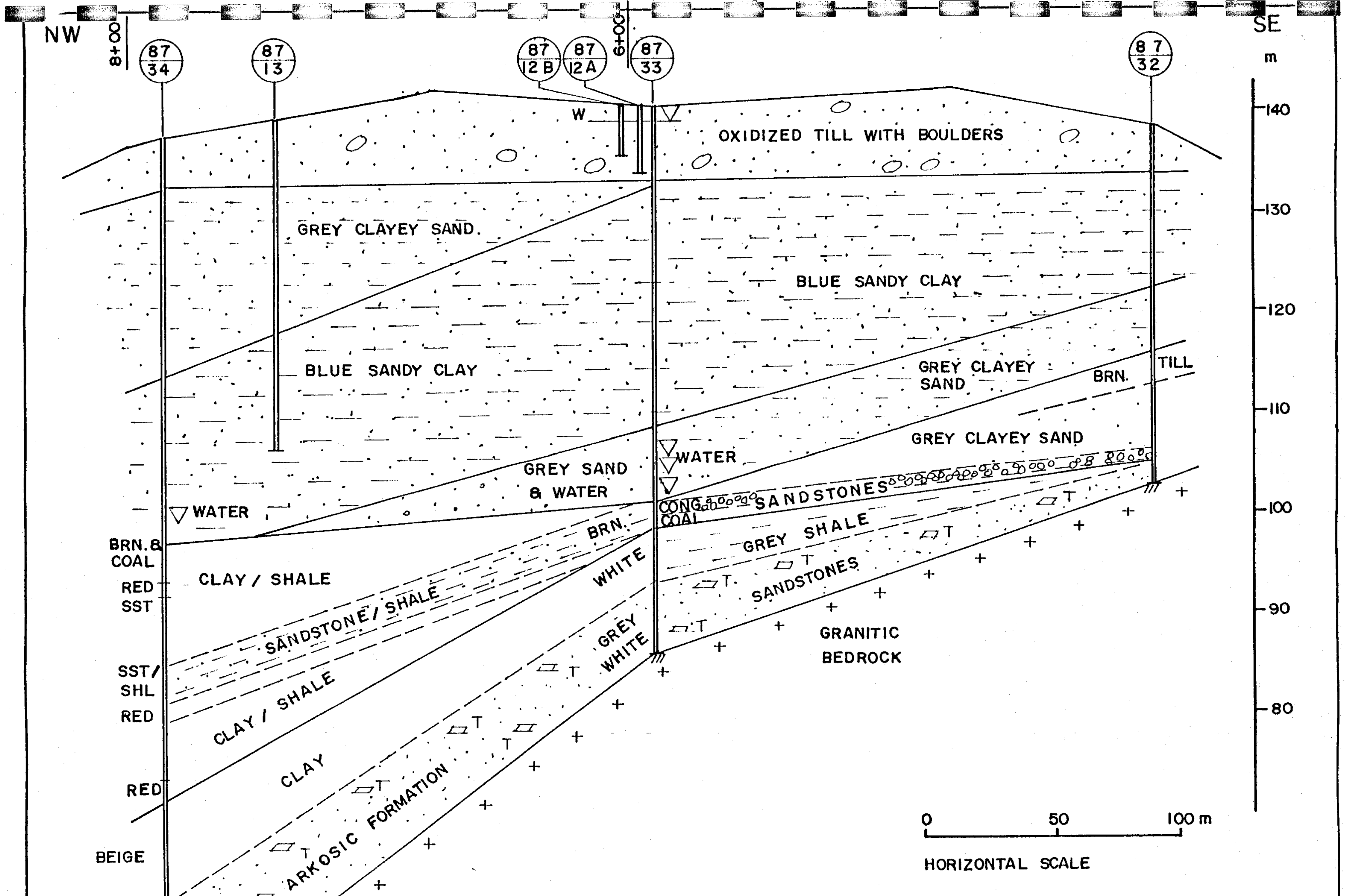
FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
CROSS SECTIONS - LINES 0+70W & 2+10W	FIGURE 4



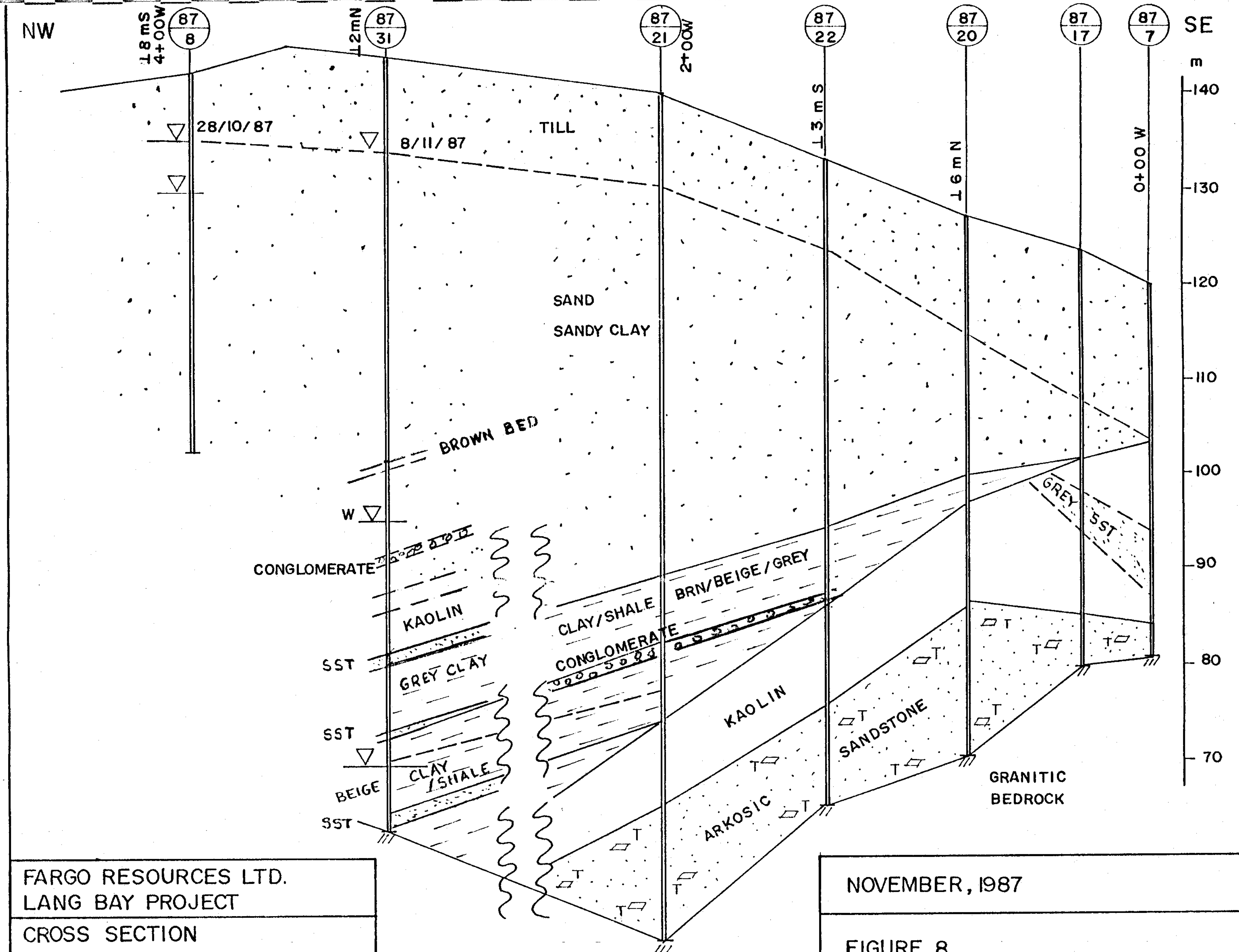
FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
CROSS SECTION LINE 1+40 W	FIGURE 5



FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
CROSS SECTION LINE 0+50 S	FIGURE 6



FARGO RESOURCES LTD. LANG BAY PROJECT	NOVEMBER, 1987
CROSS SECTION LINE 2+00 N	FIGURE 7



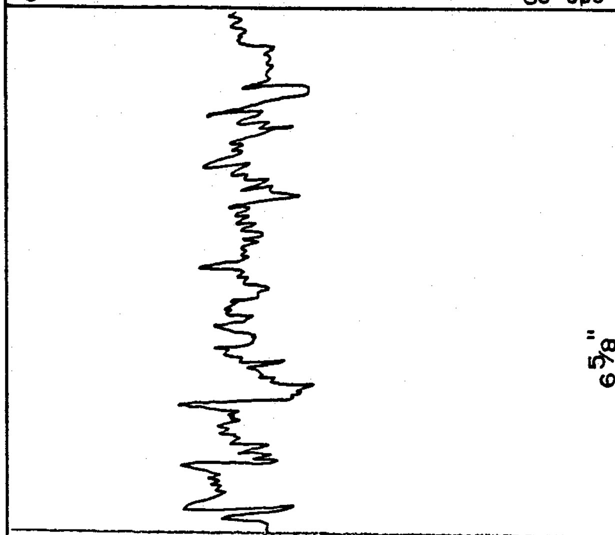
FARGO RESOURCES LTD.
LANG BAY PROJECT

CROSS SECTION
LINE 0+00N

NOVEMBER, 1987

FIGURE 8

NATURAL GAMMA LOG	CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
0 — 80 cps			0	0		



Casing: 6 5/8"

Drilling: ODEX

Depth scale (m): 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

Depth scale (ft): 50, 100, 150, 200, 250, 300, 350

DESCRIPTION:

OXIDIZED TILL & BOULDERS

▽ WATER LEVEL 26/10/87

▽ GREY SAND – WATER

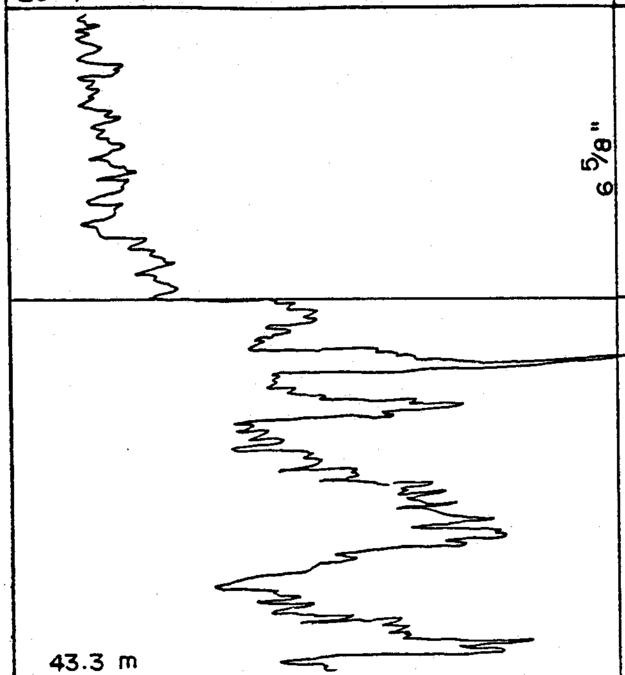
GREY SAND

SATURATED SAND

HOLE STOPPED AT 134'

FARGO RESOURCES LTD.	ELEVATION: 142.9 m	HOLE # 87 – 8
LANG BAY PROJECT	NOVEMBER, 1987	

NATURAL GAMMA LOG	CASING	DRILLING	m DEPTH ft	LITHOLOGY	DESCRIPTION	
20 cps — 100 cps			0 / 0			
	6 5/8"	ODEX	10 / 50		GREY SAND	
		REVERSE CIRC.	20		WHITE KAOLIN	
			30 / 100, 40 / 150	T	LIGHT GREY ARKOSIC SANDSTONES BIOTITE INCREASING WITH DEPTH	DRY SAMPLING EVERY 2'
43.3 m			50, 60 / 200, 70, 250, 80, 90 / 300, 100, 350, 110	+ + +	GRANITIC BEDROCK HARD TO DRILL	



FARGO RESOURCES LTD.	ELEVATION: 122.2 m	HOLE # 87-9
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
		0	0		
NONE	REVERSE CIRC.	10, 20, 30, 40	50, 100, 150		GREY SAND
		50, 60, 70, 80, 90, 100, 110	200, 250, 300, 350		HOLE STOPPED AT 160' LOSS OF CIRCULATION

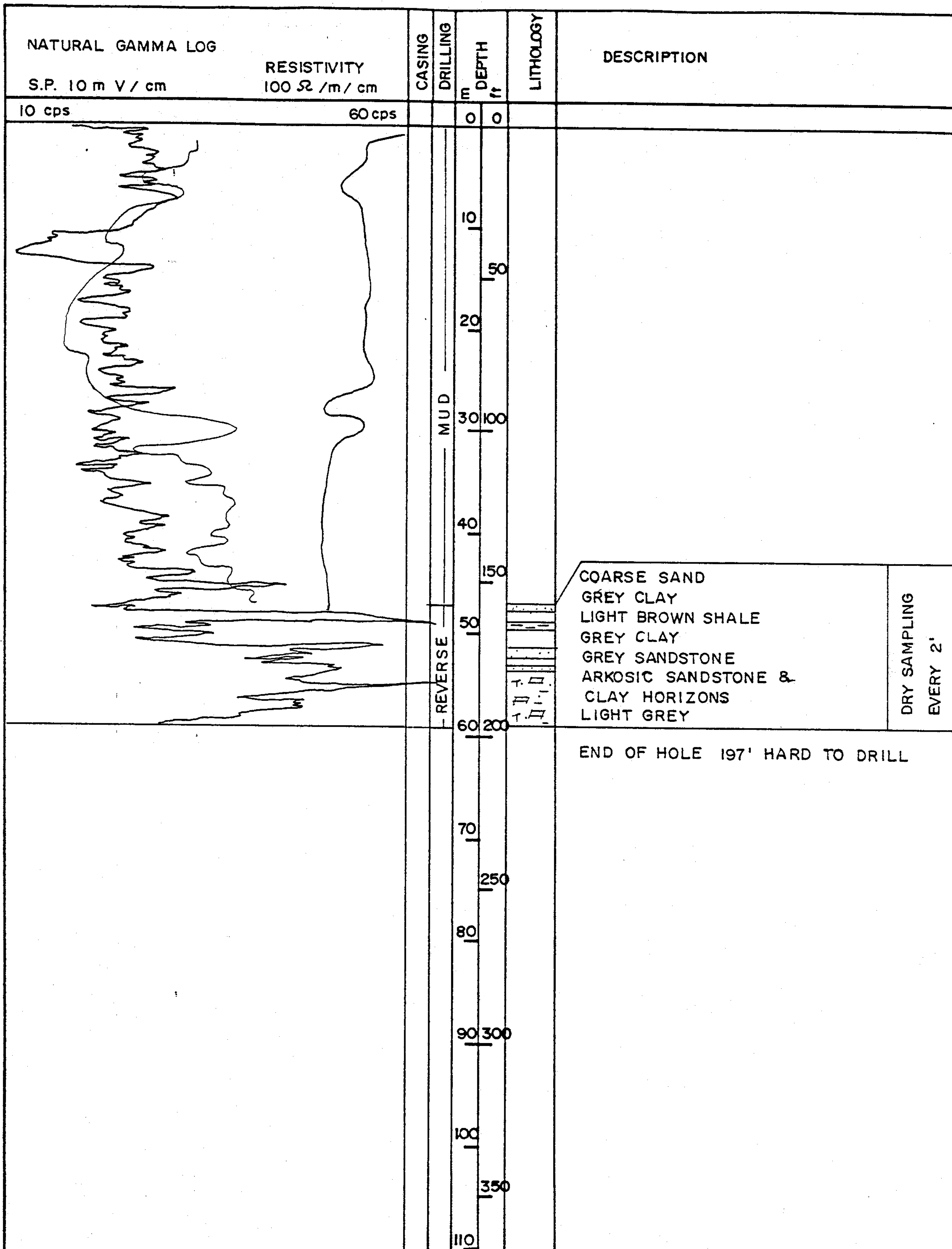
FARGO RESOURCES LTD.	ELEVATION: 122.6 m	HOLE # 87 - 11
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
		0	0		
					BOULDERS
		10			87.12 A STOPPED AT 20'
					87.12 B STOPPED AT 15'
			50		
		20			
		30	100		
		40			
			150		
		50			
		60	200		
		70			
			250		
		80			
		90	300		
		100			
			350		
		110			

FARGO RESOURCES LTD.	ELEVATION: 140.4 m	HOLE # 87 - 12
LANG BAY PROJECT	NOVEMBER, 1987	

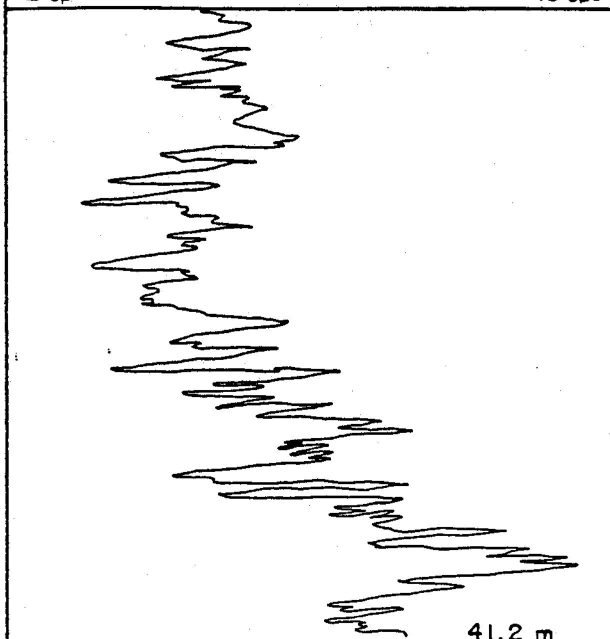
CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
		0	0		
					OXIDIZED TILL
		10	50		GREY SAND
		20			
		30	100		BLUE CLAYEY SAND
					HOLE STOPPED AT 110'
		40	150		
		50			
		60	200		
		70	250		
		80			
		90	300		
		100	350		
		110			

FARGO RESOURCES LTD.	ELEVATION: 138.6 m	HOLE # 87 - 13
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 123.3 m	HOLE #
LANG BAY PROJECT	NOVEMBER, 1987	87 - 14

NATURAL γ LOG	CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
2 cps — 10 cps			0	0		



CASING: NONE

DRILLING: REVERSE CIRC.

DEPTH (m): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

DEPTH (ft): 0, 50, 100, 150, 200, 250, 300, 350

DESCRIPTION:

16' BOULDER
CLAY & GRAVELS
22' BOULDER

GREY SAND

GRAVELS & BROWN CLAY

35' KAOLIN

2' GREY SANDSTONES

8' WHITE KAOLIN

32' ARKOSIC SANDSTONES

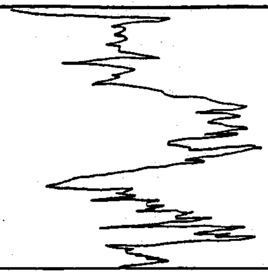
62' DRY SAMPLING EVERY 2'

?

END OF HOLE 140'

FARGO RESOURCES LTD.	ELEVATION: 122.7 m	HOLE # 87 - 15
LANG BAY PROJECT	NOVEMBER, 1987	

NATURAL γ LOG	CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION : NO SAMPLES
5 cps — 45 cps			0	0		



Casing: NONE

Depth scale (m): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

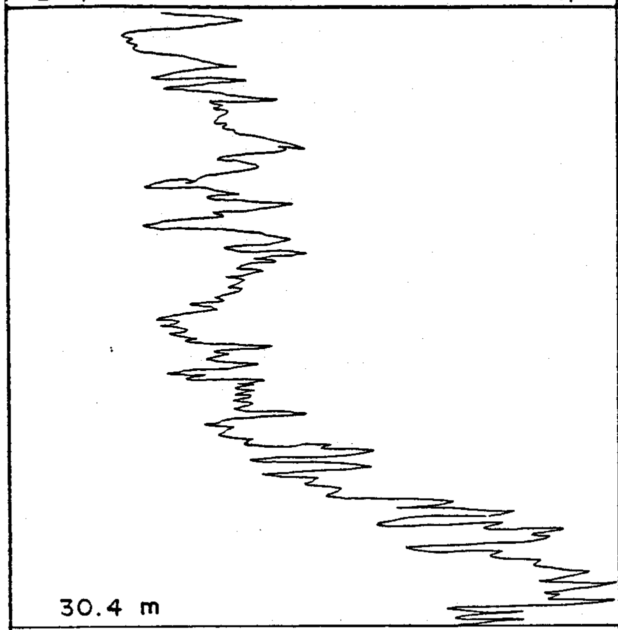
Depth scale (ft): 0, 50, 100, 150, 200, 250, 300, 350

TILL
19' BOULDER
GREY SANDY CLAY
BROWN CLAY
BLUE CLAY
GREY BLUE CLAY & GRAVELS
CONGLOMERATE
GRAVEL 1/2" – 1"
65' BOULDER
69' PEBBLES 1–2"
GRANITE END OF HOLE 69'

FARGO RESOURCES LTD.	ELEVATION: 117.5 m	HOLE # 87 - 16
LANG BAY PROJECT	NOVEMBER, 1987	

NATURAL γ LOG | CASING | DRILLING | DEPTH (m / ft) | LITHOLOGY | DESCRIPTION

2 cps — 10 cps



DRILLING: HAMMER; REVERSE CIRC.

DEPTH m: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

DEPTH ft: 0, 50, 100, 150, 200, 250, 300, 350

DESCRIPTION	
TILL	
GREY SAND	
2' GREY SANDY CLAY	
2' WHITE KAOLIN	DRY SAMPLING EVERY 2"
8' GREY – LIGHT GREY CLAY	
18' MEDIUM GREY SANDY CLAY	
22' WHITE – LT. GREY – GREY CLAY	
22' ARKOSIC SANDSTONE DARK GREY	
GRANITE END OF HOLE 149'	

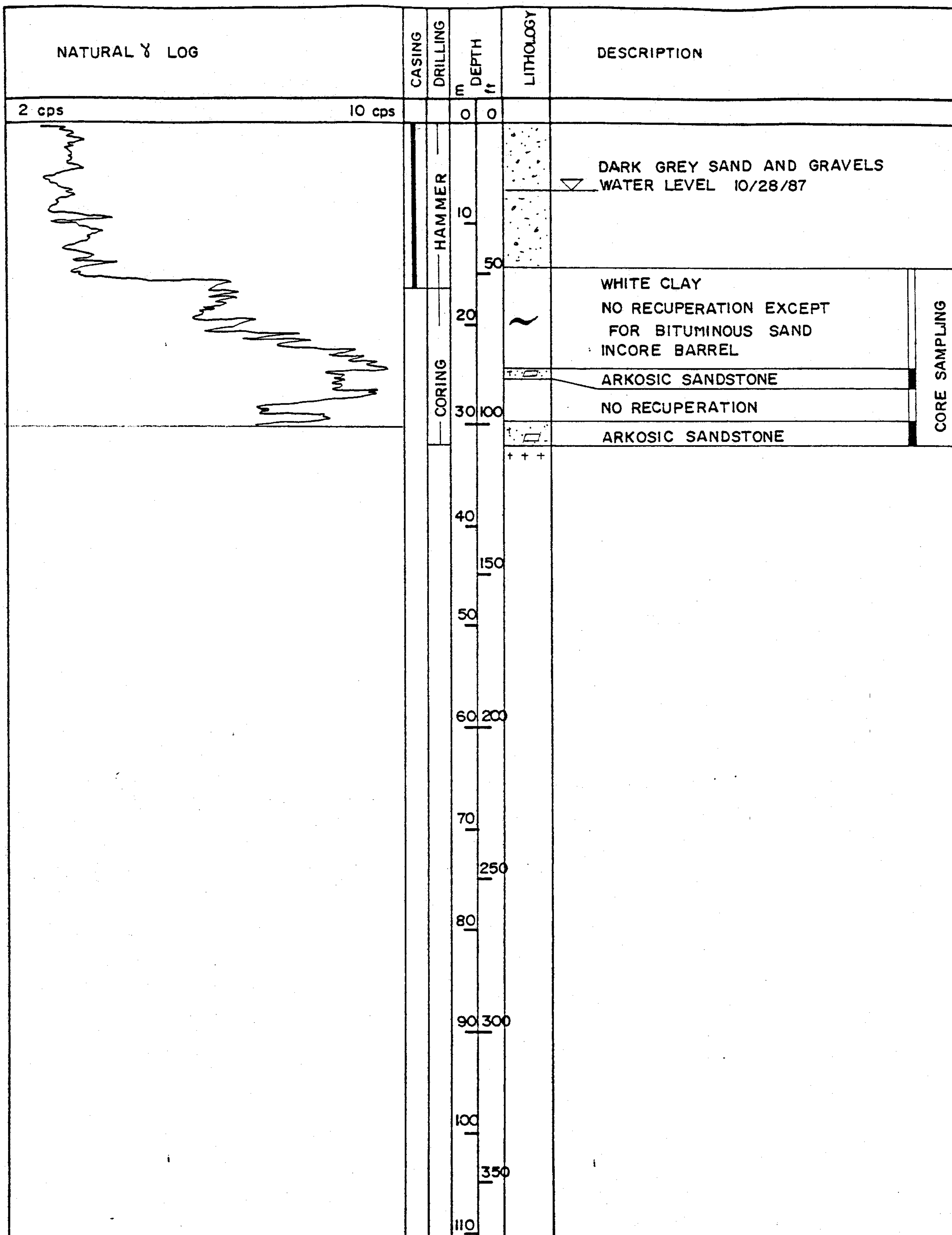
FARGO RESOURCES LTD.

LANG BAY PROJECT

ELEVATION: 123.7

NOVEMBER, 1987

HOLE # 87 – 17

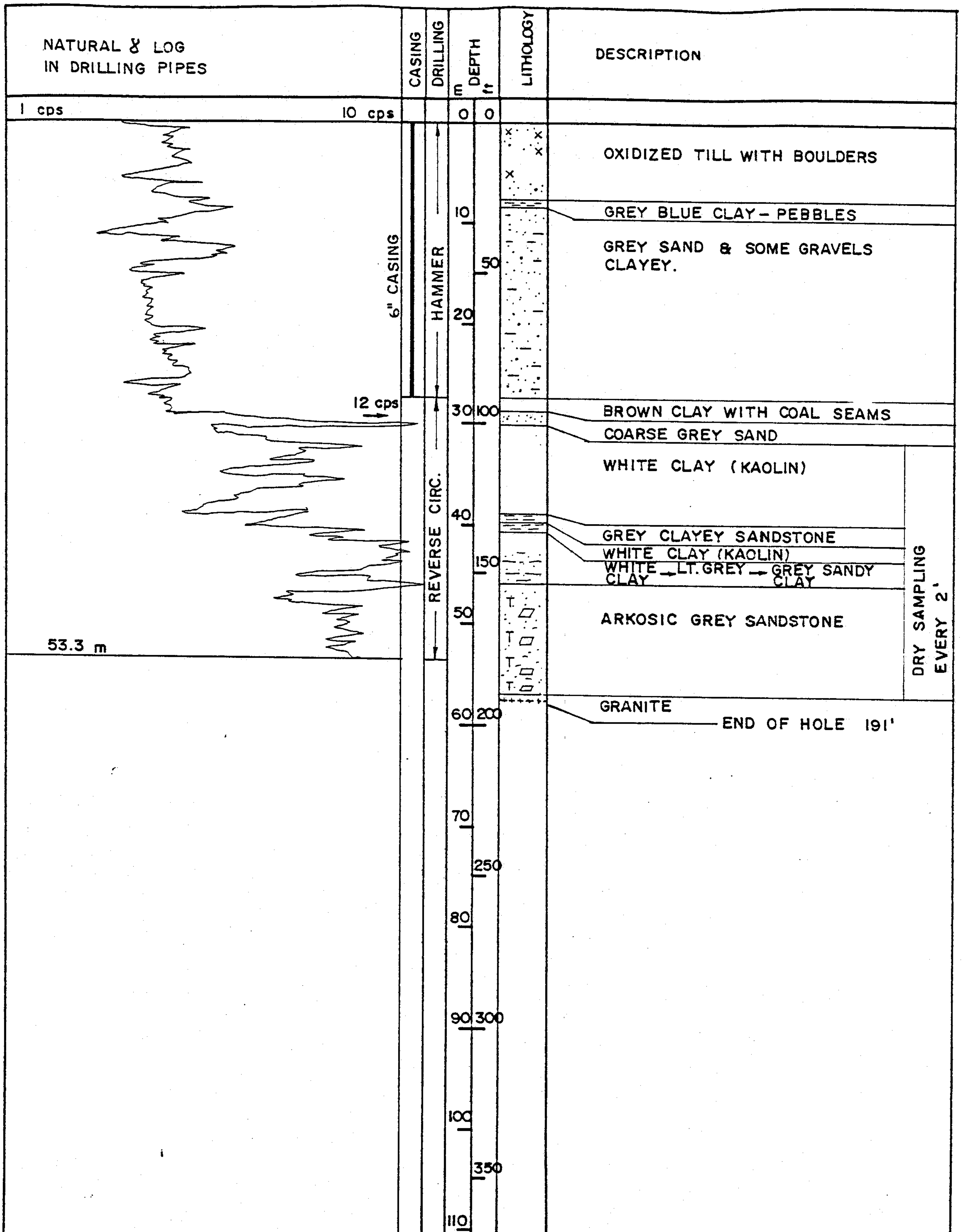


FARGO RESOURCES LTD.	ELEVATION: 119.0 m	HOLE # 87 - 18
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
		0	0		
	HAMMER	10			13' - 16' BOULDER WATER LEVEL 10/28/87 DARK GREY SAND & GRAVEL
			50		47' BOULDER SAND, GRAVEL, WATER
	REVERSE CIRC.	20			(KAOLIN) WHITE CLAY 78' - 80' FEW ROUNDED PEBBLES
		30	100		ARKOSIC SANDSTONES
		40			
			150		
		50			
		60	200		
		70			
			250		
		80			
		90	300		
		100			
			350		
		110			

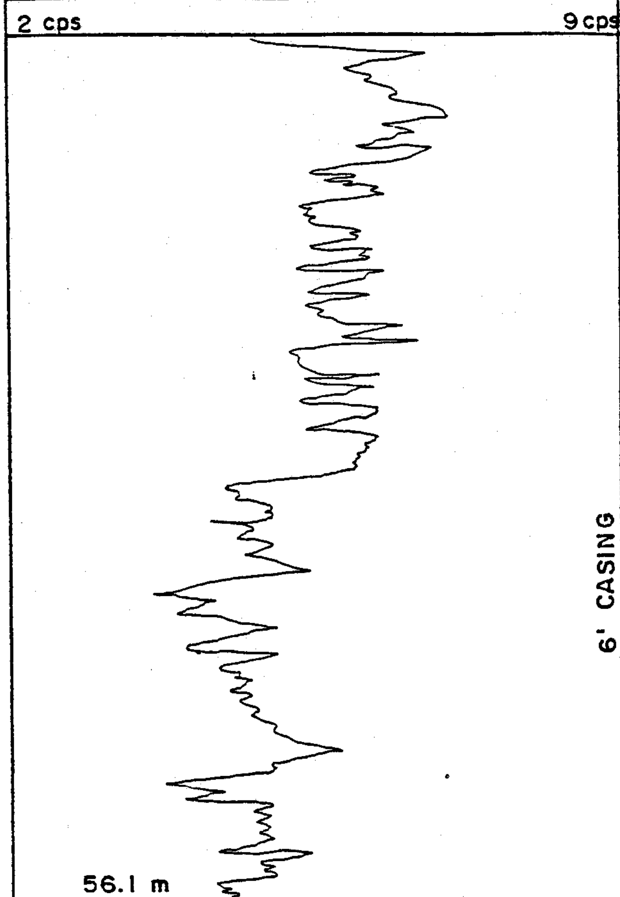
DRY SAMPLING EVERY 2'

FARGO RESOURCES LTD.	ELEVATION: 119.2 m	HOLE # 87 - 19
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 127.0 m	HOLE # 87 - 20
LANG BAY PROJECT	NOVEMBER, 1987	

NATURAL γ LOG	CASING	DRILLING	DEPTH (m / ft)	LITHOLOGY	DESCRIPTION: NO DRY SAMPLES



6' CASING

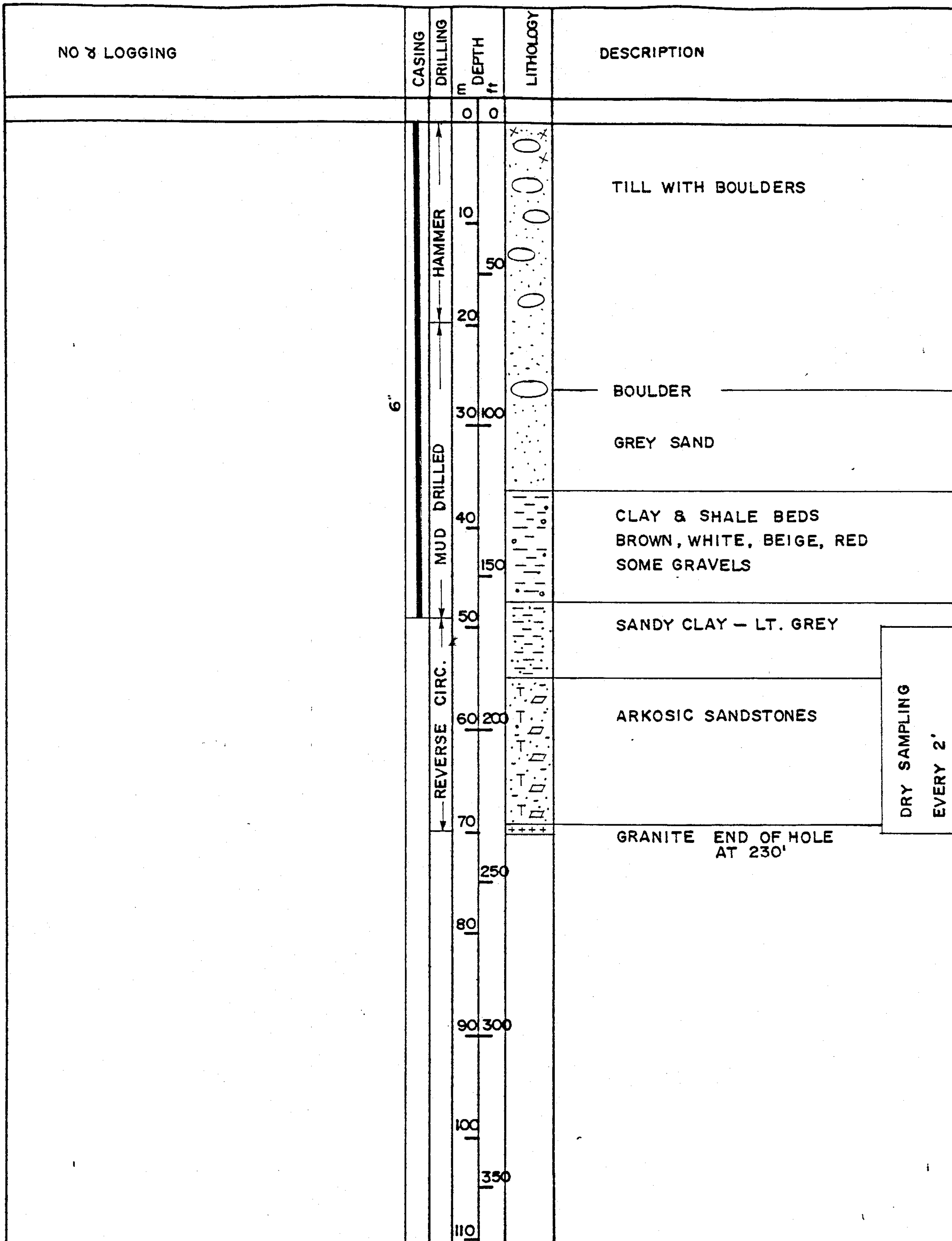
HAMMER DRILLED

MUD DRILLED

Depth	Description
0	OXIDIZED TILL WITH BOULDERS
	40' BOULDER
	GREY SAND – SOME GRAVEL
	100' BOULDER
	GREY BLUE CLAY
	GREY SANDY CLAY
	RED CLAY
	GREY COARSE SAND
	GRAVEL OR CONGLOMERATES
	CLAY BEDS – SHALES BLUE GREY – BROWN – BEIGE
	BROWN CLAY – COAL SEAMS
	WHITE CLAY
	ARKOSIC SANDSTONES
	GRANITE END OF HOLE AT 300'

Depth scale (m): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110
Depth scale (ft): 0, 50, 100, 150, 200, 250, 300, 350

FARGO RESOURCES LTD.	ELEVATION: 141.0	HOLE # 87 – 21
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 135.4 m	HOLE # 87 - 22
LANG BAY PROJECT	NOVEMBER, 1987	

NO LOGGING	CASING	DRILLING	DEPTH (m / ft)	LITHOLOGY	DESCRIPTION
	6"	MUD — HAMMER	0 / 0 – 30 / 100		OXIDIZED TILL WITH BOULDERS
			10, 50, 20		GREY SAND
			30 / 100		COARSE SAND & GRAVEL
		CORING	40, 150		HIGHLY FRACTURED ARKOSIC SANDSTONES WITH KAOLIN & GREY CLAY IN FRACTURATION BIOTITE CONTENT INCREASING WITH DEPTH. — CORE SAMPLING
			150 ft – 110 m		GRANITE

Depth scale: m — 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110; ft — 0, 50, 100, 150, 200, 250, 300, 350

FARGO RESOURCES LTD.	ELEVATION: 128.3 m	HOLE # 87 - 23
LANG BAY PROJECT	NOVEMBER, 1987	

NO LOGGING	CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
	NONE	HAMMER	0	0		OXIDIZED TILL & BOULDERS
		MUD	10			
				50		GREY SAND SOME PEBBLES
			20			
			30	100		99' BOULDER
			40			130' BOULDER
				150		
			50			
						CONGLOMERATES
			60	200		BEIGE – LT. BROWN CLAY / SHALE
		REVERSE CIRC				GRAVELS & GREY CLAY
DRY SAMPLING EVERY 2'						2' THICK BEDS OF CLAY BROWN GREY → LT. BROWN → PURPLE GREY → DARK GREY → BLACK → PURPLE GREY
			70			LIGHT GREY ARKOSIC CLAY
				250		GRANITE END OF HOLE 251'
			80			
			90	300		
			100			
				350		
			110			

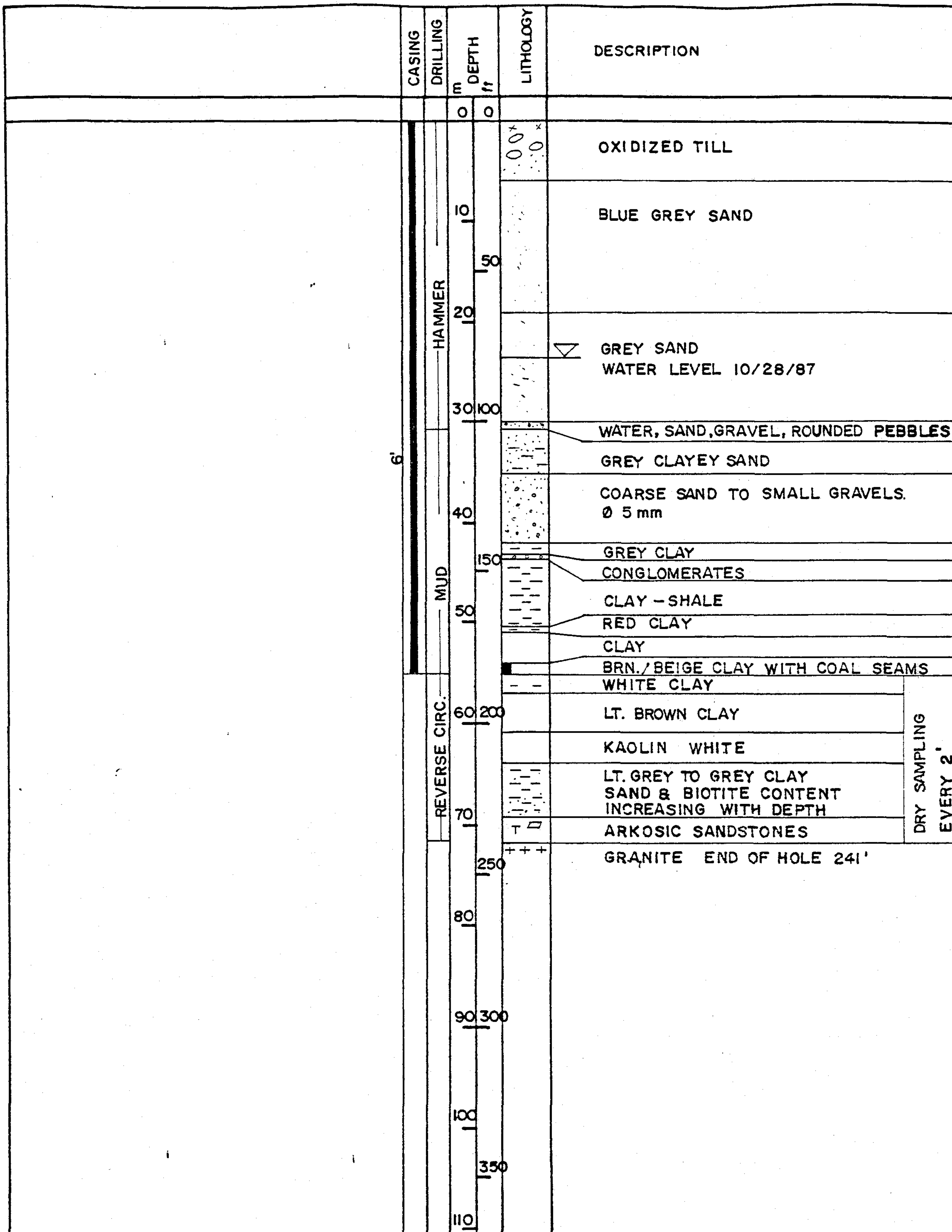
FARGO RESOURCES LTD.

LANG BAY PROJECT

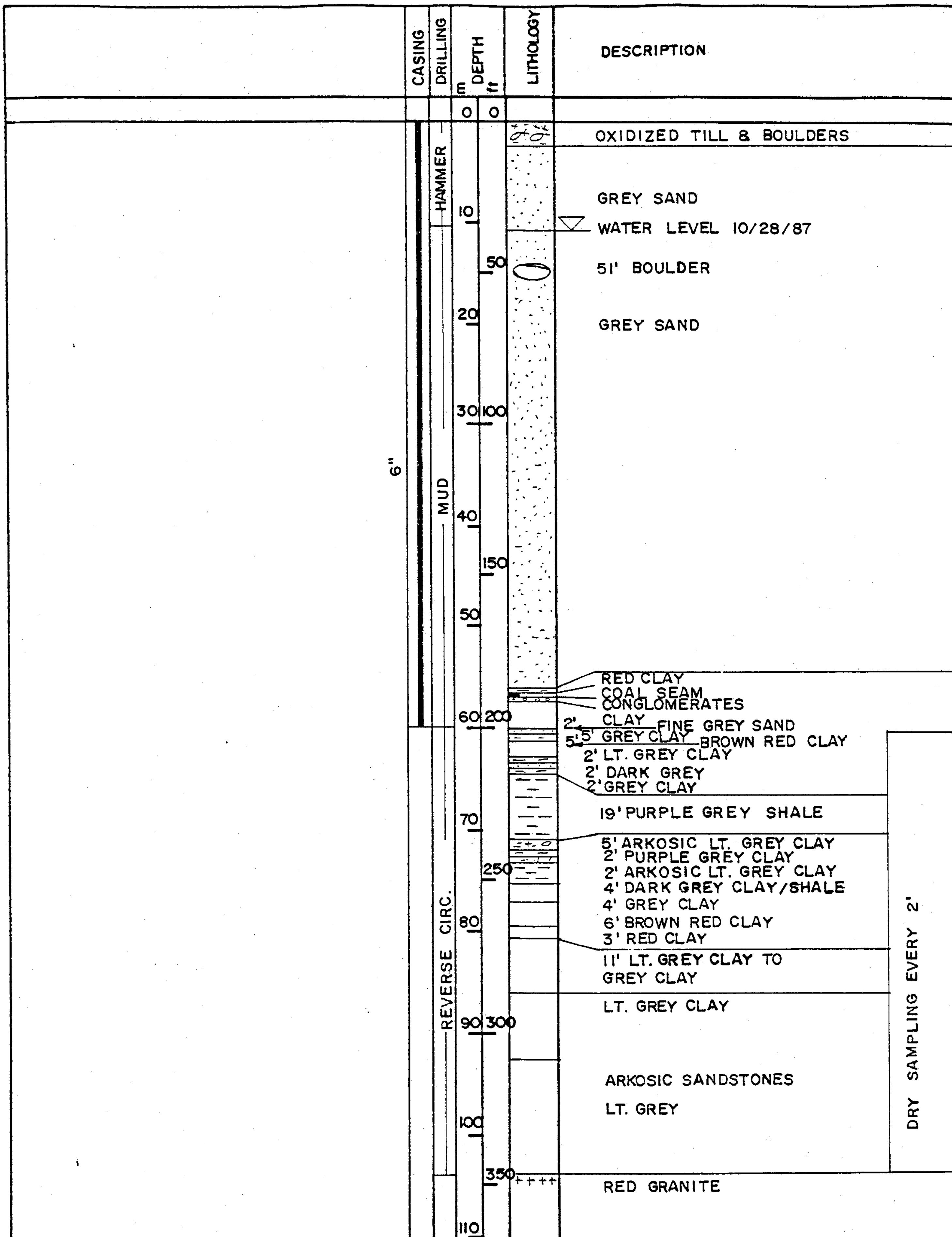
ELEVATION: 135.3 m

NOVEMBER, 1987

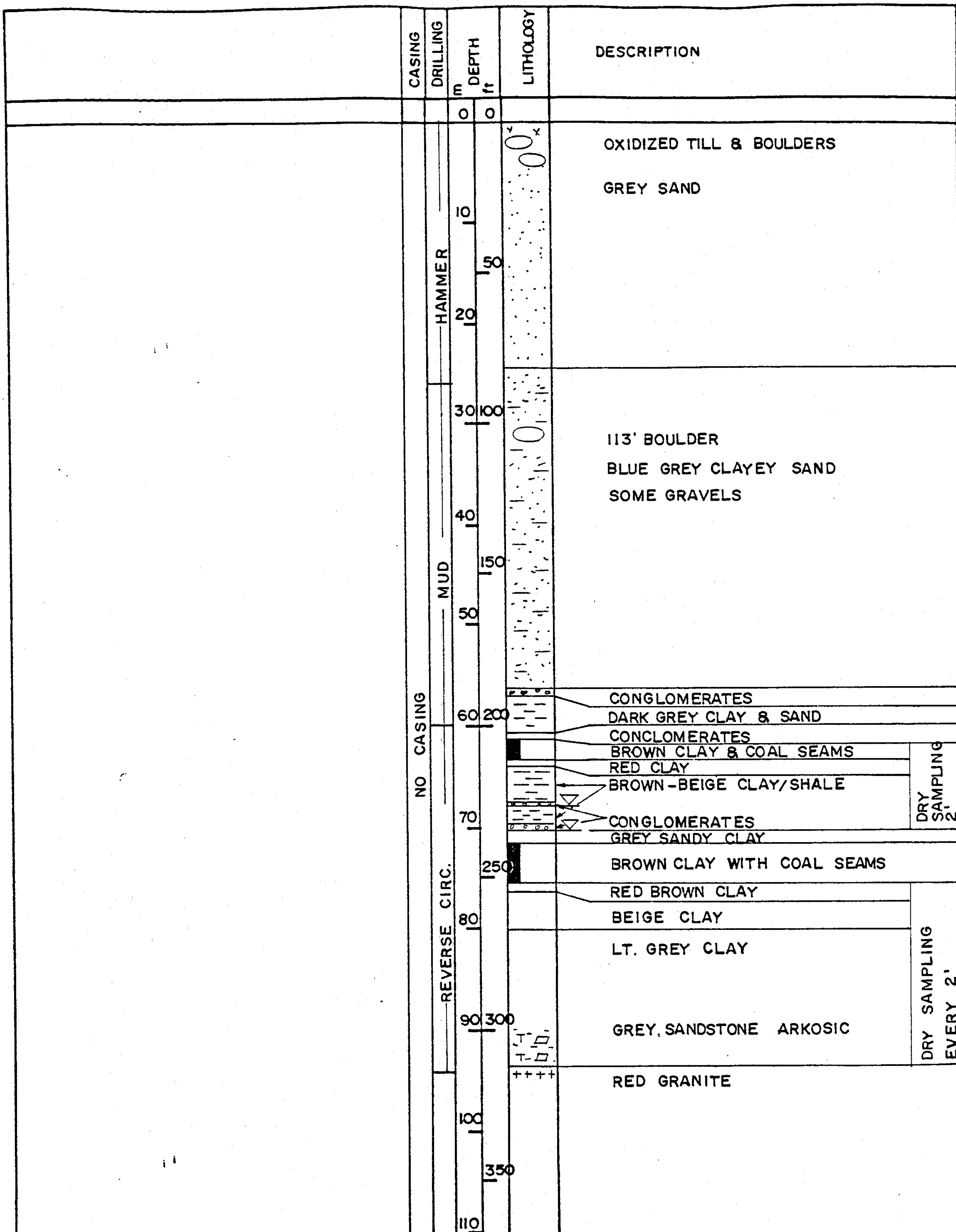
HOLE # 87-24



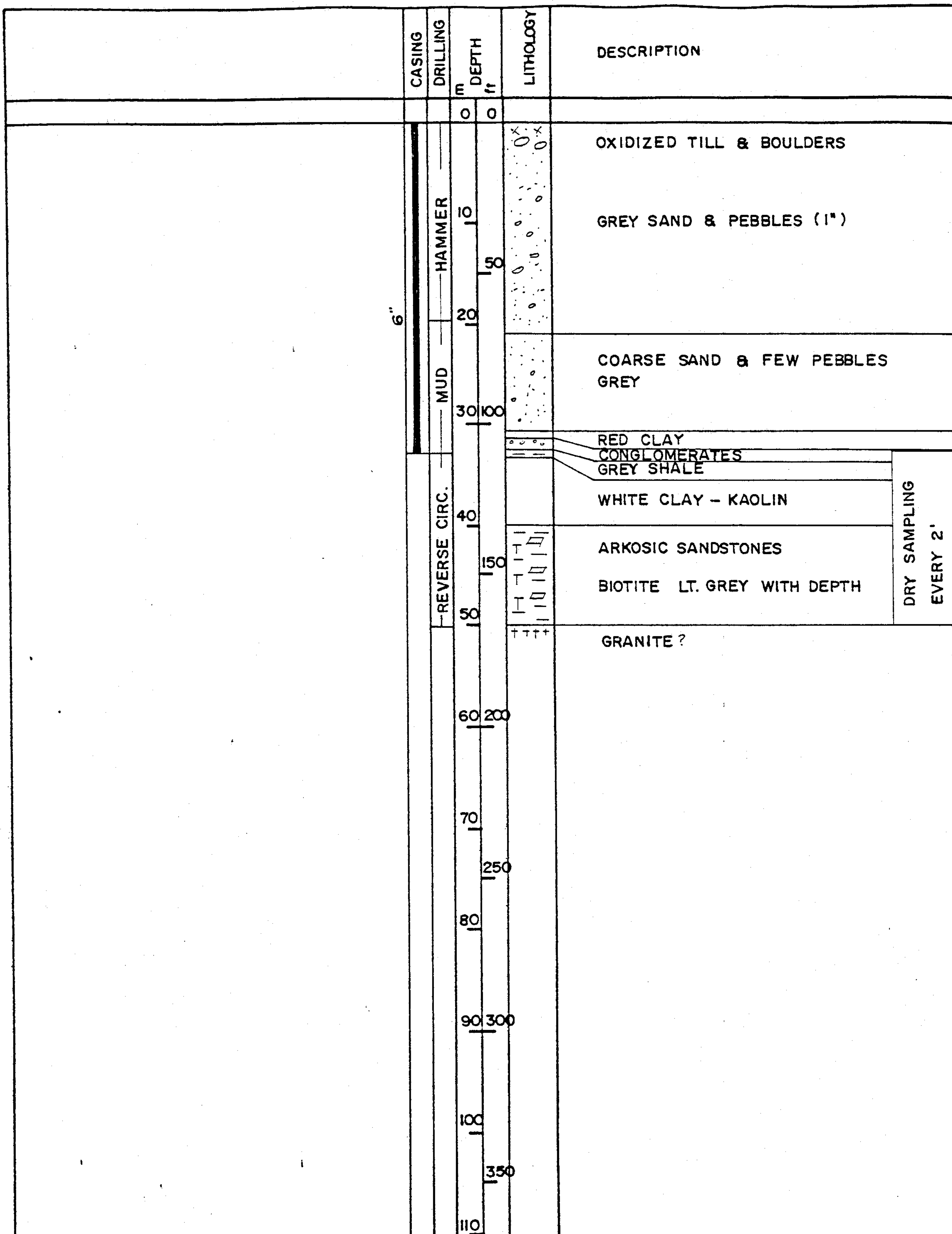
FARGO RESOURCES LTD.	ELEVATION: 136.4 m	HOLE # 87 – 25
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 144.0 m	HOLE # 87 - 26
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 142.4 m	HOLE # 87-27
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 127.4 m	HOLE # 87 – 28
LANG BAY PROJECT	NOVEMBER, 1987	

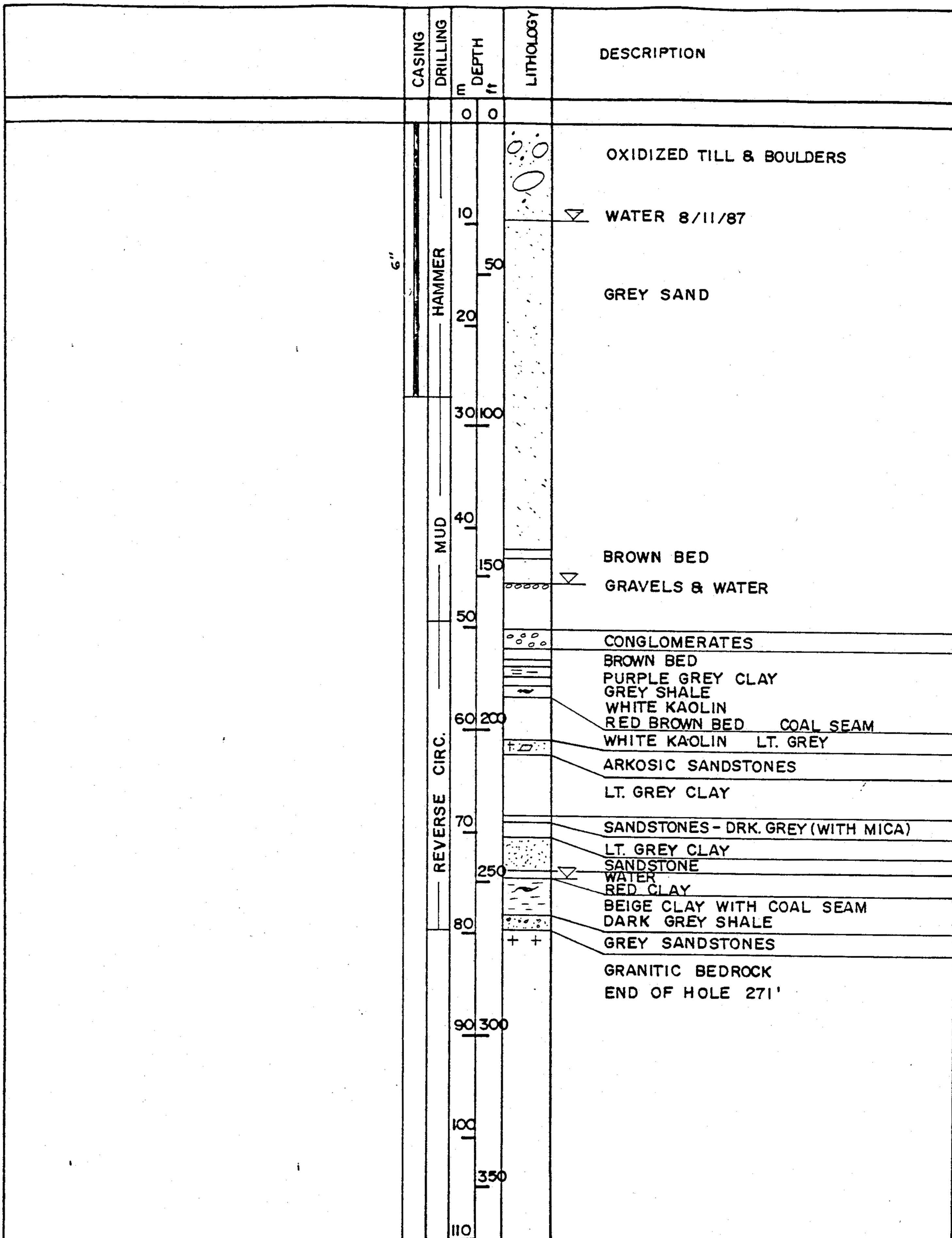
CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
NONE	HAMMER	0	0		OXIDIZED BROWN TILL
		10			GREY BLUE CLAYEY SAND, GRAVEL, PEBBLES
			50		GREY BLUE CLAY
					GREY SAND & PEBBLES
		20			CONGLOMERATE BEDS ALTERNATED CLAY BEDS
	REVERSE CIRC.	30	100		PURPLE-GREY CLAY — SHALE LT. GREY CLAY 33' BEIGE — BROWN 93' COAL SEAM LT. & DRK. GREY CLAY/BEIGE/BRN. 96 1/2' COAL SEAM 104' COAL SEAM 104-105' RED CLAY 26' 109' COAL SEAM BEIGE CLAY
		40	150		17' WHITE KAOLIN
					ARKOSIC SANDSTONES LT. GREY
		50			156' END OF HOLE
		60	200		
		70			
			250		
		80			
		90	300		
		100			
			350		
		110			

DRY SAMPLING EVERY 2'

FARGO RESOURCES LTD.	ELEVATION: 125.0	HOLE # 87-29
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	DESCRIPTION
NONE	HAMMER	0	0	OXIDIZED TILL & BOULDERS
	HAMMER	10		BLUE GREY CLAYEY SAND
	HAMMER		50	
	HAMMER	20		
	HAMMER			▽ WATER
	REVERSE CIRC.	30	100	CONGLOMERATES & BLUE CLAY ALTERNATING
	REVERSE CIRC.			GRAVELS < 1/2" COARSE WASHED SAND
	REVERSE CIRC.			▽ WATER
	REVERSE CIRC.	40		RED BROWN CLAY (DRY SAMPLING EVERY 2' from here to 218')
	REVERSE CIRC.			BEIGE SHALE
	REVERSE CIRC.		150	▽ GRAVELS - WATER
	REVERSE CIRC.			DARK GREY SHALE
	REVERSE CIRC.	50		30' LIGHT GREY CLAY
	REVERSE CIRC.	60	200	23' ARKOSIC SANDSTONES GREY
				GRANITIC HARD TO DRILL
				END OF HOLE 218'
		70		
			250	
		80		
		90	300	
		100		
			350	
		110		

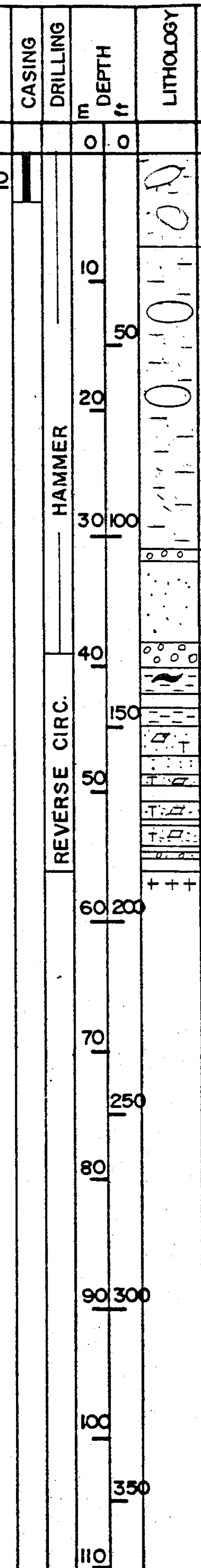
FARGO RESOURCES LTD.	ELEVATION: 132.7 m	HOLE # 87 - 30
LANG BAY PROJECT	NOVEMBER, 1987	



FARGO RESOURCES LTD.	ELEVATION: 144.0 m	HOLE # 87 - 31
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION
NONE	HAMMER	0	0		BROWN OXIDIZED TILL
		10			BLUE CLAY & GRAVELS
			50		CLAYEY GREY SAND
	REVERSE CIRC.				2' BOULDER
		20			PURPLE GREY CLAYEY SAND
					BROWN TILL
					PURPLE CLAY & PEBBLES
		30	100		GREY CLAYEY SAND
					BLUE CLAY, GRAVELS, WATER
					CONGLOMERATES 1/2" – 3/4"
					GREY SHALE
					SANDSTONES
					GRANITIC ROCK
		40			END OF HOLE AT 118'
			150		
		50			
		60	200		
		70			
			250		
		80			
		90	300		
		100			
			350		
		110			

FARGO RESOURCES LTD.	ELEVATION: 140.0 m	HOLE # 87 - 32
LANG BAY PROJECT	NOVEMBER, 1987	



DESCRIPTION

BROWN OXIDIZED TILL & BOULDERS

4" BOULDER

BLUE SANDY CLAY

1' BOULDER

PEBBLE 1' TO 2" WATER

COARSE SAND & WATER

CONGLOMERATES

PURPLE GREY SHALE & COAL SEAM

WHITE KAOLIN

GREY CLAY / SHALE

ARKOSIC SANDSTONE

CLEAN SAND & BROKEN ROCK - WATER

ARKOSIC SANDSTONE

DIRTY WHITE CLAY

ARKOSIC SANDSTONE/CLAY ALTERNATE

HARD TO DRILL

END OF HOLE 183'

FARGO RESOURCES LTD.	ELEVATION: 140.4 m	HOLE # 87 - 33
LANG BAY PROJECT	NOVEMBER, 1987	

CASING	DRILLING	DEPTH m	DEPTH ft	LITHOLOGY	DESCRIPTION

Casing: 6 3/4"

Drilling: HAMMER; REVERSE CIRC.

Depth scale (m): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

Depth scale (ft): 0, 50, 100, 150, 200, 250, 300, 350

DESCRIPTION
OXIDIZED TILL & BOULDERS
GREY SAND
BLUE SANDY CLAY
BROWN BEDS - COAL SEAM GREY & BROWN SHALES
RED SHALES
GREY SHALES SANDSTONES
LT. GREY TO BEIGE SHALE
RED BROWN CLAY
GREY CLAY / SHALE
RED BROWN CLAY
BEIGE CLAY
RED BROWN CLAY
BEIGE CLAY
DEEP GREEN — GREEN SANDSTONES & CLAY ARKOSIC
HARD TO DRILL END OF HOLE AT 296'

FARGO RESOURCES LTD.	ELEVATION: 136.4 m	HOLE # 87 - 34
LANG BAY PROJECT	NOVEMBER, 1987	

APPENDIX B

SEISMIC SURVEY REPORT OF FOUNDEX GEOPHYSICS INC.

FARGO RESOURCES LIMITED

REPORT ON

SEISMIC REFRACTION INVESTIGATION

LANG BAY KAOLIN PROSPECT

LANG CREEK AREA

VANCOUVER, M.D.

NTS 92F/16W

$49^{\circ}48'$N, $124^{\circ}25'$W

OWNER AND OPERATOR

FARGO RESOURCES LIMITED

900 - 850 WEST HASTINGS STREET

VANCOUVER, B.C. V6C 1E1

by

Russell A. Hillman, P.Eng.

October, 1987

FGI-024-3

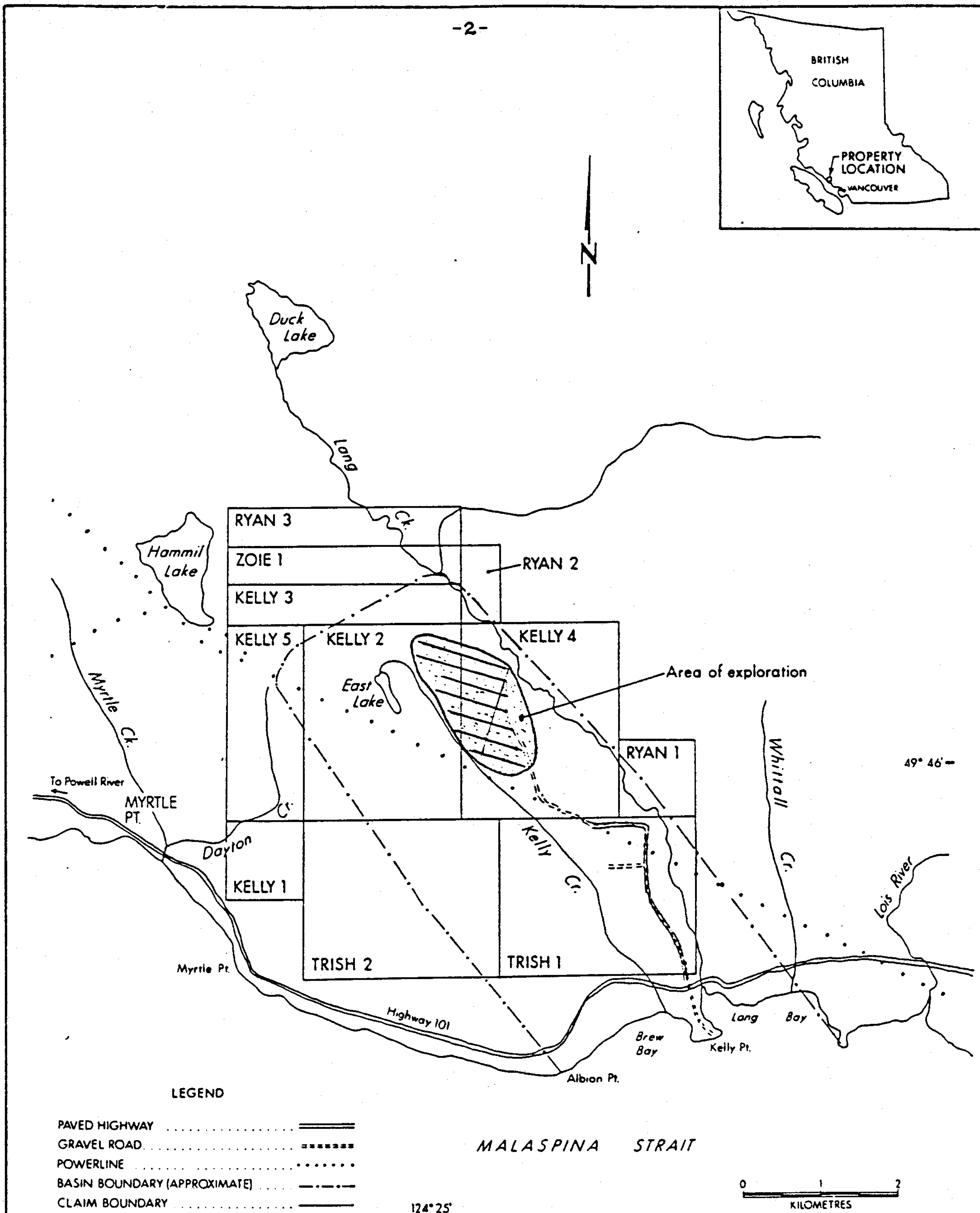
CONTENTS

Figures

1. INTRODUCTION

In the period September 10 to September 19, 1987, Foundex Geophysics Inc. carried out a seismic refraction investigation for Fargo Resources Limited at their property at Lang Bay near Powell River, B.C. The investigation was carried out along seven separate parallel lines on claims staked to cover the postulated extent of a kaolin clay deposit in the area. The purpose of the survey was to determine the thickness and general composition of oberburden soils overlying sedimentary beds and the overall thickness of materials overlying the basement granitic bedrock.

A site plan is presented in Figure 1. In total, 22,000' (6.7 km) of seismic refraction survey work was carried out at the site.



FARGO RESOURCES LTD. LANG BAY PROJECT	OCTOBER, 1987
SITE PLAN	FIGURE 1

2. LOCATION AND ACCESS

The claim group lies 9.3 miles (15 km) southeast of the town of Powell River, B.C., and in close proximity to Lang Bay. The property is bounded by Lang Creek to the east and north, by Hammil Lake to the west and Malaspina Strait to the south.

Highway 101 follows the coast from Saltery Bay to Powell River and passes very near to the southern limit of the property. Zilinsky Road extends north and then west from Highway 101 to the B.C. Hydro power line where a tote road gives access to the exploration area.

3. HISTORY

Interest in the Lang Bay property dates from 1948, when a spectrographic research study on the coals of British Columbia discovered high values of germanium in the carbonaceous sandstone material found in the sedimentary basin located there. A trenching and churn drilling program was carried out by Taiga Mines Ltd. in 1958 and 1959.

In 1977, the property was staked by Ultrabasic Minerals Ltd. who treated samples in a high temperature furnace. These results did not warrant further work and the claims were allowed to lapse.

In 1981, the claims were acquired by Fargo Resources Limited who carried out an extensive sampling program on the Kelly group in 1981 and 1982. In 1986, a drill program was completed in the Kelly claim group.

In May, 1987, Foundex Geophysics Inc. carried out a 610 m north-south seismic refraction survey line on the Kelly 4 claim. Drillhole 87-7 was put down on the seismic line and extensively sampled between 58' (17.4 m) and 132' (39.6 m). The samples were analyzed at the University of British Columbia and proved to be a kaolinitic clay with kaolin concentrations varying from 35% to 60%.

In September, 1987, more extensive seismic refraction and drilling programs were initiated in an area encompassed by the access road to the east, Kelly Creek to the west, and the power line to the south.

4. GEOLOGY

The property is underlain by a basin of thin-bedded Eocene sedimentary rock composed of poorly to well consolidated shales, sandstones, arkose and conglomerates. The basin is surrounded and underlain by granitic intrusives of the Coast Plutonic complex of Jurassic-Cretaceous age. Glacial overburden covers all of the claim area, except along Lang Creek.

The recent drilling program, summarized in "Drilling Report on the Lang Bay Kaolin Prospect" by C. G. Pilon, November, 1987, outlined the following:

4.1 Overburden

The overall overburden thickness ranges from 50' (15 m) to 170' (50 m). A surficial layer composed of oxidized till with numerous boulders is from 15' (4.5 m) to 25' (7.5 m) in thickness. This unit is underlain by a glacial deposit of grey sand, blue clay/clayey sand, and coarse grey washed sand which is usually saturated.

4.2 Brown Beds Formation

The Brown Beds Formation is formed by a succession of thin bedded shales, sandstones, clays and conglomerates. Coal cuttings and organic fragments are present in shale/clay horizons. The dip trend is south-westerly with a dip angle of up to 20 .

4.3 Kaolin and Arkosic Formation

The formation encompasses feldspar alteration of the granitic rock in situ, arkosic sandstones interbedded with kaolinitic clay, kaolin residual of primary deposit found above the arkosic sandstones and kaolinitic clays of secondary origin in the upper part of the formation. Secondary kaolinitic clays are also found on the Brown Beds Formation.

The kaolin deposit trend is along a structural feature oriented south-east to north-west and trending through drillholes 87-9, 87-20, 87-30, and 87-33 (Figure 2). The thicknesses and whiteness of the kaolin found along this line suggests weathering of the underlying granitic rock by hydrothermal processes.

The Arkosic Formation lies above the granitic bedrock with an average thickness of 47.5' (14.5 m).

5. THE SEISMIC REFRACTION SURVEY METHOD

5,1 Equipment

The seismic refraction investigation was carried out using a Geometrics Model ES-1225, 12 Channel, signal enhancement seismograph and Mark Products Ltd. 14 Hz geophones. A 1000' (305 m) cable was used for all seismic lines with geophone spacings of either 50' (15.2 m) or 100' (30.5 m). Explosive charges ranging from one to eight sticks of 75% Forcite dynamite were detonated electrically using a Geometrics HVB-1 high voltage, capacitor-type blaster.

5.2 Survey Procedure

For each spread, the seismic cable was stretched out in a straight line and the geophones implanted. Six different shot-holes were then excavated; one at either end of the spread, two intermediate locations within the line, and one off each end of the line for coverage of the basal layer. Shots were detonated individually and arrival times for each geophone were automatically recorded in the seismograph. Hard copy records were made on electrically sensitive recording film. Data recorded during field surveying operations was generally of good to excellent quality.

Topographic surveying was carried out at the site by R. J. Durling & Associates of Powell River, B.C.

6. SEISMIC REFRACTION DATA ANALYSIS

6.1 Interpretation

Interpreted geological conditions at the site indicate shallow to deep basement overlain by up to five separate layers. In general, the velocity contrast between refractive layers was distinct, however, the contrast between the Brown Beds Formation with the underlying Arkose Formation and in some instances, the overlying glacial overburden, was small requiring careful application of the standard interpretive methods to arrive at final profiles. Interpreted boundaries between layers with different velocities are indicated by dashed lines in the profiles. The basal dashed line in all cases represents the interpreted competent granitic basement surface.

6.2 Interpretive Methods

The interpretation of the seismic data was arrived at using the method of differences technique. This method utilizes the time taken to travel to a geophone from shotpoints located to either side of the geophone. Using the total time, a small vertical time is computed which represents the time taken to travel from the refractor up to the ground surface. This time is then multiplied by the velocity of each overlying layer to obtain the thickness of each layer at that point.

6.3 Limitations

The interpreted depths to subsurface boundaries derived from seismic refraction surveys are generally accepted as accurate to within ten percent of the true depths to the boundaries. In some cases, unusual geological conditions may produce false or misleading seismic arrivals with the result that computed depths to subsurface refractors may be less accurate.

In this survey, the large depths to bedrock in some areas coupled with the thickness and high approximate 3000 m.p.s. velocity of the overlying layer resulted in incomplete two-way coverage of the basal granitic basement surface. This difficulty was partially overcome by "picking" of second arrivals on seismic records which were interpreted as the basement refractor and extrapolation of calculated basement velocities into areas of incomplete coverage. In addition, the small velocity contrast between the Brown Beds Formation with the underlying Arkose Formation and in some instances with the overlying glacial till overburden, give rise to partial definition of hidden layers which will result in some additional inaccuracies.

Interpretation errors may be large in areas of thick nominal 3000 m.p.s. velocity layer presence which is essentially to the west and south. With additional drillhole information, seismic refraction interpretation may require revision in order to better define layer boundaries and thicknesses.

7. GEOPHYSICAL RESULTS

7.1 General

Seismic refraction profiles at a natural scale of 1:2000 are shown in Appendix A. Seismic Line 1 was carried out in May, 1987, but is included here for completeness.

7.2 Overburden

The seismic refraction interpretation has identified three distinct overburden velocities. The thin surficial layer ranging in velocity from 645 m.p.s. to 1045 m.p.s. has been directly correlated with loose sand, gravels and cobbles, cemented sands and gravels, and loose, wet silt and sand in swampy areas. This unit appreciably thickens at station 3+00W on Line 2+00N coincident with an interpreted fault.

The second grouping ranges in velocity from 1210 m.p.s. to 1600 m.p.s. These velocities have been directly correlated with dry, loose clay, sand and gravels and occasional boulders. These materials pinch out against higher or lower velocity materials in the vicinity of inferred faults located at 3+00W on Line 2+00N, and 2+70W and 6+00W on Line 0+00.

The third distinct group ranges in velocity from 1770 m.p.s. to 2510 m.p.s. and averages 2100 m.p.s. Drillhole intersections indicate these velocities represent glacial till and sand and clay with some boulders. Velocities within this layer are high for overburden materials due either to numerous boulder inclusions or saturated conditions. The 2440 m.p.s. and 2510 m.p.s. velocities encountered at station 7+50W to 12+00W on Line 2+00N, seem anomalously high and may indiate either shallow Brown Beds Formation or extremely dense overburden.

7.3 Intermediate Layers

There are two distinct velocity layers intermediate between the interpreted overburden layers and the basement granitic rock. The upper thinner unit with velocities of 2320 m.p.s. to 2670 m.p.s. and average velocity of 2510 m.p.s. has been correlated with the Brown Beds Formation. This unit, due to its depth of burial, thickness and velocity behaves in some instances, as a "hidden" layer in that it is not consistently detected throughout the survey area.

The major intermediate layer has a velocity range of 2680 m.p.s. to 3410 m.p.s. and an average velocity of 3060 m.p.s. This unit which may contain some "hidden" Brown Beds Formation at near surface, has been sampled by limited drilling and is correlated with the Arkose Formation. This layer thickens substantially to the west and south reaching a maximum interpreted thickness of 160 m on Line 6+00S. The composition of this layer to the west and south is believed to be arkosic sandstones with or without a layer of more competent overlying Brown Beds Formation. At depth, this layer may also be composed in part of altered granitic rock in situ.

7.4 Basal Layer

The basal layer, having velocities ranging from 4120 m.p.s. to 7925 m.p.s. is interpreted as the competent granitic bedrock surface. Computed basement velocities indicate a weak trend of higher velocities in areas of shallow overall depths to basement, to lower velocities in areas of greatest interpreted depths to basement. The basement surface dips generally west and south although data from the east section of Line 2+00S, Line 4+00S and Line 10+00S, indicate an easterly dip to the bedrock surface. There is a significant drop in bedrock elevation between Lines 4+00S and 6+00S suggesting the presence of faulting between these lines.

8. SUMMARY AND RECOMMENDATIONS

A total of 22,000' (6705 m) of seismic refraction work has been completed on Fargo Resources Ltd.'s kaolin clay prospect at Lang Bay near Powell River, B.C.

The seismic work was able to identify distinct velocities for overburden units, the Brown Beds Formation, Arkose Formation and the basement granitic bedrock. Faulting was detected by the seismic refraction survey.

The Brown Beds Formation, due to its velocity, thickness and depth of burial, is believed to be a "hidden" layer in the interpretation of some profiles. The granitic basement surface dips generally to the west and south and is overlain in areas of greatest thickness by the interpreted "Arkose Formation" which is interpreted to be up to 160 m thick on Line 6+00S. The depths to bedrock and the thicknesses of the "Arkose Formation" in deep areas is reliant in some instanes on incomplete two-way coverage of the basal granitic surface and may be in error.

Future work should consist of drilling and geophysical surveying. Priorities of the drilling program should be the sampling of the thick "Arkose Formation" to the west and south of the present detailed drilling area and an investigation of bedrock depths especially the discrepancy between Lines 4+00S and 6+00S.

Given that primary kaolin contains significant magnetite and is associated with faulting, high resolution magnetometer surveying should be carried out. Results of surveying on the present grid should be evaluated to detemine if the technique is effective in structural mapping and determining kaolin concentrations.

Resistivity surveying should be carried out on the present grid to determine its effectiveness in delineating overburden, Brown Beds Formation, kaolin and structural anomalies.

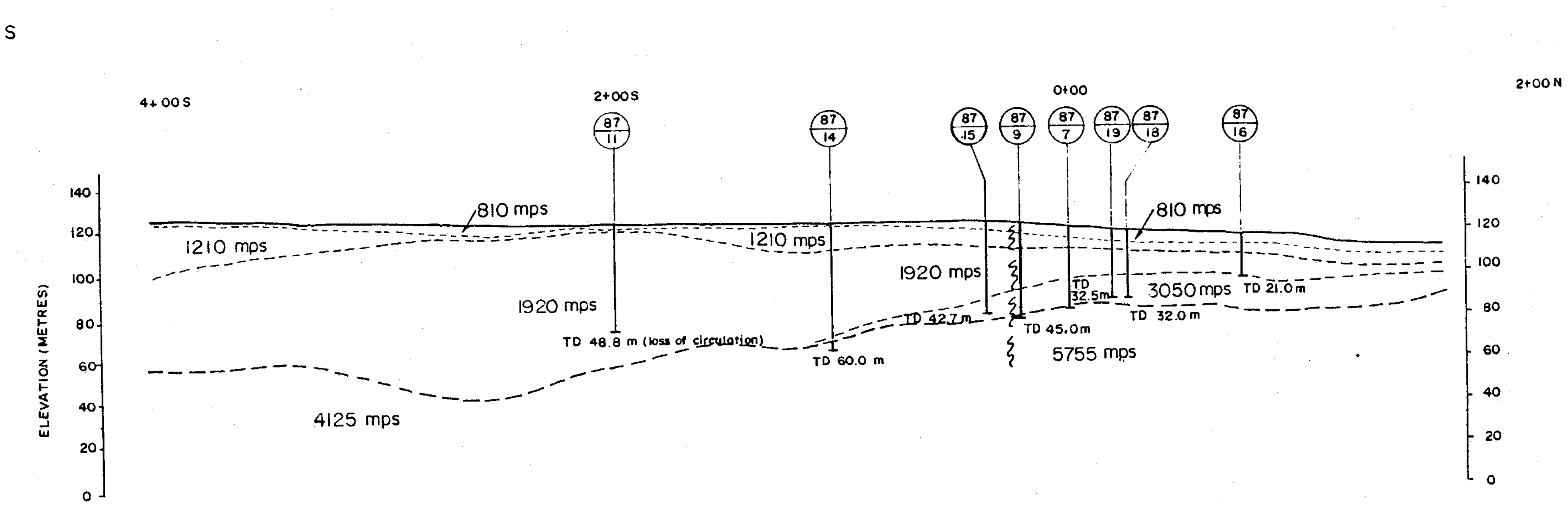
Seismic refraction surveying is effective in mapping the major geological units at the site and in identifying major faults. Future seismic refraction work should be carried out with tighter geophone spacings and wider offset shooting. This will result in improved intermediate layer and basement definition and a more thorough understanding of site geology.

for

FOUNDEX GEOPHYSICS INC.

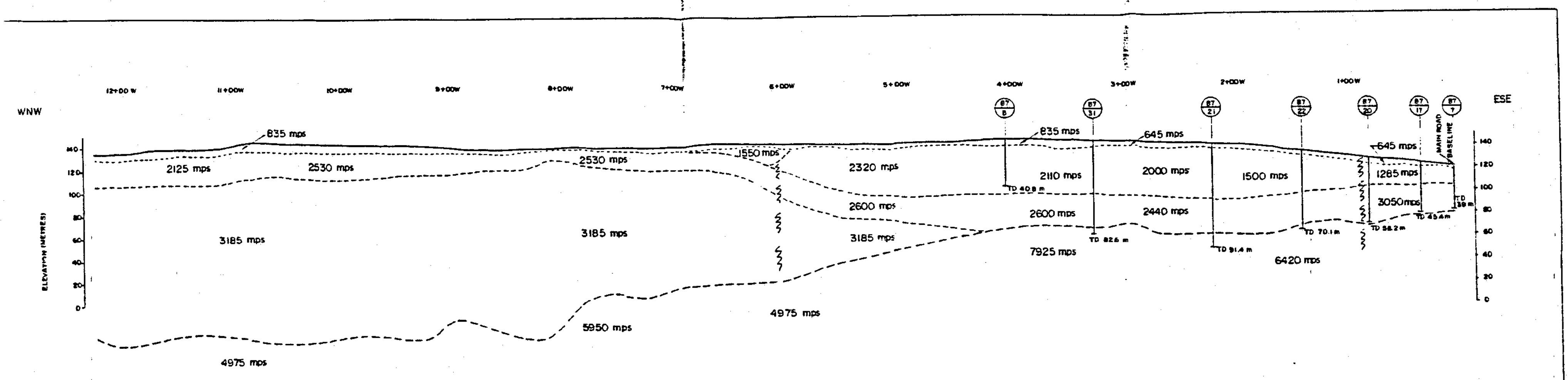
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
Russell A. Hillman

Russell A. Hillman, P.Eng.



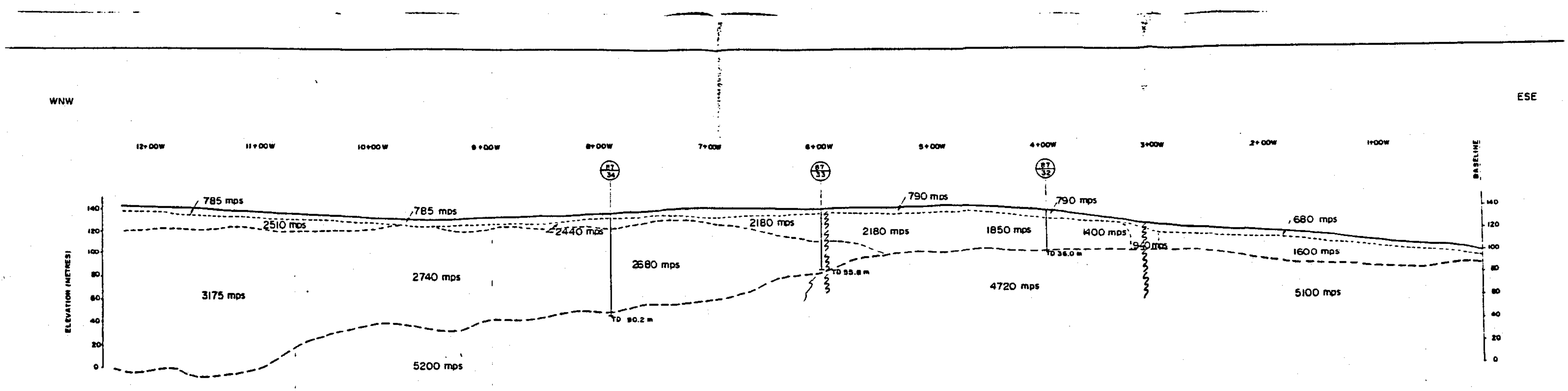
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION SL-1	OCTOBER, 1987 FGI-024-3



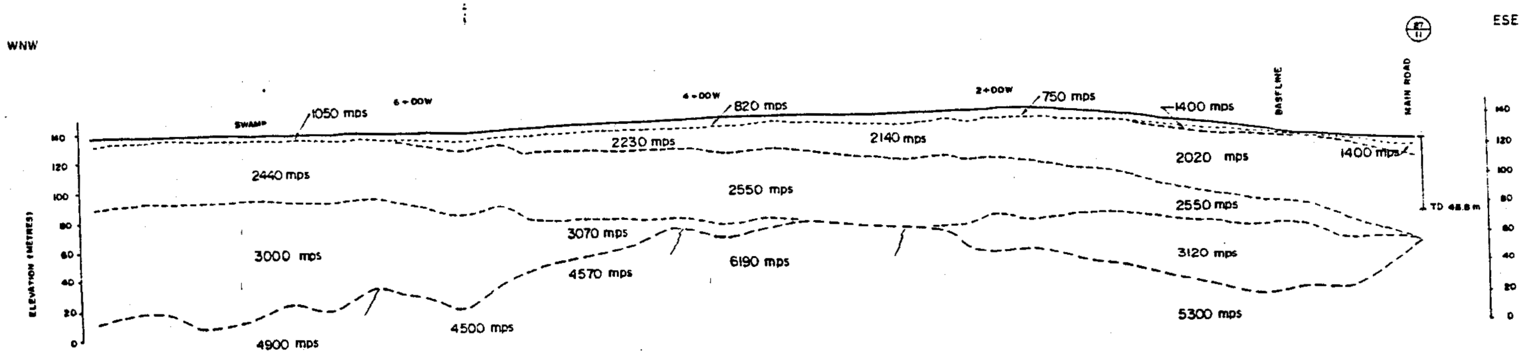
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION LINE 0+00	OCTOBER 1987 FGI - 024 - 3



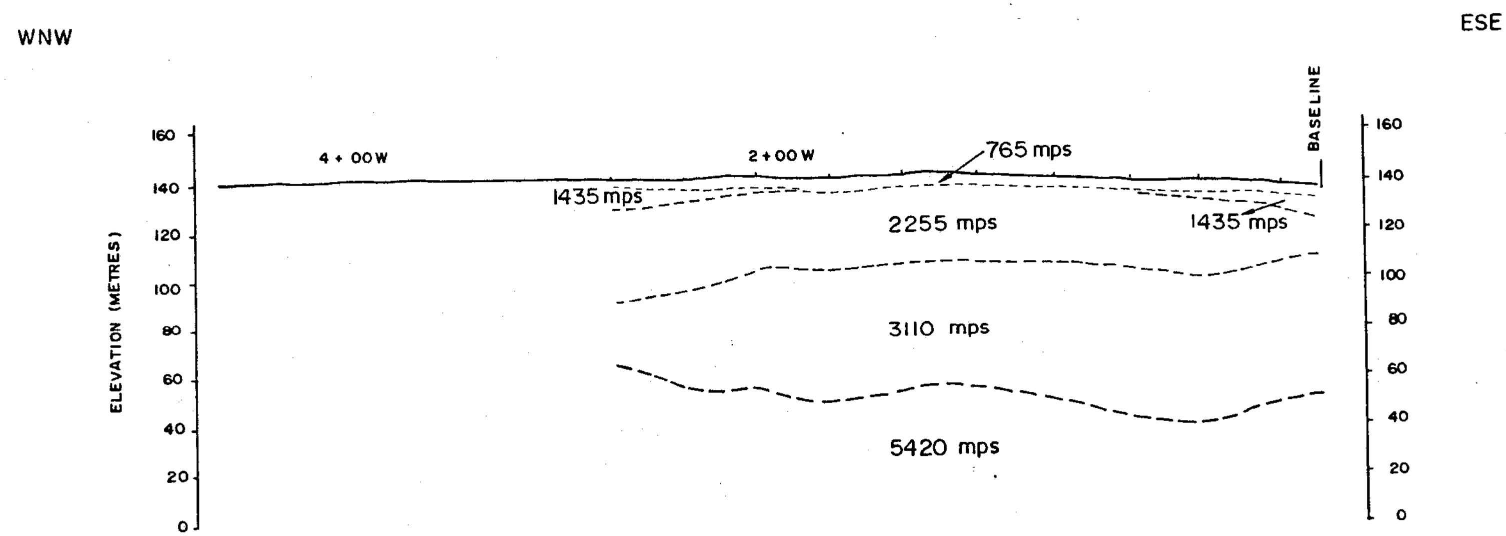
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION LINE 2+00N	OCTOBER, 1987 FGI - 024 - 3



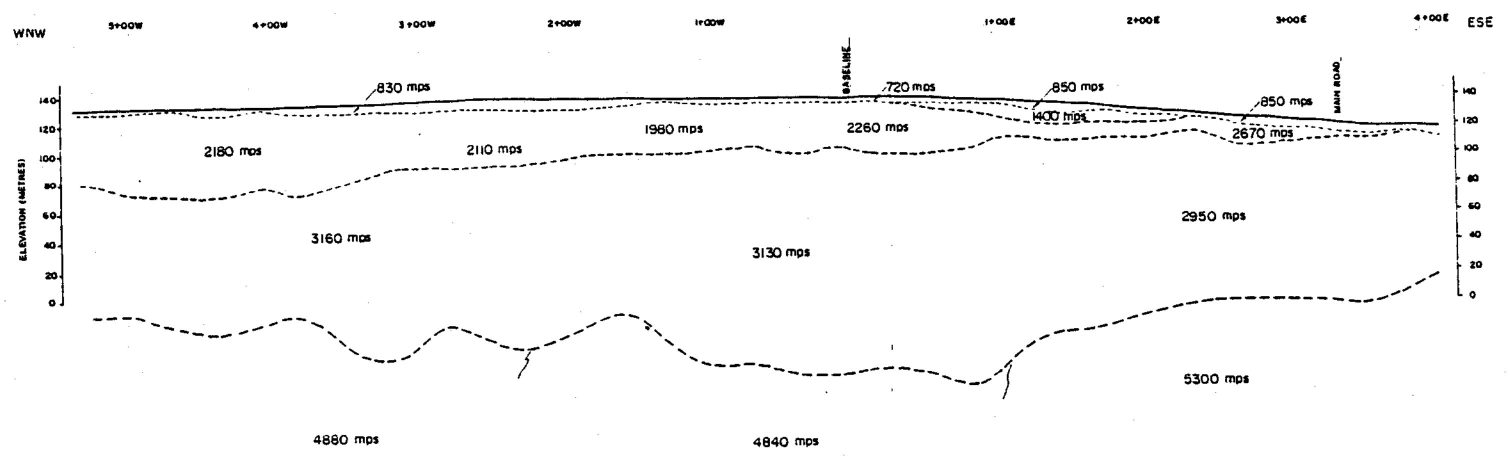
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION LINE 2+00S	OCTOBER, 1987 FGI-024-3



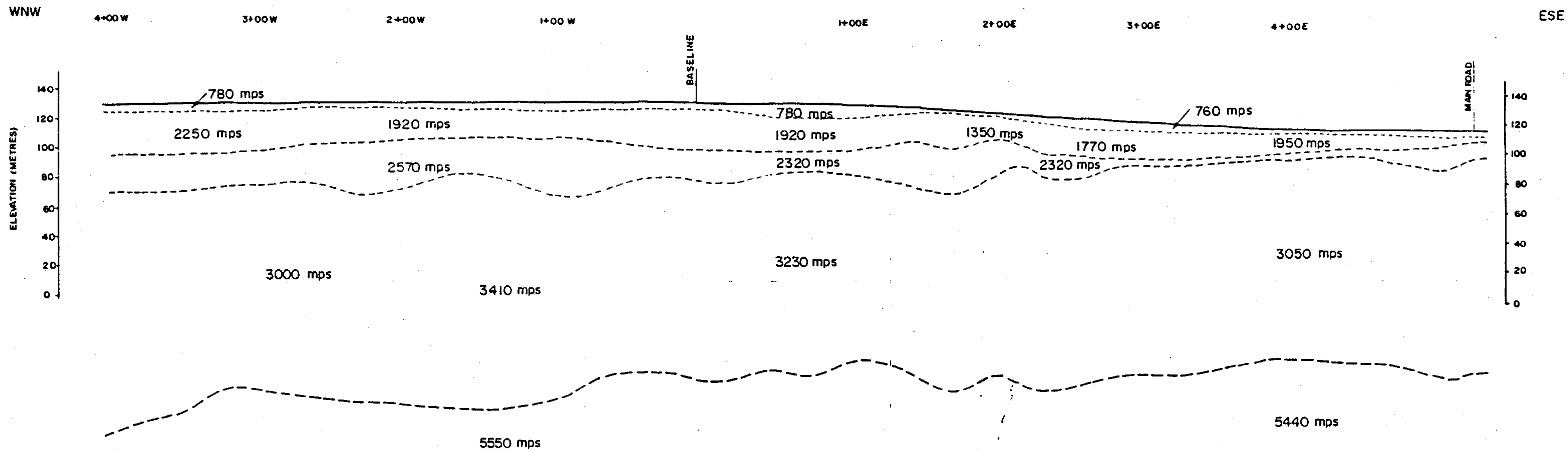
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY	OCTOBER, 1987
INTERPRETED SECTION LINE 4+00S	FGI-024-3



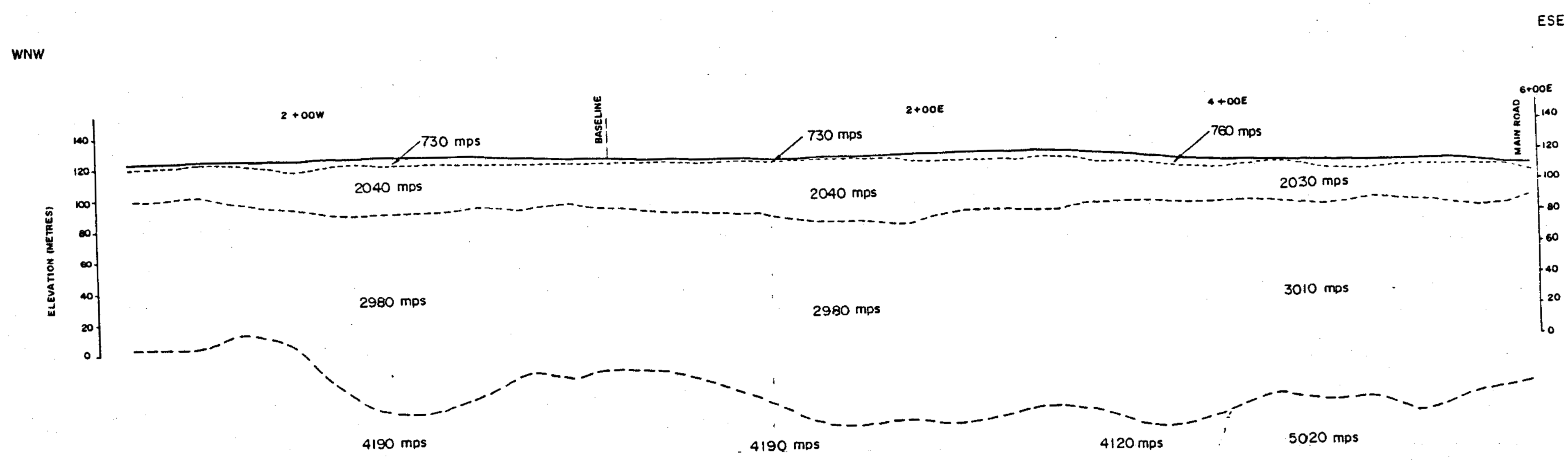
SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION LINE 6+00 S	OCTOBER, 1987 FGI - 024 - 3



SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY	OCTOBER, 1987
INTERPRETED SECTION LINE 8+00S	FGI-024-3



SCALE 1:2000

FARGO RESOURCES LTD. LANG BAY PROJECT	FOUNDEX GEOPHYSICS INC.
SEISMIC REFRACTION SURVEY INTERPRETED SECTION LINE 10+00S	OCTOBER, 1987 FGI-024-3

APPENDIX C

MAGNETOMETER AND RESISTIVITY REPORT OF FOUNDEX GEOPHYSICS INC.

FARGO RESOURCES LIMITED

REPORT ON AN

ELECTRICAL RESISTIVITY AND

MAGNETOMETER SURVEY

LANG BAY KAOLIN PROSPECT

LANG CREEK AREA

VANCOUVER, M.D.

NTS 92F/16W

49° 48′ N, 124° 25′ W

OWNER AND OPERATOR

FARGO RESOURCES LIMITED

900 - 850 WEST HASTINGS STREET

VANCOUVER, B.C. V6C 1E1

by

Clifford E. Candy, Senior Geophysicist

Russell A. Hillman, P.Eng.

December, 1987 FGI-024-5

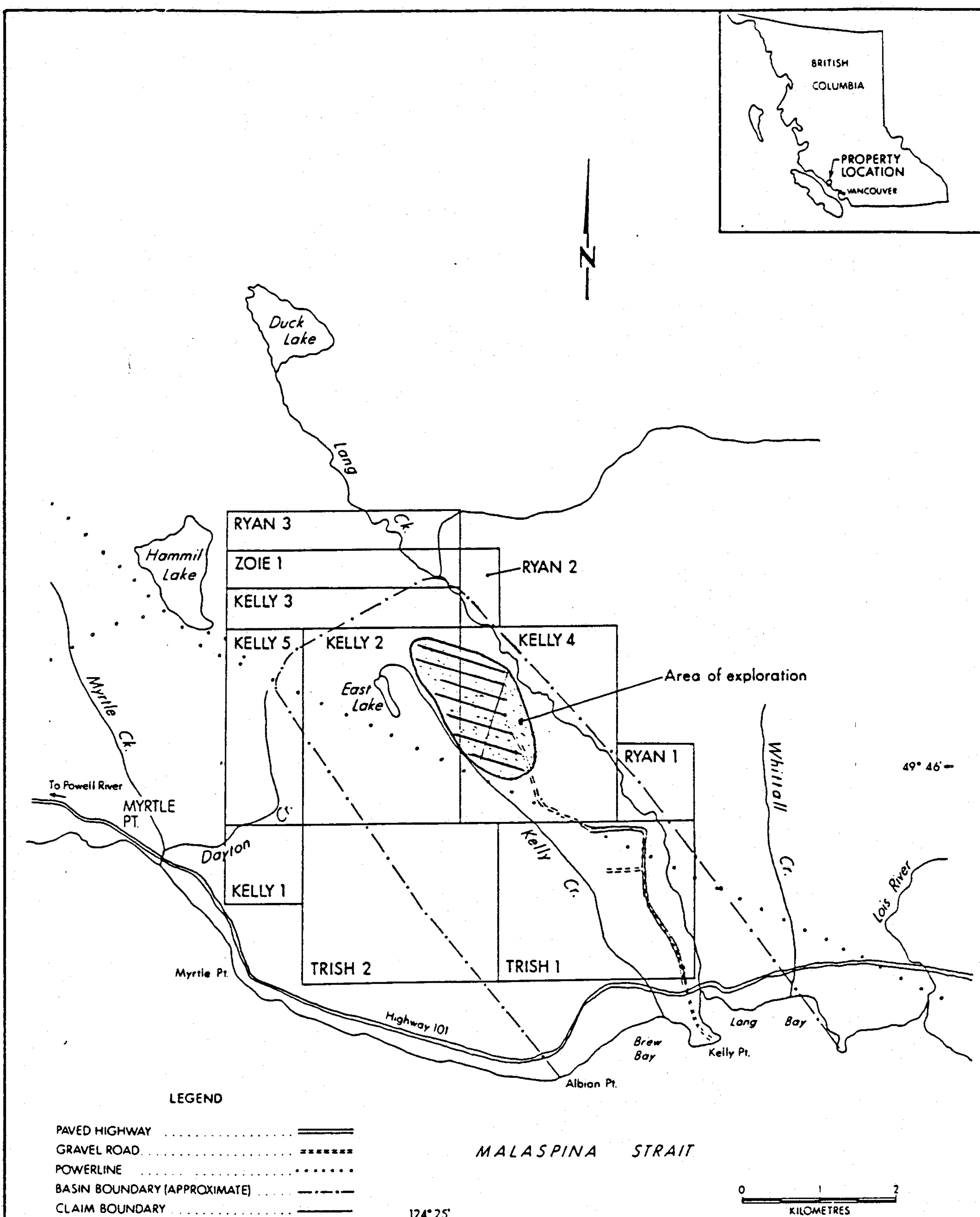
CONTENTS

ILLUSTRATIONS

1. INTRODUCTION

During December of 1987, a program of dipole-dipole apparent resistivity surveying and proton precession magnetometer surveying was undertaken on the Lang Bay Kaolin Prospect. The resistivity survey consisted of approximately ten kilometres of five separation coverage as well as four Schlumberger electrical resistivity soundings. The magnetometer survey was carried out over approximately 10.5 kilometres of line with 12.5 metre station intervals.

The objective of the resistivity surveys was to determine whether sufficient resistivity contrasts existed to delineate the kaolin-bearing formation, and within the scope of the limited program layed out, determine the extent and distribution of the Kaolin. The magnetometer survey had as its objective the detection of structural features, such as faulting which might have both controlling and disruptive attributes with respect to the kaolin-bearing formation. As well, the possibility exists that direct detection of the kaolin may be possible due to the high magnetite content of the clay-bearing formation given sufficient magnetic susceptibility contrasts exist against the basement rocks and other units.



FARGO RESOURCES LTD. LANG BAY PROJECT	DECEMBER, 1987
SITE PLAN	FIGURE 1

2. LOCATION AND ACCESS

The claim group lies 9.3 miles (15 km) southeast of the town of Powell River, B.C., and in close proximity to Lang Bay. The property is bounded by Lang Creek to the east and north, by Hammil Lake to the west and Malaspina Strait to the south.

Highway 101 follows the coast from Saltery Bay to Powell River and passes very near to the southern limit of the property. Zilinsky Road extends north and then west from Highway 101 to the B.C. Hydro power line where a tote road gives access to the exploration area.

3. GEOLOGY

The property is underlain by a basin of thin-bedded Eocene sedimentary rock composed of poorly to well consolidated shales, sandstones, arkose and conglomerates. The basin is surrounded and underlain by granitic intrusives of the Coast Plutonic complex of Jurassic-Cretaceous age. Glacial overburden covers all of the claim area, except along Lang Creek.

The recent drilling program, summarized in "Drilling Report on the Lang Bay Kaolin Prospect" by C. G. Pilon, November, 1987, outlined the following:

3.1 Overburden

The overall overburden thickness ranges from 50' (15 m) to 170' (50 m). A surficial layer composed of oxidized till with numerous boulders is from 15' (4.5 m) to 25' (7.5 m) in thickness. This unit is underlain by a glacial deposit of grey sand, blue clay/clayey sand, and coarse grey washed sand which is usually saturated.

3.2 Brown Beds Formation

The Brown Beds Formation is formed by a succession of thin bedded shales, sandstones, clays and conglomerates. Coal cuttings and organic fragments are present in shale/clay horizons. The dip trend is south-westerly with a dip angle of up to 20^{o}.

3.3 Kaolin and Arkosic Formation

The formation encompasses feldspar alteration of the granitic rock in situ, arkosic sandstones interbedded with kaolinitic clay, kaolin residual of primary deposit found above the arkosic sandstones and kaolinitic clays of secondary origin in the upper part of the formation. Secondary kaolinitic clays are also found on the Brown Beds Formation.

The kaolin deposit trend as defined by the drilling program is along a structural feature oriented south-east to north-west. The thicknesses and whiteness of the kaolin found along this line suggests weathering of the underlying granitic rock by hydrothermal processes.

The Arkosic Formation lies above the granitic bedrock with an average thickness of 47.5' (14.5 m).

4. INSTRUMENTATION AND SURVEY PROCEDURE

4.1 Resistivity Surveys

The dipole-dipole resistivity survey was undertaken using an ABEM SAS 300B resistivity meter. An "a" spacing of 25 metres was employed with "n" values ranging from one to five in the shallower basement areas and two through six in the deeper south and west grid areas. Porous pot electrodes were used to sense potential information and self-potential data was recorded to monitor contact integrity.

The Schlumberger soundings were undertaken using the 300B resistivity meter. The potential "mn" separation expansion points were read twice to ensure accuracy. Geometric "k" factors were computed and results plotted ongoing with survey operations in order to maintain data quality and monitor for lateral inhomogeneity effects.

4.2 Magnetometer Survey

The magnetometer survey was carried out using a Gem Systems Lamontagne GSM-18 instrument. A GSM-18 with extended memory was used as a base station. Operator demagnetization precautions were observed and base station to roving magnetometer synchronization was maintained to within one second per day. Diurnal variation removal was accomplished using software internal to the GSM-18 and the resulting data downloaded to field computer.

5. DATA PROCESSING AND INTERPRETATION

5.1 Resistivity Surveys

The dipole-dipole data was gridded utilizing an elliptical window consistent with the "n" and "a" parameters and the resulting gridded data assigned colours in a logarithmic distribution. This information is displayed in false colour pseudo-section format in Figures 6 - 9. It should be noted that the vertical scale is exaggerated by a factor of two to enhance the clarity of vertical detail.

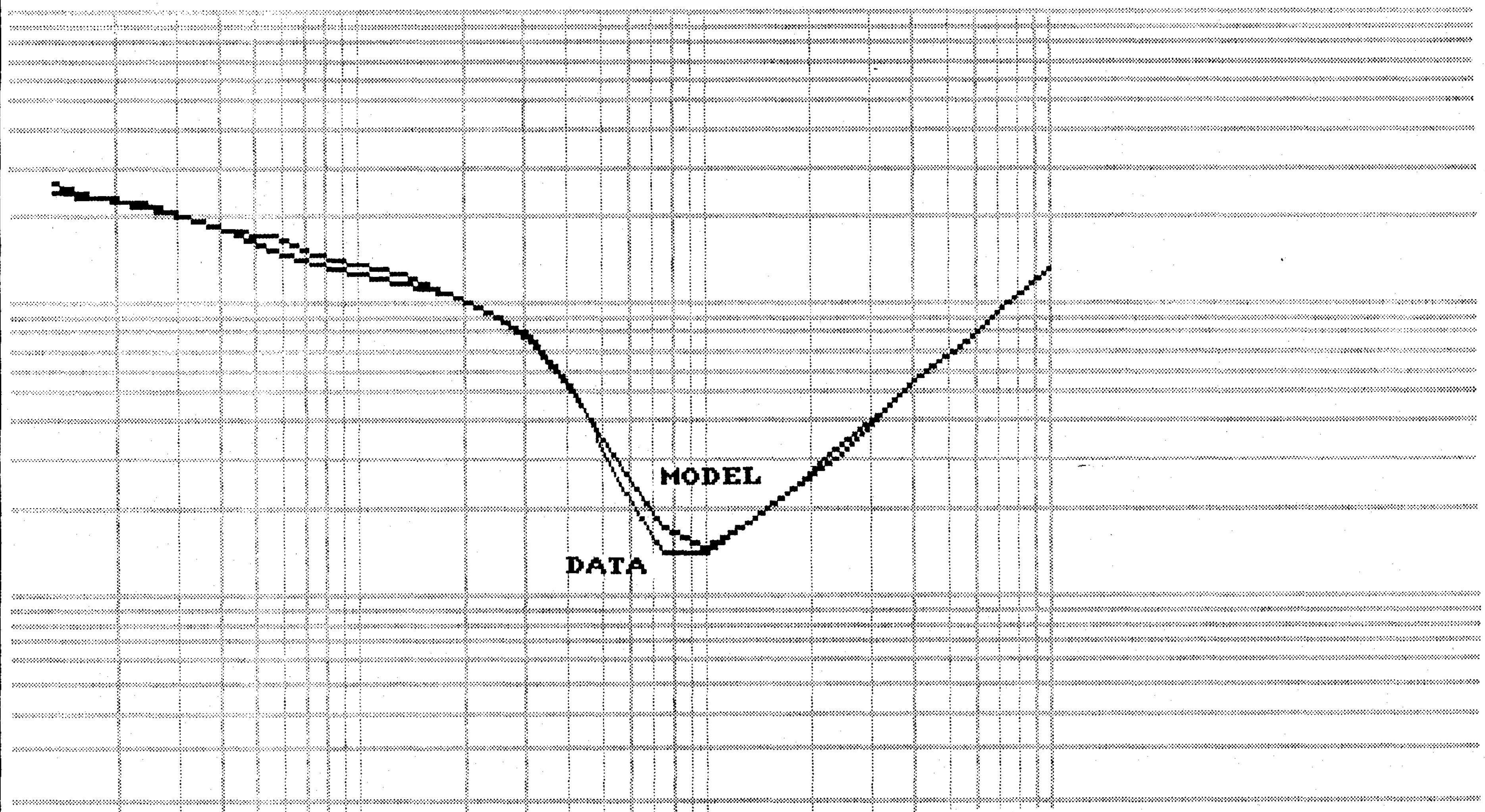
The n=5 data was gridded in plan and plotted at a scale of 1:10000 in Figure 3. This provides an overview of the plan distribution of apparent resistivities at this separation.

At appropriate intervals apparent resistivity data was selected and modelled using a digital linear filter method forward case (Ref. 1, 2). These data form partial sounding curves, spanning a small interval of less than a decade. However, the models provide a useful estimate of true resistivities and a rough estimate of layer thicknesses. These data have been plotted on interpretation sections in Figures 8 - 17. The data on lines 2+00N and 0+00N overlay the detailed seismic interpretation for these lines (Ref. 3). Where the extent of the seismic lines permits, the north-south apparent resistivity traverses intersect the seismic lines at approximately 200 metre intervals. These data are plotted on the interpretation sections for comparison with the apparent resistivity data. The dashed lines connecting the various velocity layers are for correlation purposes only and do not form a detailed estimate of horizon topography.

The Schlumberger resistivity sounding data and the corresponding model curves are plotted in Figures 18 - 21. The locations of the soundings are noted in Figure 2 and the derived models on Figures 9, 14 and 16. The Schlumberger sounding method requires little movement of the potential pot electrodes during the course of the soundings as compared to other methods. As potential sensing is much more subject to local resistivity effects as compared to the current introduction points this method provides some immunity against the presence of lateral inhomogeneities. In some areas of the property however, strong lateral resistivity contrasts are present and interference with the sounding results is apparent.

5.2 Magnetometer Survey

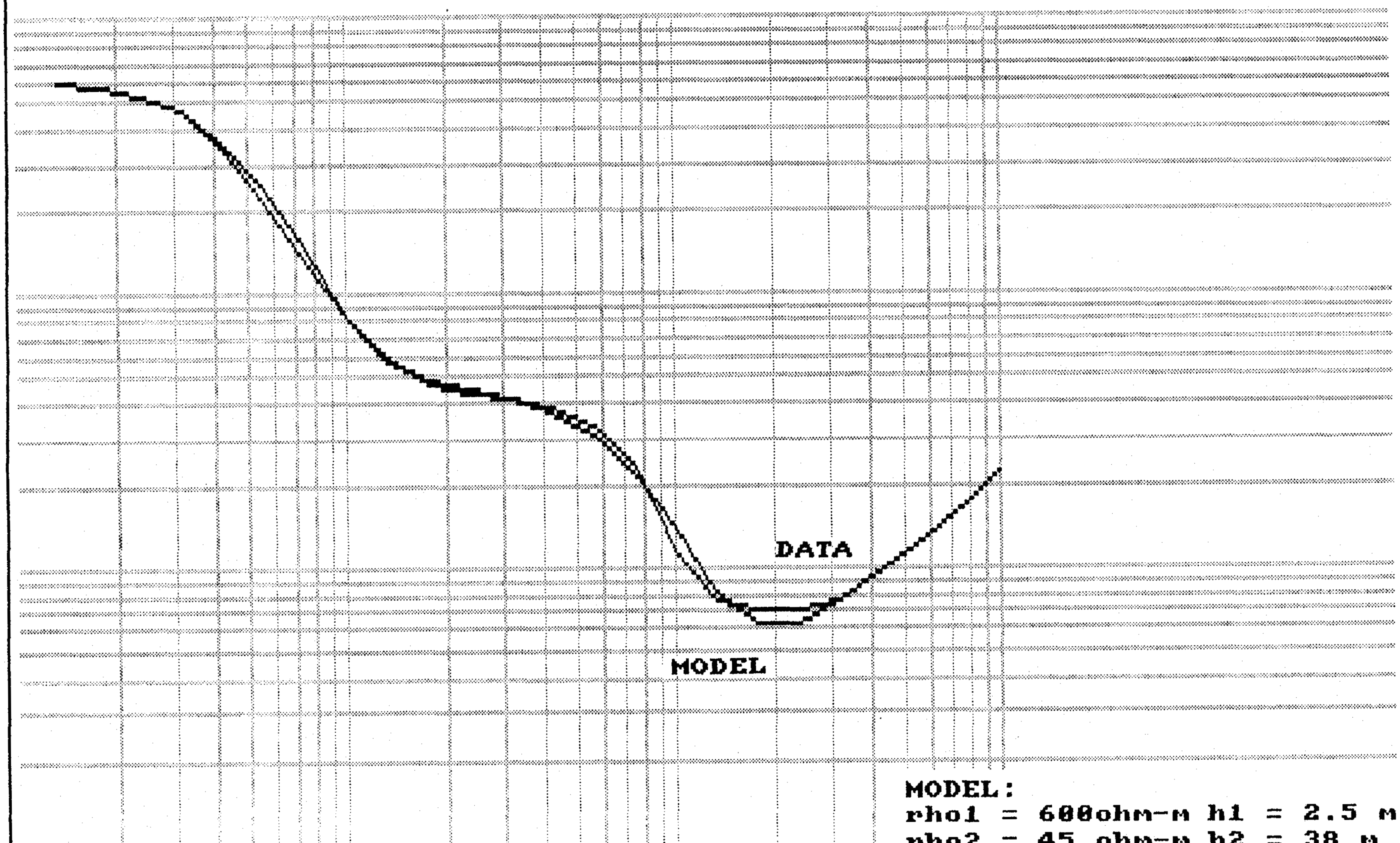
The diurnal-corrected, unfiltered magnetometer data is plotted in stacked profile form in Figure 22. An overview of the data at 1:10000 scale is provided in Figures 23 and 24. Figure 23 shows the data is gridded with a weighting ellipse which reflects the 12.5 metre by 200 metre sampling of the data. Figure 24 conforms to the clearly established trends oriented at azimuth 330° and emphasizes features possessing this strike.



MODEL:
rho1 = 250 ohm-m h1 = 1.8m
rho2 = 120 ohm-m h2 = 18.5m
rho3 = 5 ohm-m h3 = 37 m
rho4 = 999 ohm-m h4 = 999m

SCHLUMBERGER ELECTRICAL RESISTIVITY SOUNDING ES-1

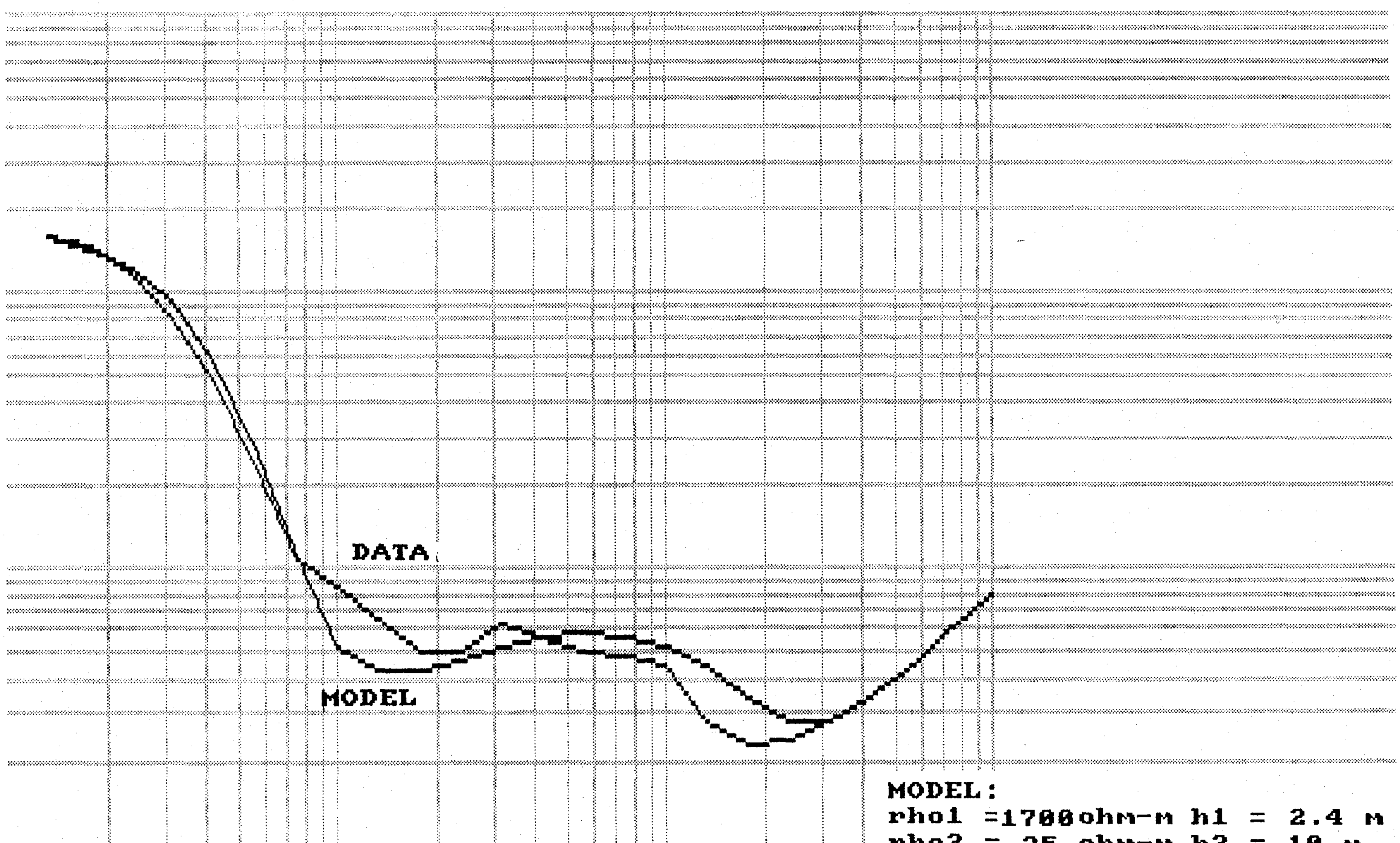
SURVEY DATE: DEC/87 FIG: 18



MODEL:
rho1 = 600ohm-m h1 = 2.5 m
rho2 = 45 ohm-m h2 = 38 m
rho3 = 2 ohm-m h3 = 36 m
rho4 = 8 ohm-m h4 = 200+ m

SCHLUMBERGER ELECTRICAL RESISTIVITY SOUNDING ES-2

SURVEY DATE: DEC/87 FIG: 19

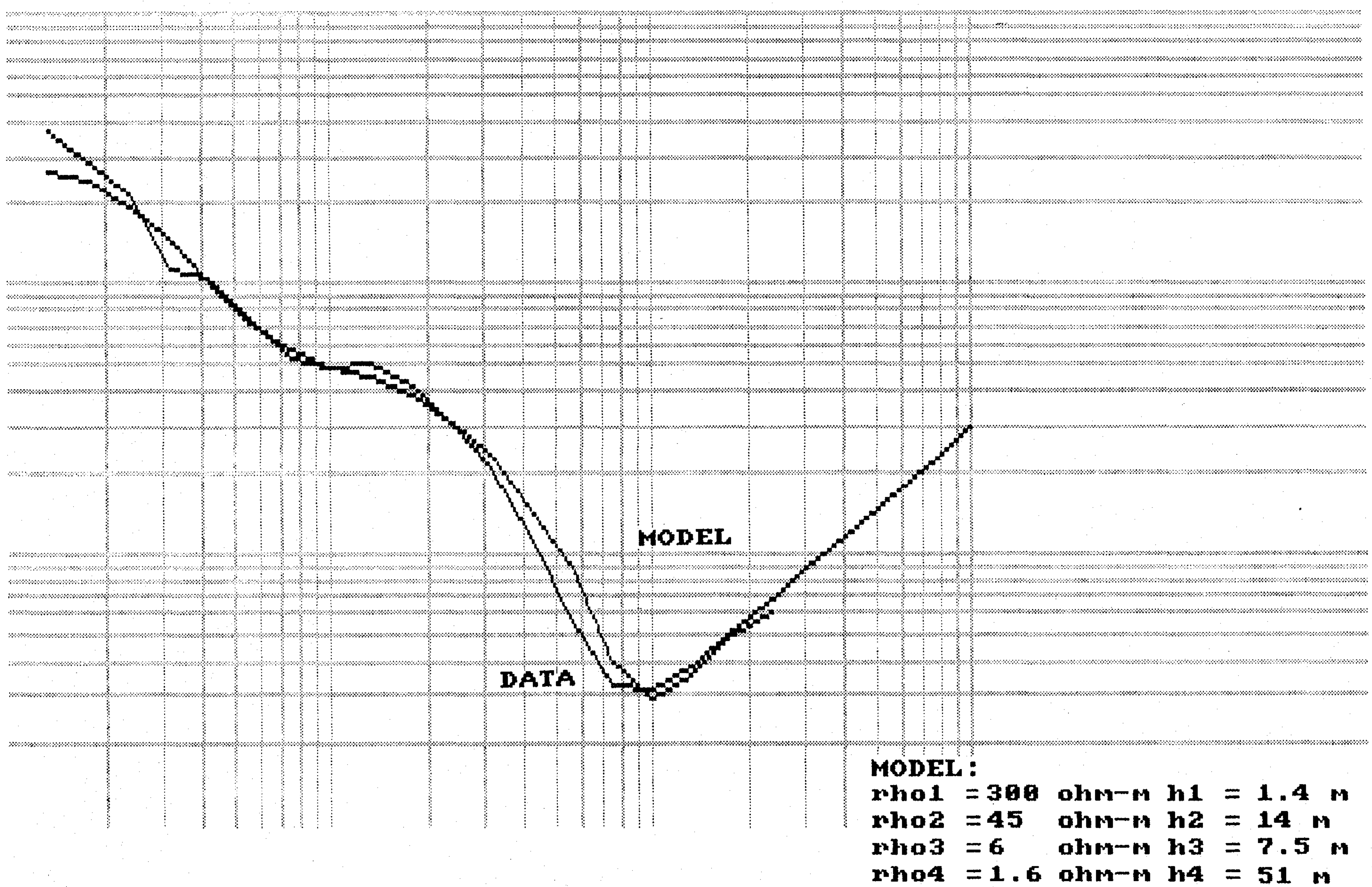


MODEL:
rho1 =1700 ohm-m h1 = 2.4 m
rho2 = 35 ohm-m h2 = 10 m
rho3 = 60 ohm-m h3 = 60 m
rho4 = .9 ohm-m h4 = 10 m

SCHLUMBERGER ELECTRICAL RESISTIVITY SOUNDING ES-3

SURVEY DATE: DEC/87

FIG: 20



SCHLUMBERGER ELECTRICAL RESISTIVITY SOUNDING ES-4

SURVEY DATE: DEC/87 FIG: 21

6.0 DISCUSSION OF RESULTS

6.1 Resistivity Surveys

The apparent resistivity profile of line 0+00W in Figure 6 shows the low apparent resistivities correlated with the kaolin formation found in the 0+00N, 0+00W, "Discovery" and other nearby holes. This pseudo-section may be compared with Figure 3 of C. Pilon's report (Ref. 4). Schlumberger sounding ES-1, illustrated in Figure 14, shows the conductive properties of the clay. A resistivity value of 5 ohm-m is fairly representative of the kaolin formation in this area. An additional contributing conductive source could be well interconnected carboniferous material in the Brown Beds Formation. These layers however, are generally of low grade and thin and are often not present in the strata. A sounding generated from the dipole-dipole data is shown for comparison at station 0+50N.

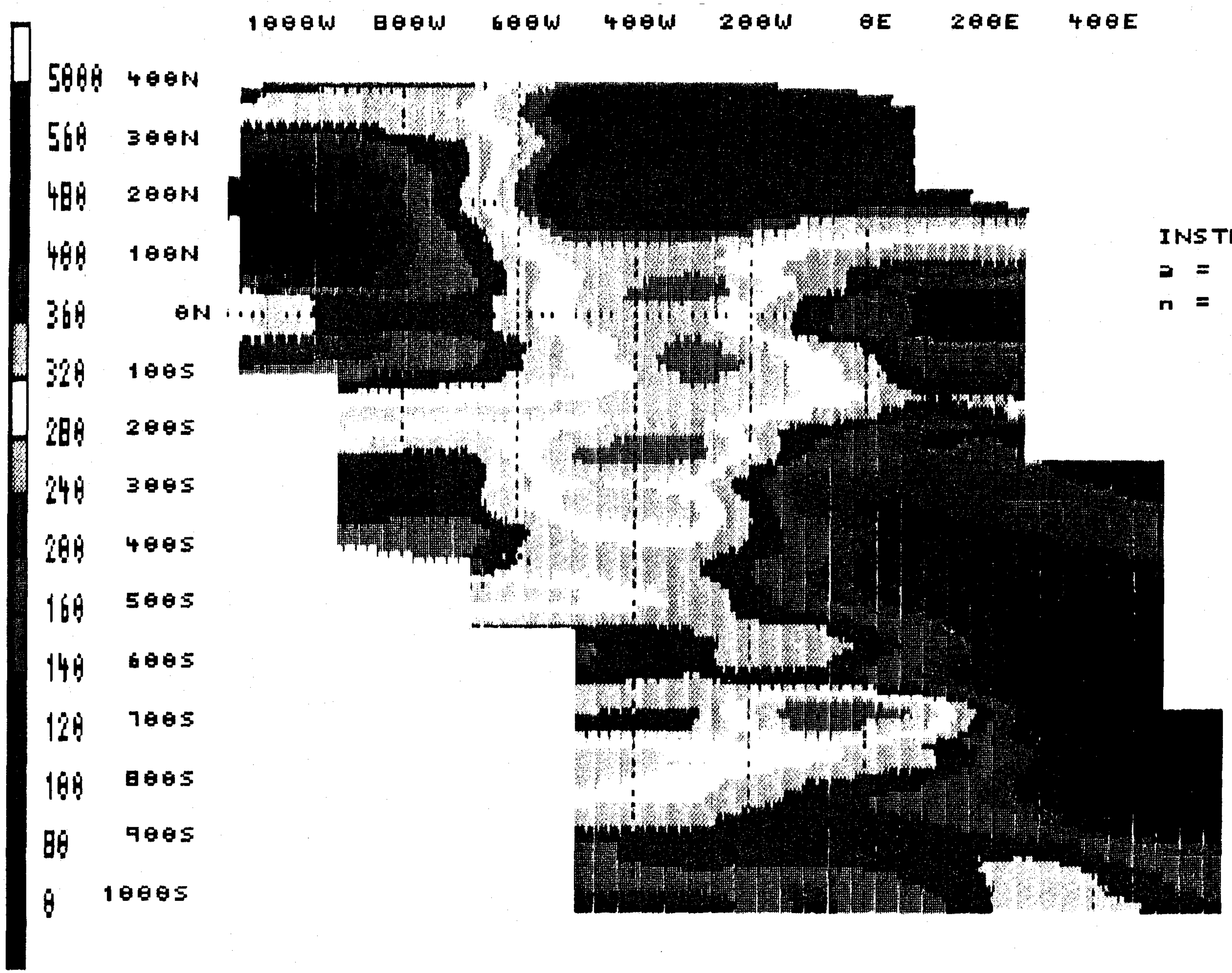
This strong resistivity low persists to grid north to approximately 1+50N where a transition into the high apparent resistivities of 500 - 800 ohm-m, characteristic of the basement rock is seen. To the south of ES-1, the seismic data (Ref. 3) shows an increase in overburden depths as an increase in the 2000 m.p.s. layer. This is well correlated with an increase in apparent resistivities associated with a resistive glacial and/or alluvial overburden. A thinning of this resistive layer occurs near 4+00S, again well correlated with the thinning of the 2000 m.p.s. zone. Schlumberger sounding ES-2 at 3+67S shows the presence of the conductive zone as does the n=5 separation of the dipole-dipole data (Fig. 6).

A disruptive feature, likely an east-west fault between 4+00S and 6+00S, is evidenced as a sharp change in bedrock elevations in the seismic data. This correlates with the thickest accumulation of resistive material generally thinning to the south. The surface of the 3060 m.p.s. zone is relatively shallow on line 6+00S suggesting a resistive component of the sedimentary formation may be present rather than mere thickening of the glacial overburden. At 8+00S, the conductive zone is located at depth within the 3060 m.p.s. velocity layer, inferring the presence of the kaolin formation.

Line 2+00E shows a continuation of the conductive zone to the east, with the strongest conductive feature centred on 4+00S. On Line 4+00E, the conductive zone is very well established at relatively shallow depths between stations 5+00S and 6+00S. Schlumberger sounding ES-4 documents the extremely conductive nature of the zone. The modelling of this zone provides a "best fit" with approximately 50 metres of 1.6 ohm-m material. Line 6+00E provides a window on the southward extent of the conductive zone and shows very precise line-to-line correlation with the south end of 4+00E.

Line 0+00N, Fig. 4, shows the east-west behaviour of the formation near the "Discovery" hole and may be compared with Figure 8 of C. Pilon's report (Ref. 4). The apparent resistivity profile shows the plunge of the zone under the resistive glacial/alluvial material to the west. Continuation of the zone to the east is strongly indicated. Schlumberger sounding ES-3 shows an erroneously low overburden layer resistivity. This is probably due to the fact that the current array expands into very conductive material as little as 125 metres from the sounding point. As well, a number of offsets were noted characteristic of the expanding array traversing fault zones. However, it is feasible that the conductive material is present at depth under this deep overburden area. Thinning of the resistive overburden to the west is observed, well correlated with a thinning of the 2500 m.p.s. velocity layer (Fig. 9).

Lines 2+00W and 4+00W show the presence of deeper resistive overburden. North of approximately 1+00N on 2+00W and 2+00N on 4+00W the strongly resistive feature is likely due to resistive basement rocks. The conductive zone is evident at a number of points on these lines in the n=6 data (Fig. 6).



N

INSTRUMENT: SAS-300B
a = 25m
n = 5

FGI:-024-5
SURVEY DATE: DEC/87
SCALE: 1:10000

GeoSci Data Analysis Ltd.

FARGO RESOURCES LTD.
LANG BAY PROJECT
APPARENT RESITIVITY (ohm-m)
FALSE COLOUR CONTOUR MAP

FIG: 3

Line 8+00W , and Seismic Refraction Line 2+00N show the presence of a well expressed conductive zone. The most easterly extreme of this zone was tested by drillhole 87-34 (Ref. 4), and a clay zone was intersected at depth. Some carboniferous material was also intersected in this hole and may form a contributing conductive source.

6.2 Magnetometer Survey

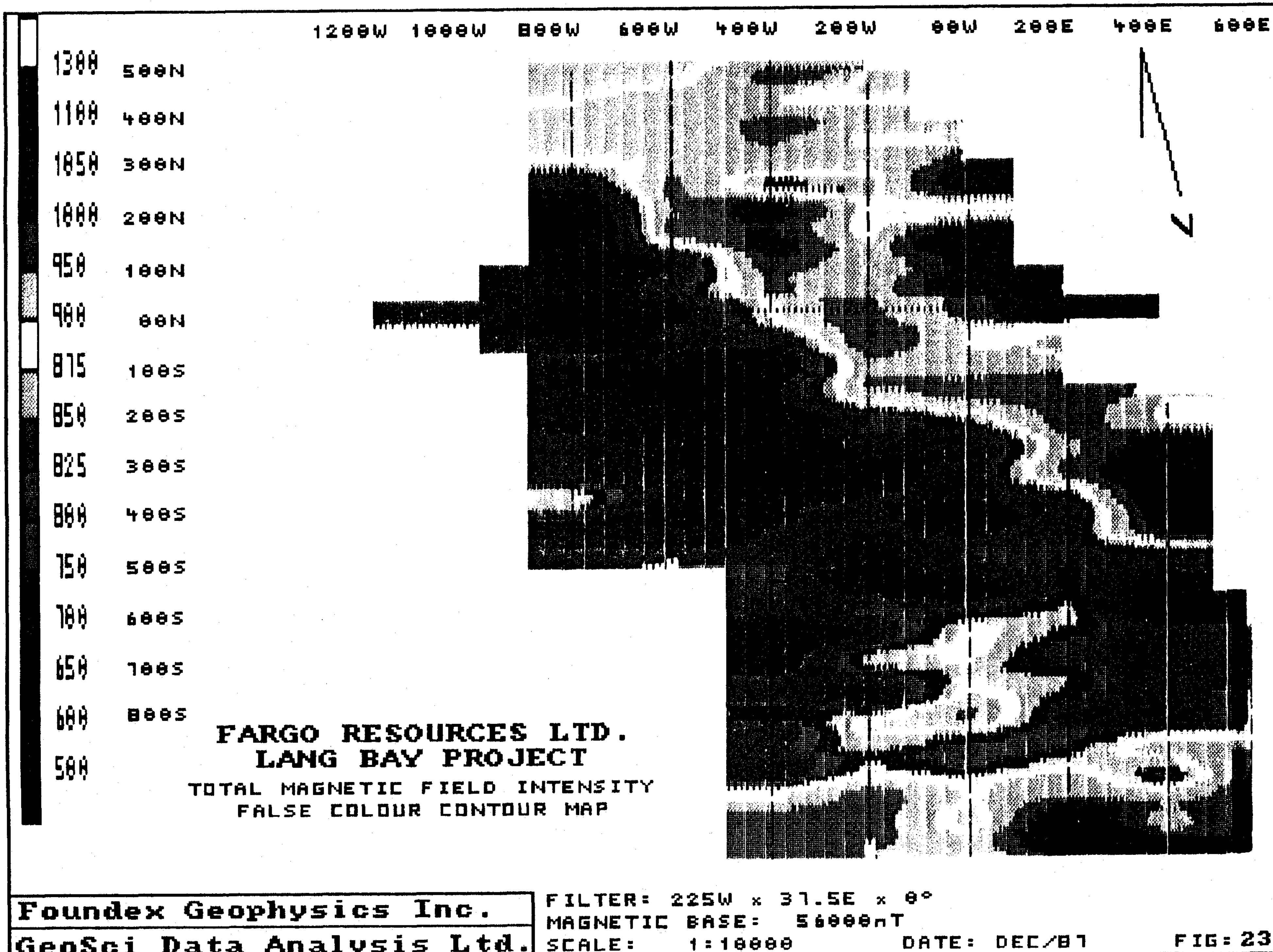
The proton precession magnetometer survey data is displayed in Figures 22, 23 and 24. The stacked profile map (Fig. 22) shows an abundance of shallow sourced high spatial frequency variations. These are believed to be due to the presence of magnetic mineral rich rock fragments within the glacial overburden. In some areas, the overburden materials are quite coarse, consisting of very large boulders. This contributes a "geologic noise" which remains under sampled even at 12.5 metre intervals.

At longer spatial wave lengths however, a number of deeper sourced features are evident. The most pronounced feature is a strong north westerly striking lineament separating high magnetic susceptibility material to the northeast from low susceptibility to the southwest. This break trends from

2+50N on 8+00W to 5+00S on 4+00E. The trend is likely a basement effect and may represent a fault zone. The false colour contour map, Fig. 24, best represents this trend. It may be noted that this trend is, in turn, offset by an interpreted north-south trending fault passing between 0+00W and 2+00W. This north-south inferred fault acts to terminate a series of magnetic highs to the north. Within the general magnetic low, the strike of individual lows continues to display a 330° strike.

The unbiased colour contour map, Fig. 23, best displays the alignment of the magnetic high at the southern extent of survey coverage.

The kaolin zone in the area of present drilling shows a rough correlation with a magnetic high, however, the northwestern and southeastern anomalies appear to be correlated with magnetic lows. Thus, it seems that the magnetic activity is largely basement controlled. The general trend towards magnetic lows in the western area of the grid may, in part, be due to a general increase in basement depth.


1200W 1000W 800W 600W 400W 200W 00W 200E 400E 600E
1300 500N
1100 400N
1050 300N
1000 200N
950 100N
900 00N
875 100S
850 200S
825 300S
800 400S
750 500S
700 600S
650 700S
600 800S
580
FARGO RESOURCES LTD.
LANG BAY PROJECT
TOTAL MAGNETIC FIELD INTENSITY
FALSE COLOUR CONTOUR MAP
Foundex Geophysics Inc.
GeoSci Data Analysis Ltd.
FILTER: 225W x 37.5E x 0°
MAGNETIC BASE: 56000nT
SCALE: 1:10000
DATE: DEC/87
FIG: 23

Foundex Geophysics Inc.	FILTER: 300W x 37.5E x -45°
	MAGNETIC BASE: 56000nT
GeoSci Data Analysis Ltd.	SCALE: 1:10000 DATE: DEC/87 FIG: 24

7. SUMMARY AND RECOMMENDATIONS

The dipole-dipole resistivity survey method proved to be effective in delineating conductive anomalies due to the strong apparent resistivity contrasts between geological units on the property. In two areas, these conductive features are correlated with kaolin rich formation. In addition, the resistive overburden and resistive basement rocks are distinguishable in the pseudo-sections. The Schlumberger electrical resistivity sounding method appears to be effective as a complementary tool to the lateral search method, except in areas where very large lateral inhomogeneities exist.

The magnetometer survey was effective in delineating several large-scale effects such as faulting. Some detail will be lost, however, due to the near-surface geologic noise prevalent in the grid area.

Further exploration work at the property should consist of drilling and geophysical surveying. Drilling should be concentrated on the conductive anomalous areas identified by the dipole-dipole resistivity survey. The resistivity data indicates a conductive zone extending east from the detailed drilling area located at stations 0+00W to 2+00W on Line 0+00N. A large target area south of this zone is roughly bounded by grid lines 2+00S, 9+00S and 0+00E, with an open extension further to the east.

The third target area is roughly centred on Line 2+00N and is bounded to the east by Line 8+00W. This zone is open to the west.

Future geophysical work should consist of 25 metre, dipole-dipole resistivity surveying with "n" values of 1 to 6 in areas of shallow overburden and 1 to 7 in areas of deeper overburden. This work should be supported by detailed resistivity soundings at appropriate intervals. Magnetometer work should be carried out with station intervals of 12.5 metres in areas of shallow overburden, and 25 metres in areas of deeper overburden. Detailed seismic refraction work should be undertaken to supplement the resistivity and magnetometer surveying. Line interval frequency should remain at 200 metres for dipole-dipole resistivity and magnetometer surveying with 400 metre line intervals for seismic refraction surveying.

for FOUNDEX GEOPHYSICS INC.

Clifford E. Candy, Senior Geophysicist

PROFESSIONAL PROVINCE OF Russell A. Hillman BRITISH COLUMBIA ENGINEER

Russell A. Hillman, P.Eng.

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3) Kumar, R., Das, U.C., 1976, Transformation of Schlumberger Apparent Resistivity to Dipole Apparent Resistivity With Digital Linear Filters, Gèophysical Prospecting Vol. 26

4) Pilon, C.G., November, 1987, Drilling Report on the Lang Bay Kaolin Prospect, for Fargo Resources Ltd.

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
200N	2	-300	339	3	-313	309	4	-325	342	5	-338	626	6	-350	137
200N	2	-325	400	3	-338	412	4	-350	509	5	-363	743	6	-375	771
200N	2	-350	423	3	-363	451	4	-375	582	5	-388	629	6	-400	1108
200N	2	-375	451	3	-388	528	4	-400	527	5	-413	772	6	-425	528
200N	2	-400	594	3	-413	638	4	-425	1143	5	-438	572	6	-450	467
200N	2	-425	472	3	-438	236	4	-450	474	5	-463	421	6	-475	269
200N	2	-450	686	3	-463	414	4	-475	339	5	-488	1019	6	-500	607
200N	2	-475	517	3	-488	349	4	-500	546	5	-513	345	6	-525	422
200N	2	-500	459	3	-513	240	4	-525	198	5	-538	394	6	-550	79
200N	2	-525	427	3	-538	330	4	-550	396	5	-563	107	6	-575	100
200N	2	-550	404	3	-563	436	4	-575	408	5	-588	315	6	-600	235
200N	2	-575	462	3	-588	506	4	-600	493	5	-613	449	6	-625	618
200N	2	-600	494	3	-613	442	4	-625	342	5	-638	210	6	-650	169
200N	2	-625	498	3	-638	456	4	-650	455	5	-663	250	6	-675	238
200N	2	-650	602	3	-663	662	4	-675	505	5	-688	348	6	-700	193
200N	2	-675	746	3	-688	666	4	-700	430	5	-713	288	6	-725	285
200N	2	-700	615	3	-713	593	4	-725	352	5	-738	322	6	-750	164
200N	2	-725	517	3	-738	406	4	-750	369	5	-763	210	6	-775	153
200N	2	-750	575	3	-763	518	4	-775	292	5	-788	197	6	-800	106
200N	2	-775	549	3	-788	279	4	-800	123	5	-813	71	6	-825	74
200N	2	-800	425	3	-813	202	4	-825	96	5	-838	56	6	-850	77
200N	2	-825	282	3	-838	124	4	-850	64	5	-863	43	6	-875	29
200N	2	-850	207	3	-863	94	4	-875	57	5	-888	53	6	-900	71
200N	2	-875	179	3	-888	85	4	-900	55	5	-913	46	6	-925	45
200N	2	-900	149	3	-913	100	4	-925	84	5	-938	58	6	-950	58
200N	2	-925	138	3	-938	112	4	-950	73	5	-963	46	6	-975	53
200N	2	-950	137	3	-963	76	4	-975	61	5	-988	76	6	-1000	84
200N	2	-975	85	3	-988	59	4	-1000	49	5	-1013	67	6	-1025	84
200N	2	-1000	74	3	-1013	83	4	-1025	86	5	-1038	110	6	-1050	84
200N	2	-1025	153	3	-1038	128	4	-1050	181	5	-1063	136	6	-1075	84
200N	2	-1050	174	3	-1063	106	4	-1075	78	5	-1088	82	6	-1100	82

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
00N	2	-1150	189	3	-1138	298	4	-1125	563	5	-1113	383	6	-1100	356
00N	2	-1125	240	3	-1113	256	4	-1100	394	5	-1088	422	6	-1075	372
00N	2	-1100	152	3	-1088	197	4	-1075	386	5	-1063	46	6	-1050	63
00N	2	-1075	221	3	-1063	371	4	-1050	301	5	-1038	92	6	-1025	29
00N	2	-1050	451	3	-1038	466	4	-1025	273	5	-1013	462	6	-1000	84
00N	2	-1025	487	3	-1013	499	4	-1000	190	5	-988	450	6	-975	195
00N	2	-1000	449	3	-988	396	4	-975	184	5	-963	693	6	-950	106
00N	2	-975	393	3	-963	238	4	-950	141	5	-938	148	6	-925	158
00N	2	-950	387	3	-938	273	4	-925	94	5	-913	176	6	-900	53
00N	2	-925	376	3	-913	292	4	-900	245	5	-888	165	6	-875	66
00N	2	-900	404	3	-888	259	4	-875	160	5	-863	115	6	-850	238

00N	2	-875	560	3	-863	299	4	-850	153	5	-838	102	6	-825	71
00N	2	-850	457	3	-838	218	4	-825	176	5	-813	125	6	-800	124
00N	2	-825	494	3	-813	236	4	-800	198	5	-788	185	6	-775	211
00N	2	-800	400	3	-788	292	4	-775	248	5	-763	244	6	-750	29
00N	2	-775	384	3	-763	354	4	-750	393	5	-738	257	6	-725	135
00N	2	-750	483	3	-738	578	4	-725	287	5	-713	155	6	-700	198
00N	2	-725	810	3	-713	438	4	-700	262	5	-688	191	6	-675	462
00N	2	-700	446	3	-688	294	4	-675	216	5	-663	287	6	-650	45
00N	2	-675	429	3	-663	342	4	-650	284	5	-638	160	6	-625	113
00N	2	-650	844	3	-638	719	4	-625	408	5	-613	234	6	-600	454
00N	2	-625	592	3	-613	461	4	-600	246	5	-588	430	6	-575	214
00N	2	-600	526	3	-588	306	4	-575	479	5	-563	561	6	-550	140
00N	2	-575	506	3	-563	419	4	-550	443	5	-538	247	6	-525	238
00N	2	-550	543	3	-538	259	4	-525	424	5	-513	313	6	-500	264
00N	2	-525	479	3	-513	448	4	-500	391	5	-488	229	6	-475	201
00N	2	-500	375	3	-488	357	4	-475	480	5	-463	327	6	-450	203
00N	2	-475	662	3	-463	541	4	-450	530	5	-438	368	6	-425	267
00N	2	-450	494	3	-438	453	4	-425	360	5	-413	221	6	-400	198
00N	2	-425	553	3	-413	607	4	-400	396	5	-388	409	6	-375	512
00N	2	-400	585	3	-388	574	4	-375	447	5	-363	582	6	-350	377
00N	2	-375	662	3	-363	598	4	-350	537	5	-338	462	6	-325	475
00N	2	-350	613	3	-338	551	4	-325	301	5	-313	412	6	-300	557
00N	2	-325	519	3	-313	560	4	-300	452	5	-288	396	6	-275	317
00N	2	-300	613	3	-288	662	4	-275	509	5	-263	363	6	-250	322
00N	2	-275	699	3	-263	617	4	-250	495	5	-238	381	6	-225	533
00N	2	-250	564	3	-238	462	4	-225	584	5	-213	247	6	-200	528
00N	2	-225	421	3	-213	306	4	-200	301	5	-188	264	6	-175	132
00N	2	-200	466	3	-188	380	4	-175	284	5	-163	208	6	-150	211
00N	2	-175	466	3	-163	388	4	-150	307	5	-138	231	6	-125	158
00N	2	-150	449	3	-138	367	4	-125	254	5	-113	165	6	-100	166
00N	2	-125	434	3	-113	287	4	-100	301	5	-88	200	6	-75	219
00N	2	-100	297	3	-88	207	4	-75	150	5	-63	114	6	-50	161
00N	2	-75	327	3	-63	195	4	-50	148	5	-38	175	6	-25	187
00N	2	-50	218	3	-38	126	4	-25	145	5	-13	135	6	0	182
00N	2	-25	165	3	-13	141	4	0	122	5	13	171	6	25	190
00N	2	0	165	3	13	102	4	25	132	5	38	147	6	50	153
00N	2	25	89	3	38	96	4	50	110	5	63	114	6	75	129
00N	2	50	82	3	63	85	4	75	89	5	88	132	6	100	129
00N	2	75	103	3	88	97	4	100	112	5	113	130	6	125	124
00N	2	100	77	3	113	83	4	125	97	5	138	96	6	150	103
00N	2	125	76	3	138	86	4	150	84	5	163	86	6	175	108
00N	2	150	62	3	163	57	4	175	58	5	188	106	6	200	140

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
800W	2	-400	297	3	-388	278	4	-375	271	5	-363	162	6	-350	124
800W	2	-375	534	3	-363	524	4	-350	396	5	-338	272	6	-325	443
800W	2	-350	564	3	-338	377	4	-325	252	5	-313	226	6	-300	259
800W	2	-325	142	3	-313	237	4	-300	238	5	-288	196	6	-275	230
800W	2	-300	318	3	-288	320	4	-275	245	5	-263	214	6	-250	132
800W	2	-275	509	3	-263	430	4	-250	485	5	-238	239	6	-225	232
800W	2	-250	538	3	-238	626	4	-225	300	5	-213	237	6	-200	185

800W	2	-225	949	3	-213	394	4	-200	414	5	-188	482	6	-175	187
800W	2	-200	415	3	-188	367	4	-175	243	5	-163	228	6	-150	150
800W	2	-175	487	3	-163	437	4	-150	324	5	-138	282	6	-125	156
800W	2	-150	632	3	-138	566	4	-125	386	5	-113	214	6	-100	119
800W	2	-125	635	3	-113	447	4	-100	253	5	-88	143	6	-75	145
800W	2	-100	635	3	-88	382	4	-75	222	5	-63	158	6	-50	108
800W	2	-75	526	3	-63	318	4	-50	245	5	-38	135	6	-25	84
800W	2	-50	485	3	-38	387	4	-25	216	5	-13	135	6	0	74
800W	2	-25	645	3	-13	374	4	0	233	5	13	175	6	25	203
800W	2	0	451	3	13	290	4	25	170	5	38	82	6	50	11
800W	2	25	339	3	38	210	4	50	155	5	63	211	6	75	235
800W	2	50	486	3	63	209	4	75	138	5	88	68	6	100	74
800W	2	75	305	3	88	241	4	100	138	5	113	87	6	125	48
800W	2	100	331	3	113	150	4	125	110	5	138	74	6	150	45
800W	2	125	269	3	138	191	4	150	102	5	163	45	6	175	45
800W	2	150	318	3	163	164	4	175	89	5	188	18	6	200	21
800W	2	175	346	3	188	122	4	200	75	5	213	40	6	225	13
800W	2	200	159	3	213	80	4	225	50	5	238	40	6	250	87
800W	2	225	175	3	238	109	4	250	86	5	263	114	6	275	74
800W	2	250	289	3	263	204	4	275	284	5	288	148	6	300	16
800W	2	275	393	3	288	428	4	300	192	5	313	145	6	325	61
800W	2	300	878	3	313	416	4	325	154	5	338	247	6	350	185
800W	2	325	681	3	338	685	4	350	437	5	363	335	6	375	182
800W	2	350	566	3	363	476	4	375	398	5	388	201	6	400	127

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
600W	2	450	619	3	438	406	4	425	299	5	413	226	6	400	509
600W	2	425	677	3	413	480	4	400	297	5	388	246	6	375	259
600W	2	400	575	3	388	430	4	375	282	5	363	348	6	350	216
600W	2	375	637	3	363	415	4	350	351	5	338	300	6	325	211
600W	2	350	590	3	338	561	4	325	331	5	313	279	6	300	261
600W	2	325	771	3	313	497	4	300	332	5	288	348	6	275	383
600W	2	300	598	3	288	409	4	275	356	5	263	368	6	250	343
600W	2	275	423	3	263	480	4	250	397	5	238	327	6	225	335
600W	2	250	620	3	238	603	4	225	518	5	213	452	6	200	325
600W	2	225	664	3	213	615	4	200	548	5	188	404	6	175	293
600W	2	200	677	3	188	650	4	175	480	5	163	358	6	150	259
600W	2	175	620	3	163	539	4	150	419	5	138	336	6	125	311
600W	2	150	598	3	138	521	4	125	423	5	113	331	6	100	240
600W	2	125	579	3	113	511	4	100	373	5	88	257	6	75	140
600W	2	100	656	3	88	515	4	75	362	5	63	237	6	50	143
600W	2	75	669	3	63	494	4	50	365	5	38	204	6	25	185
600W	2	50	615	3	38	439	4	25	261	5	13	228	6	0	143
600W	2	25	705	3	13	431	4	0	469	5	-13	204	6	-25	208
600W	2	0	652	3	-13	675	4	-25	423	5	-38	218	6	-50	140
600W	2	-25	773	3	-38	545	4	-50	310	5	-63	203	6	-75	179
600W	2	-50	765	3	-63	442	4	-75	307	5	-88	246	6	-100	222
600W	2	-75	444	3	-88	420	4	-100	334	5	-113	176	6	-125	193
600W	2	-100	626	3	-113	529	4	-125	477	5	-138	373	6	-150	259
600W	2	-125	946	3	-138	810	4	-150	538	5	-163	394	6	-175	301
600W	2	-150	500	3	-163	439	4	-175	347	5	-188	269	6	-200	193

600W	2	-175	389	3	-188	348	4	-200	283	5	-213	204	6	-225	145
600W	2	-200	351	3	-213	316	4	-225	243	5	-238	214	6	-250	166
600W	2	-225	494	3	-238	308	4	-250	245	5	-263	228	6	-275	203
600W	2	-250	382	3	-263	271	4	-275	268	5	-288	257	6	-300	208
600W	2	-275	299	3	-288	318	4	-300	318	5	-313	247	6	-325	153
600W	2	-300	378	3	-313	420	4	-325	322	5	-338	191	6	-350	282
600W	2	-325	356	3	-338	300	4	-350	159	5	-363	153	6	-375	140
600W	2	-350	417	3	-363	288	4	-375	252	5	-388	198	6	-400	277

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
400W	2	-1050	799	3	-1038	724	4	-1025	423	5	-1013	274	6	-1000	185
400W	2	-1025	840	3	-1013	429	4	-1000	318	5	-988	170	6	-975	166
400W	2	-1000	462	3	-988	394	4	-975	262	5	-963	170	6	-950	143
400W	2	-975	504	3	-963	382	4	-950	247	5	-938	186	6	-925	127
400W	2	-950	585	3	-938	422	4	-925	336	5	-913	200	6	-900	156
400W	2	-925	455	3	-913	360	4	-900	265	5	-888	188	6	-875	409
400W	2	-900	538	3	-888	447	4	-875	284	5	-863	327	6	-850	235
400W	2	-875	498	3	-863	293	4	-850	186	5	-838	214	6	-825	224
400W	2	-850	380	3	-838	348	4	-825	341	5	-813	376	6	-800	309
400W	2	-825	309	3	-813	350	4	-800	413	5	-788	331	6	-775	327
400W	2	-800	300	3	-788	430	4	-775	389	5	-763	381	6	-750	303
400W	2	-775	364	3	-763	371	4	-750	390	5	-738	327	6	-725	259
400W	2	-750	229	3	-738	283	4	-725	271	5	-713	187	6	-700	181
400W	2	-725	307	3	-713	310	4	-700	244	5	-688	231	6	-675	106
400W	2	-700	408	3	-688	344	4	-675	329	5	-663	312	6	-650	161
400W	2	-675	356	3	-663	392	4	-650	268	5	-638	221	6	-625	153
400W	2	-650	481	3	-638	446	4	-625	283	5	-613	208	6	-600	135
400W	2	-625	483	3	-613	320	4	-600	236	5	-588	206	6	-575	121
400W	2	-600	357	3	-588	301	4	-575	216	5	-563	153	6	-550	129
400W	2	-575	468	3	-563	339	4	-550	298	5	-538	244	6	-525	193
400W	2	-550	502	3	-538	472	4	-525	405	5	-513	297	6	-500	240
400W	2	-525	620	3	-513	567	4	-500	430	5	-488	340	6	-475	317
400W	2	-500	598	3	-488	489	4	-475	350	5	-463	361	6	-450	367
400W	2	-475	449	3	-463	414	4	-450	370	5	-438	167	6	-425	216
400W	2	-450	474	3	-438	502	4	-425	485	5	-413	325	6	-400	333
400W	2	-425	541	3	-413	472	4	-400	360	5	-388	307	6	-375	343
400W	2	-400	476	3	-388	400	4	-375	375	5	-363	409	6	-350	322
400W	2	-375	399	3	-363	421	4	-350	527	5	-338	546	6	-325	296
400W	2	-350	438	3	-338	578	4	-325	419	5	-313	409	6	-300	214
400W	2	-325	476	3	-313	578	4	-300	409	5	-288	373	6	-275	198
400W	2	-300	517	3	-288	578	4	-275	491	5	-263	379	6	-250	227
400W	2	-275	556	3	-263	541	4	-250	452	5	-238	726	6	-225	267
400W	2	-250	722	3	-238	617	4	-225	603	5	-213	383	6	-200	269
400W	2	-225	583	3	-213	564	4	-200	430	5	-188	300	6	-175	256
400W	2	-200	564	3	-188	451	4	-175	341	5	-163	318	6	-150	243
400W	2	-175	479	3	-163	397	4	-150	418	5	-138	305	6	-125	296
400W	2	-150	408	3	-138	461	4	-125	369	5	-113	289	6	-100	214
400W	2	-125	481	3	-113	434	4	-100	367	5	-88	351	6	-75	401
400W	2	-100	466	3	-88	429	4	-75	428	5	-63	430	6	-50	309
400W	2	-75	329	3	-63	365	4	-50	268	5	-38	272	6	-25	208
400W	2	-50	493	3	-38	456	4	-25	441	5	-13	353	6	0	269

400W	2	-25	509	3	-13	529	4	0	446	5	13	356	6	25	654
400W	2	0	622	3	13	566	4	25	464	5	38	427	6	50	406
400W	2	25	750	3	38	667	4	50	540	5	63	455	6	75	335
400W	2	50	596	3	63	530	4	75	383	5	88	295	6	100	319
400W	2	75	696	3	88	539	4	100	396	5	113	379	6	125	317
400W	2	100	594	3	113	562	4	125	402	5	138	356	6	150	462
400W	2	125	579	3	138	455	4	150	359	5	163	460	6	175	388
400W	2	150	504	3	163	277	4	175	468	5	188	496	6	200	607
400W	2	175	493	3	188	546	4	200	528	5	213	627	6	225	581
400W	2	200	573	3	213	537	4	225	622	5	238	792	6	250	396
400W	2	225	549	3	238	598	4	250	744	5	263	610	6	275	554
400W	2	250	440	3	263	560	4	275	499	5	288	495	6	300	1029
400W	2	275	476	3	288	433	4	300	650	5	313	495	6	325	818
400W	2	300	528	3	313	504	4	325	707	5	338	549	6	350	530
400W	2	325	585	3	338	777	4	350	641	5	363	577	6	375	789
400W	2	350	628	3	363	598	4	375	479	5	388	740	6	400	866

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
200W.	2	-250	461	3	-263	315	4	-275	216	5	-288	183	6	-275	121
200W.	2	-275	336	3	-288	254	4	-300	215	5	-313	178	6	-300	143
200W.	2	-300	342	3	-313	302	4	-325	261	5	-338	195	6	-325	124
200W.	2	-325	382	3	-338	339	4	-350	272	5	-363	229	6	-350	132
200W.	2	-350	432	3	-363	395	4	-375	526	5	-388	292	6	-375	216
200W.	2	-375	425	3	-388	372	4	-400	350	5	-413	204	6	-400	298
200W.	2	-400	449	3	-413	369	4	-425	302	5	-438	213	6	-425	251
200W.	2	-425	449	3	-438	417	4	-450	277	5	-463	239	6	-450	129
200W.	2	-450	397	3	-463	309	4	-475	247	5	-488	186	6	-475	158
200W.	2	-475	415	3	-488	352	4	-500	284	5	-513	265	6	-500	169
200W.	2	-500	343	3	-513	309	4	-525	271	5	-538	239	6	-525	216
200W.	2	-525	351	3	-538	369	4	-550	332	5	-563	274	6	-550	132
200W.	2	-550	330	3	-563	337	4	-575	309	5	-588	287	6	-575	261
200W.	2	-575	294	3	-588	312	4	-600	307	5	-613	265	6	-600	208
200W.	2	-600	320	3	-613	351	4	-625	297	5	-638	259	6	-625	211
200W.	2	-625	300	3	-638	261	4	-650	287	5	-663	254	6	-650	161
200W.	2	-650	317	3	-663	281	4	-675	341	5	-688	190	6	-675	193
200W.	2	-675	355	3	-688	387	4	-700	223	5	-713	190	6	-700	343
200W.	2	-700	464	3	-713	321	4	-725	306	5	-738	411	6	-725	111
200W.	2	-725	316	3	-738	344	4	-750	328	5	-763	261	6	-750	145
200W.	2	-750	397	3	-763	407	4	-775	349	5	-788	241	6	-775	145
200W.	2	-775	641	3	-788	589	4	-800	441	5	-813	308	6	-800	108
200W.	2	-800	429	3	-813	366	4	-825	220	5	-838	214	6	-825	290
200W.	2	-825	457	3	-838	329	4	-850	349	5	-863	335	6	-850	121
200W.	2	-850	343	3	-863	355	4	-875	222	5	-888	162	6	-875	203
200W.	2	-875	596	3	-888	536	4	-900	285	5	-913	241	6	-900	150
200W.	2	-900	389	3	-913	324	4	-925	288	5	-938	277	6	-925	240

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
200W	1	413	387	2	400	594	3	388	707	4	375	885	5	363	760
200W	1	388	478	2	375	669	3	363	889	4	350	832	5	338	673
200W	1	363	463	2	350	737	3	338	791	4	325	810	5	313	846
200W	1	338	623	2	325	701	3	313	813	4	300	890	5	288	963
200W	1	313	401	2	300	491	3	288	541	4	275	668	5	263	765
200W	1	288	456	2	275	468	3	263	556	4	250	687	5	238	836
200W	1	263	328	2	250	340	3	238	415	4	225	514	5	213	465
200W	1	238	302	2	225	344	3	213	442	4	200	571	5	188	407
200W	1	213	252	2	200	335	3	188	311	4	175	301	5	163	327
200W	1	188	302	2	175	271	3	163	286	4	150	414	5	138	369
200W	1	163	289	2	150	267	3	138	277	4	125	235	5	113	262
200W	1	138	324	2	125	368	3	113	306	4	100	318	5	88	302
200W	1	113	501	2	100	417	3	88	432	4	75	339	5	63	457
200W	1	88	404	2	75	447	3	63	345	4	50	367	5	38	455
200W	1	63	422	2	50	380	3	38	360	4	25	333	5	13	295
200W	1	38	428	2	25	494	3	13	424	4	0	396	5	-13	298
200W	1	13	522	2	0	485	3	-13	502	4	-25	343	5	-38	327
200W	1	-13	442	2	-25	479	3	-38	528	4	-50	433	5	-63	511
200W	1	-38	596	2	-50	556	3	-63	656	4	-75	547	5	-88	379
200W	1	-63	563	2	-75	628	3	-88	646	4	-100	463	5	-113	397
200W	1	-88	746	2	-100	823	3	-113	622	4	-125	530	5	-138	473
200W	1	-113	615	2	-125	573	3	-138	513	4	-150	491	5	-163	320
200W	1	-138	575	2	-150	588	3	-163	551	4	-175	409	5	-188	340
200W	1	-163	563	2	-175	607	3	-188	505	4	-200	414	5	-213	270
200W	1	-188	525	2	-200	526	3	-213	497	4	-225	356	5	-238	236
200W	1	-213	464	2	-225	537	3	-238	406	4	-250	290	5	-263	214

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
00W	1	238	321	2	225	438	3	213	481	4	200	470	5	188	435
00W	1	213	215	2	200	277	3	188	306	4	175	285	5	163	290
00W	1	188	268	2	175	294	3	163	256	4	150	262	5	138	289
00W	1	163	347	2	150	186	3	138	188	4	125	178	5	113	264
00W	1	138	182	2	125	113	3	113	120	4	100	150	5	88	155
00W	1	113	142	2	100	92	3	88	97	4	75	113	5	63	143
00W	1	88	138	2	75	95	3	63	87	4	50	97	5	38	114
00W	1	63	162	2	50	98	3	38	86	4	25	115	5	13	132
00W	1	38	167	2	25	96	3	13	88	4	0	110	5	-13	129
00W	1	13	204	2	0	120	3	-13	118	4	-25	142	5	-38	140
00W	1	-13	176	2	-25	158	3	-38	153	4	-50	139	5	-63	157
00W	1	-38	215	2	-50	195	3	-63	228	4	-75	271	5	-88	211
00W	1	-63	210	2	-75	232	3	-88	254	4	-100	222	5	-113	198
00W	1	-88	331	2	-100	372	3	-113	341	4	-125	317	5	-138	211
00W	1	-113	378	2	-125	373	3	-138	381	4	-150	263	5	-163	330
00W	1	-138	390	2	-150	395	3	-163	280	4	-175	210	5	-188	92

00W	1	-163	488	2	-175	352	3	-188	302	4	-200	192	5	-213	106
00W	1	-188	414	2	-200	361	3	-213	245	4	-225	124	5	-238	214
00W	1	-213	554	2	-225	389	3	-238	205	4	-250	155	5	-263	132
00W	1	-238	461	2	-250	289	3	-263	210	4	-275	171	5	-288	109
00W	1	-263	440	2	-275	316	3	-288	223	4	-300	152	5	-313	104
00W	1	-288	418	2	-300	333	3	-313	234	4	-325	162	5	-338	110
00W	1	-313	679	2	-325	406	3	-338	276	4	-350	192	5	-363	91
00W	1	-338	483	2	-350	446	3	-363	290	4	-375	169	5	-388	134
00W	1	-363	491	2	-375	385	3	-388	221	4	-400	185	5	-413	148
00W	1	-388	436	2	-400	257	3	-413	223	4	-425	144	5	-438	104
00W	1	-413	311	2	-425	399	3	-438	207	4	-450	230	5	-463	107
00W	1	-438	366	2	-450	287	3	-463	215	4	-475	137	5	-488	102
00W	1	-463	349	2	-475	299	3	-488	218	4	-500	152	5	-513	150
00W	1	-488	485	2	-500	378	3	-513	279	4	-525	298	5	-538	254
00W	1	-513	374	2	-525	340	3	-538	390	4	-550	353	5	-563	287
00W	1	-538	329	2	-550	489	3	-563	385	4	-575	333	5	-588	298
00W	1	-563	392	2	-575	357	3	-588	355	4	-600	284	5	-613	115
00W	1	-588	415	2	-600	404	3	-613	385	4	-625	287	5	-638	175
00W	1	-613	520	2	-625	470	3	-638	406	4	-650	283	5	-663	366
00W	1	-638	538	2	-650	566	3	-663	616	4	-675	452	5	-688	1047
00W	1	-663	378	2	-675	293	3	-688	356	4	-700	319	5	-713	226
00W	1	-688	443	2	-700	526	3	-713	388	4	-725	334	5	-738	280
00W	1	-713	680	2	-725	540	3	-738	447	4	-750	366	5	-763	315
00W	1	-738	501	2	-750	349	3	-763	267	4	-775	353	5	-788	249
00W	1	-763	539	2	-775	438	3	-788	349	4	-800	306	5	-813	208
00W	1	-788	547	2	-800	470	3	-813	390	4	-825	301	5	-838	162
00W	1	-813	523	2	-825	449	3	-838	361	4	-850	192	5	-863	193
00W	1	-838	481	2	-850	444	3	-863	270	4	-875	283	5	-888	158
00W	1	-863	396	2	-875	283	3	-888	317	4	-900	161	5	-913	241
00W	1	-888	302	2	-900	385	3	-913	209	4	-925	241	5	-938	143
00W	1	-913	585	2	-925	320	3	-938	352	4	-950	226	5	-963	160
00W	1	-938	478	2	-950	560	3	-963	338	4	-975	217	5	-988	150
00W	1	-963	499	2	-975	380	3	-988	304	4	-1000	198	5	-1013	153

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
200E	1	-1063	384	2	-1050	252	3	-1038	328	4	-1025	181	5	-1013	190
200E	1	-1038	400	2	-1025	322	3	-1013	246	4	-1000	253	5	-988	252
200E	1	-1013	490	2	-1000	320	3	-988	338	4	-975	340	5	-963	269
200E	1	-988	428	2	-975	378	3	-963	400	4	-950	490	5	-938	300
200E	1	-963	427	2	-950	368	3	-938	295	4	-925	307	5	-913	231
200E	1	-938	446	2	-925	417	3	-913	340	4	-900	261	5	-888	252
200E	1	-913	472	2	-900	385	3	-888	325	4	-875	304	5	-863	259
200E	1	-888	517	2	-875	462	3	-863	361	4	-850	253	5	-838	142
200E	1	-863	556	2	-850	474	3	-838	337	4	-825	181	5	-813	186
200E	1	-838	707	2	-825	489	3	-813	265	4	-800	272	5	-788	213
200E	1	-813	593	2	-800	312	3	-788	315	4	-775	259	5	-763	181
200E	1	-788	460	2	-775	525	3	-763	466	4	-750	782	5	-738	297
200E	1	-763	618	2	-750	447	3	-738	184	4	-725	226	5	-713	82
200E	1	-738	425	2	-725	321	3	-713	268	4	-700	155	5	-688	109
200E	1	-713	484	2	-700	459	3	-688	273	4	-675	181	5	-663	160
200E	1	-688	500	2	-675	321	3	-663	235	4	-650	183	5	-638	132

200E	1	-663	485	2	-650	343	3	-638	235	4	-625	109	5	-613	107
200E	1	-638	431	2	-625	378	3	-613	230	4	-600	151	5	-588	129
200E	1	-613	487	2	-600	325	3	-588	199	4	-575	137	5	-563	94
200E	1	-588	517	2	-575	309	3	-563	226	4	-550	149	5	-538	87
200E	1	-563	468	2	-550	340	3	-538	258	4	-525	164	5	-513	94
200E	1	-538	411	2	-525	338	3	-513	242	4	-500	139	5	-488	150
200E	1	-513	402	2	-500	352	3	-488	263	4	-475	171	5	-463	110
200E	1	-488	328	2	-475	307	3	-463	187	4	-450	104	5	-438	86
200E	1	-463	486	2	-450	314	3	-438	170	4	-425	115	5	-413	74
200E	1	-438	415	2	-425	248	3	-413	120	4	-400	76	5	-388	74
200E	1	-413	496	2	-400	275	3	-388	133	4	-375	151	5	-363	176
200E	1	-388	464	2	-375	193	3	-363	191	4	-350	148	5	-338	140
200E	1	-363	574	2	-350	362	3	-338	266	4	-325	263	5	-313	229
200E	1	-338	368	2	-325	256	3	-313	270	4	-300	245	5	-288	191

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
400E	1	-238	233	2	-250	122	3	-263	112	4	-275	117	5	-288	94
400E	1	-263	280	2	-275	199	3	-288	221	4	-300	156	5	-313	125
400E	1	-288	445	2	-300	328	3	-313	222	4	-325	195	5	-338	162
400E	1	-313	434	2	-325	277	3	-338	247	4	-350	226	5	-363	200
400E	1	-338	335	2	-350	313	3	-363	285	4	-375	272	5	-388	145
400E	1	-363	345	2	-375	321	3	-388	315	4	-400	190	5	-413	165
400E	1	-388	382	2	-400	329	3	-413	209	4	-425	206	5	-438	135
400E	1	-413	415	2	-425	248	3	-438	246	4	-450	154	5	-463	59
400E	1	-438	233	2	-450	237	3	-463	209	4	-475	58	5	-488	46
400E	1	-463	465	2	-475	192	3	-488	109	4	-500	88	5	-513	59
400E	1	-488	341	2	-500	68	3	-513	48	4	-525	46	5	-538	28
400E	1	-513	155	2	-525	70	3	-538	52	4	-550	40	5	-563	48
400E	1	-538	225	2	-550	98	3	-563	59	4	-575	56	5	-588	56
400E	1	-563	239	2	-575	66	3	-588	52	4	-600	51	5	-613	43
400E	1	-588	150	2	-600	83	3	-613	64	4	-625	42	5	-638	38
400E	1	-613	272	2	-625	128	3	-638	76	4	-650	57	5	-663	53
400E	1	-638	309	2	-650	139	3	-663	70	4	-675	49	5	-688	59
400E	1	-663	325	2	-675	149	3	-688	93	4	-700	65	5	-713	59
400E	1	-688	473	2	-700	157	3	-713	110	4	-725	75	5	-738	66
400E	1	-713	448	2	-725	127	3	-738	151	4	-750	73	5	-763	54
400E	1	-738	291	2	-750	185	3	-763	114	4	-775	69	5	-788	53
400E	1	-763	364	2	-775	243	3	-788	154	4	-800	97	5	-813	81
400E	1	-788	433	2	-800	267	3	-813	152	4	-825	115	5	-838	82
400E	1	-813	363	2	-825	258	3	-838	211	4	-850	136	5	-863	86
400E	1	-838	550	2	-850	459	3	-863	282	4	-875	137	5	-888	104
400E	1	-863	621	2	-875	425	3	-888	251	4	-900	152	5	-913	132
400E	1	-888	564	2	-900	347	3	-913	214	4	-925	198	5	-938	331
400E	1	-913	498	2	-925	329	3	-938	349	4	-950	167	5	-963	183
400E	1	-938	510	2	-950	372	3	-963	528	4	-975	325	5	-988	331
400E	1	-963	499	2	-975	399	3	-988	381	4	-1000	384	5	-1013	346

FARGO RESOURCES LTD. LANG BAY PROPERTY

DIPOLE DIPOLE RESISTIVITY SURVEY

LINE	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho	n	STATION	rho
600E	1	-838	330	2	-825	208	3	-813	103	4	-800	49	5	-788	43
600E	1	-863	413	2	-850	210	3	-838	128	4	-825	94	5	-813	46
600E	1	-888	402	2	-875	312	3	-863	140	4	-850	111	5	-838	58
600E	1	-913	533	2	-900	340	3	-888	191	4	-875	72	5	-863	31
600E	1	-938	632	2	-925	478	3	-913	278	4	-900	188	5	-888	99
600E	1	-963	490	2	-950	509	3	-938	349	4	-925	198	5	-913	165
600E	1	-988	482	2	-975	353	3	-963	325	4	-950	206	5	-938	117
600E	1	-1013	460	2	-1000	414	3	-988	247	4	-975	220	5	-963	139
600E	1	-1038	447	2	-1025	402	3	-1013	408	4	-1000	314	5	-988	157
600E	1	-1063	539	2	-1050	431	3	-1038	333	4	-1025	224	5	-1013	124

APPENDIX D

TESTWORK REPORT OF F.W.A. SUTTON

THE LANG BAY KAOLIN DEPOSIT – BRITISH COLUMBIA

This report concerns work performed on four selected mineral samples. These samples arose from drilling operations ('reverse circulation') mounted on this previously identified kaolin deposit.

The work was confined and devoted to the tasks:-

(i) of separating kaolin-rich particle-size fractions from the whole-rock samples,

(ii) of the measurements of various aspects of these refined kaolin samples to elucidate the likely values and useability of these kaolins in the two major market areas for this industrial mineral viz. Paper Manufacture and Ceramics, which in aggregate account for over 90% of the global usage of china-clay.

This work was performed personally by the writer using the facilities of a china-clay testing laboratory in U.K. and drawing upon his 30 years' experience with its world's largest china-clay producer in which he held senior positions concerned with Research, Quality Control, Production and the evaluation of kaolin projects world-wide.

Subsidiary remarks are also made herein touching upon the peculiar nature of this ore deposit, the types of mining and processing operations best fitted to the deposit, and some feasibility aspects which require early attention.

F. V. A. SUTTON
St. Austell,
Cornwall,
England

14th January 1988

1. THE FOUR SAMPLES

The choice was made from the examination of bore-hole drilling logs and from visual appraisal of the stored mineral samples arising from the drilling operation.

It appeared that there were four main strata which were capable of reasonable discrimination and which seemed worthy of consideration.

A composite sample was made up from each of four drill holes as follows:

TABLE I

Code	Hole No.	Depth Increment-Feet
Grey White (GW)	87-20	100-132
Grey Green (GG)	87-34	258-260
Light Brown (LB)	87-26	257-267
Grey Brown (GB)	87-27	252-264

2. MANUFACTURE OF FRACTIONS

This was achieved by *"static"* sedimention in two stages, one cutting at approximately 60 mesh (250 microns) the oversize being referred to as *"Sand"*.

The undersize slurry was deflocculated and given a sedimention depth-time calculated to cut at 20 microns. This oversize is referred to as *"Slimes"* and the undersize was considered to be *"Clay"*.

In fact, the two *"oversizes"* were given two further resuspensions. This ensures that the yield values of the three fractions for each borehole refers to what would be achieved in a good, full-scale refining operation.

TABLE II Yields from whole-rock (dry weights percentage)

Code	Sand	Slimes	Clay
GW	66.17	13.37	20.46
GG	69.73	8.81	21.46
LB	-	29.21	70.79
GB	40.36	19.24	40.40

In the case of LB there was very little mass in the Sand category and a single +20 microns fraction was collected.

The clay fractions were submitted to particle-size analysis by the "Sedigraph" technique and the curves are given in Appendix. It can be seen that the target cut of 20 microns was fairly well achieved in all four cases. Significant parameters taken from the curves are:-

TABLE III

Code	+20	+10	-2	-1 microns
GW	1%	6%	50%	38%
GG	1%	8%	57%	42%
LB	NIL%	4%	49%	35%
GB	1%	5%	60%	46%

3. THE NATURE OF THE DEPOSIT

This section can be considered as a parenthesis in the report but it is convenient to consider it at this point.

The writer admits that he finds these particular materials quite intriguing; they are unique in his own experience. He has seen at least eleven china-clay deposits taken to thorough evaluation and many more given cursory treatment. Two of the eleven were secondary (sedimentary) deposits. The other nine were primary (in situ kaolinisation) deposits arising from the kaolinisation of acid igneous parents i.e. granites and in one case a volcanic rock.

Two features of the Lang Bay materials, discovered en passant in the above reported work were:-

(i) The high alkalinity of the slurries when the whole-rock samples were suspended in deionised water, i.e.

TABLE IV

Code	pH. of slurry
GV	8.7
GG	9.7
LB	8.9
GB	8.7

'Normal' granitic matrix gives a pH of about 5.0.

(ii) The large amount of magnetic materials which are so magnetic that they are removable from the sands and slimes by means of a hand magnet. See Appendix.

The writer has seen other data (provided by Brenda Mines Limited - Tables V and VI - of a report by Professor A. C. D. Chaklader) which indicates unusually high iron (magnetite) and calcium (calcite) contents by means of both X R D and chemical analysis. The magnesium analysis is also high. From these features, the writer is of the opinion that the Lang Bay materials arise not from the alteration of a 'normal' acid granite but from a much less acidic i.e. more basic parent rock in which the altered felspathic material contained much iron. In other words the parent might be considered as intermediate between a granite and a basalt.

From Table II we see that GV and GG give low yields of "clay" which is a normal feature of primary deposits. LB is distinct in showing a yield normally associated with a secondary deposit; the absence of "sand" is also a secondary deposit characteristic. A general distinction between primary kaolins and secondary kaolins (the latter category typified by the ball clays of S.W. England and the kaolins of Georgia U.S.A.) lies in particle size. Secondary clays usually exhibit relative "fineness". The transportation separates the finer clay material from the coarser sands of the parent rock but goes even further in producing a classification of the clay material. Thus if the two distinct matrix types are similarly cut at 20 microns, the secondary clay will show a larger mass of material finer than 2 microns. This feature is absent from LB (see Table III). One might hypothesise that this material arises from the same general area as GV such that the small amount of movement has separated the clay from the sands without any further classification of the clay.

GB is the odd-one-out; the clay yield is intermediate and this clay is finer than the others.

4. THE GREY WHITE CLAY AS A PAPER FILLER

The other three clays are very highly coloured and are unworthy of consideration as clays to be aimed at the paper industry. This section deals with the GW clay fraction considered as a paper filler.

(i) Particle Size

This clay, arising from a normal filler cut-point of 20 microns, has a particle size distribution intermediate between English and Georgian filler clays but is perhaps nearer to the English type. In this respect the clay is 'wholesome' as a filler.

(ii) Abrasivity

Abrasiveness of clays is mainly due to the inclusion of minerals other than kaolinite such as quartz, feldspar, tourmaline, topaz etc.; quartz (sometimes crystobalite) is the major offender. Apart from the silica-alumina ratio arising from chemical analysis, a low "loss-on-ignition" will usually indicate the presence of much non-kaolinite mineral in the clay. The L.O.I. of this clay, at 13.9%, is an indication that it should not be overly abrasive.

A test, using the Einlehner Abrasion Tester, was performed and it gave the result of 11 m.g. loss. (In this test, a clay slurry at a specified concentration is rubbed against a disc of wire mesh in a standardised manner and the loss in weight of the mesh is used as the index of abrasion).

This is a satisfactory result, again intermediate betweeen results generally applicable to English and U.S.A. fillers, the latter being the less abrasive. This is a crucially important feature and can often damn an otherwise acceptable clay.

(iii) Brightness

Here the I.S.O. system was employed. (The G.E. system, commonly used in N. America tends to give numerical results about 1.5 units higher than I.S.O.).

In this test an Elrepho meter is used. It reports % Reflectance of light having a wavelength of 457 nm. This is known as "Brightness". The reflectance, using a wavelength of 570 nm can also be measured. The arithmetical difference between these two reflectances is reported as "Yellowness".

The clay gave the results:-

Brightness 69.4; Yellowness 5.1

which are disappointing and unusual. For example, most of the kaolin fillers used in Europe have values ranging between 78.8/6.9 and 83.5/4.9. (There is one specially coarse filler, with restricted use, with a value as low as 75.5/8.0). Fillers arising from Georgia, U.S.A. are generally similar, the water-washed being brighter than the air-floated category.

The result for GV is unusual in the relationship between Brightness and Yellowness. It can be seen from the above ranges that depression of Brightness is normally accompanied by increased Yellowness, and low Brightness and high Yellowness are each separately disadvantageous. Other factors being equal, each reduces the value of the filler. For GV the low Brightness is accompanied by relatively low Yellowness. This is the reason for the visual "Greyness" of the GV clay. This is a mitigating factor; the low Brightness, although not desirable, is less excruciating than the numerical value might suggest, simply because the Yellowness factor is also low.

To the writer's knowledge, two experts skilled in the paper-making arts each agree that a clay with a value of 70/5 need not be considered unuseable as a filler in newsprint paper. Within limits, possible rather than probable, it might find some application in finer papers. This is because there are methods for overcoming the Brightness deficiency which are available to the paper manufacturer. These are not inexpensive but might be afforded within the transport cost differential; a dull, local clay might be competitive with a bright clay imported over a great distance. This will be truer, the more bright the dull clay can be made.

4A BRIGHTNESS BENEFICIATION

(i) Preamble

No kaolin is white. Perfect whiteness implies 100% reflectance of all visible wavelengths. "Colour" or departure from whiteness can have various causes.

The kaolinite crystallites themselves can be absorptive of some wavelengths and probably always are. It is thought that replacement of aluminium by iron in the crystal lattice (which is the case in natural kaolinite) is a chromophoric feature. It has been well demonstrated that a brown or green beer bottle will appear "white" when ground up sufficiently fine, at least as white as good "white" kaolin, but not perfectly white.

A major cause of colour in kaolins is due to a surface coating of adherent hydrated iron oxides (e.g. limonite).

Another cause is the presence of discrete particles of minerals other than kaolinite, such as haematite, biotite, muscovite and iron-titania complexes.

Organic compounds arising from decomposition of vegetation (peat) confer yellow and brown tints.

(ii) The most commonly used beneficiation is reductive acid leaching (The Hydros Bleaching Process) which dissolves the yellow hydrated iron oxide from the clay surface. With greater difficulty it can even bring discrete particles of haematite into solution.

Oxidative bleaching is sometimes used to decolourise organic contaminants. This is achieved by treatments with oxidising agents such as ozone or active chlorine.

Removal of non-kaolinite minerals can be achieved by two processes. One is flotation which has been used to remove micas, tourmaline and iron-titania complexes. Over the last decade this has tended to be replaced by high intensity magnetic separation. All these minerals are (weakly) magnetic.

(iii) The following attempts were made to improve the brightness of GV clay. Please see Appendix for details of treatments. Iron analysis was performed on some treated clays (XRF).

TABLE V

Treatment	Brightness I.S.O.	Fe_2O_3 %
NIL	69.4 - 5.1	2.78
Hydros Bleach	70.5 - 4.8	2.54
Ditto x 2	70.5 - 4.7	
Chlorinated	71.9 - 5.9	
Ditto plus Hydros Bleach	72.5 - 4.9	
Hydrochloric Acid I	76.1 - 4.0	1.32
Ditto II	76.5 - 3.8	1.22
Magnetic Separation - Product	73.7 - 4.3	1.55
Ditto - Magnetic Fraction	51.4 - 7.6	

Some brightness gains have been achieved but no treatment succeeded in eradicating the grey tint from the clay although the brighter products were slightly less grey.

The best results were achieved by boiling the clay with hydrocholoric acid and it is interesting to note that this treatment removed more than half of the iron (Fe_2O_3). This process seems hardly viable in practice; the costs would be very high.

The effect of chlorination is surprising as the gain of 2.5 units is rather higher than one might expect. The improvement of clays lying just under a peat bed is normally about 1.0 to 1.5 units. The increase in Yellowness is unusual; this process normally reduces Yellowness ('browness'). Perhaps this increase in Yellowness is due to the oxidation of ferrous to ferric iron at the surface of some particles. This seems likely because subsequent reduction with Hydros decreases the Yellowness.

Magnetic Separation is one process for which there remains some hope. The system used in the laboratory employs very small fields compared with the modern superconducting magnetic separators which generate enormous fields of 3 to 5 Tesla. (It takes about 5 hours to get 20 grams of clay through the matrix in the small laboratory rig employing permanent magnets). This inefficient laboratory test can do no more than indicate that the clay contains particles which can be removed magnetically and so gives confidence that a magnetic separation process is worth considering. In this case, the gain of 3.4 units of Brightness is quite encouraging but it is not possible to predict from this result what a High Gradient Magnetic Separator might achieve. It is interesting to note that the laboratory process removed 44% of the Iron (Fe_2O_3) present in the clay.

The Hydros process gives disappointing results and it appears that it cannot remove very much iron from the clay. This small lift in Brightness would not repay the cost of the process at this lower end of the Brightness scale.

It was imagined that the material causing the grey tint and low Brightness might be discrete non-kaolinite particles. It was further imagined that these particles might reside at the coarse end of the particle-size distribution. If this were so it might be possible to remove them, by a fractionation process, along with the coarser kaolinite. This would give rise to a fine clay without the grey tint and with good Brightness which could fetch a high price as a paper-coating clay.

Some GV clay (-20 microns) was slurried and deflocculated and submitted to a static sedimentation regime. The particle-size distributions of the coarse and fine fractions (Sedigraph) are included in Appendix. It will be seen that the fine fraction has a distribution typical of a paper-coating clay.

The two fractions were tested for Brightness and Iron

TABLE VI

	Brightness	Fe_2O_3 %
Fine Fraction	72.1 - 4.3	2.15
Coarse Fraction	63.1 - 5.7	3.91

Clearly there is an improvement in Brightness and a reduction of Fe_2O_3 as a result of removing the coarse material from the whole clay, but the Brightness achieved is unsuitable for paper-coating application. The grey tint, although concentrated at the coarse end, nevertheless extends into the finer particle-sizes.

5. THE FOUR CLAYS AS CERAMIC MATERIALS

The clays were measured for Fired Brightness and Fired Contraction from a standard firing schedule to 1180°C. Iron and Potash contents were also measured (XRF)

TABLE VII

Code	Fired Brightness	Contraction %	K_2O%	Fe_2O_3%
GV	57.8	8.9	1.01	2.78
GG	7.9	11.9	6.38	7.04
LB	45.1	8.6	1.65	3.80
GB	56.1	8.5	1.85	2.43

The GG clay is clearly unuseable due to the very low fired colour - the trial was dark brown in colour, similar to plain chocolate. It might possibly be used as a component for building-bricks. However, such materials are low priced and normally used "as dug" without any refining process. This GG had suffered the cost of a refining process.

It is interesting to see that GB gave a colour similar to GV, despite it being very coloured in the raw state. It is also interesting to see that it actually has a lower iron content than GV and the fact that it does not fire whiter than GV can be explained by its higher potash content. (Potash acts as a flux and enhances the lowering effect that iron has on fired colour).

The visual colours of GW, GB and LB fired trials are Light Grey Cream, Cream and Dark Cream respectively and there is absence of specking or mottling (usually caused by large particles rich in iron and coarse Biotite or Muscovite).

There is an unusual feature in the potash to iron ratio in these clays. The iron is higher than the potash whereas the opposite is the case for English china-clays.

Some typical values for English ceramic clays follow:

TABLE VIII

	K_2O	Fe_2O_3	Fired Brightness
Porcelain Clay	2.3	0.6	84+
Table-Ware Clay	2.5	0.67	82
Sanitary-Ware Clay	3.0	0.85	70+

Note the very much lower iron content of these clays arising from acid granites.

It is however possible to visualise ceramic uses for the Lang Bay clays. In sanitary-ware manufacture, fired brightness is of less importance because the colour of the finished ware is supplied by thick, opaque and often highly coloured glazes.

It has been noticed when handling dried filter-cakes of these clays, and particularly so for L.B., that they have high strength (Modulus of Rupture) i.e. the cakes are quite difficult to break and grind in a pestle and mortar. This feature is quite unusual in clays with these particle size distributions. However caused, this feature is beneficial. When cast ware is removed from the casts it has to be handled into drying ovens and then into firing kilns. This gives rise to breakage, lost production and a cost in recycling the cracked ware. Increasing the green strength of the pottery body, therefore, reduces these losses. Strength is usually increased by including strong fine sedimentary (ball) clays in the body. I do not know if these are available from Canadian sources; perhaps the nearest source is Tennessee/Kentucky U.S.A. Thus, although Fired Brightness is rather low, a compensating factor would be the strength of these clays. (A formal M.O.R. test could not be applied - it requires about 1.5 kg of clay and only small amounts of these clays were available).

Two other important ceramic clay tests were performed on a mixture of G.B. and L.B. (ratio 2 to 1). The first is known as "Casting Concentration". This is the determination of the percentage of solids in a slurry having a viscosity of 5 poises when adjusted to minimum viscosity with sodium silicate. The mixture gave a result of 60% solids.

This slurry is then used to determine the rate at which a cast builds up with time in a plaster mould. The result for this mixture was 0.42 mm^2 per minute at 20°C. Both these results are rather low and just creep into the ranges normally seen i.e. 58 to 67 and 0.2 to 6.0 respectively, but do not necessarily preclude their application as a body component. As we have seen, GB is rather finer than LB, which on its own might give better results but at the expense of some Fired Brightness loss.

It would appear quite likely that magnetic separation could improve Fired Brightness of these clays to some unknown extent. This process is used in Cornwall for exactly that purpose.

Another outlet for these clays would be in the manufacture of wall and floor tiles although this is a large volume, low price market. At even lower price the clays could be consumed in the manufacture of glazed ceramic pipes (cloamware) used for sewerage and drainage systems.

6. CONCLUSIONS

(i) The clay typified by GW would seem suitable for newsprint paper filling. There would be a lower Brightness limit that would have to be observed and reached by a system of matrix selection.

Clays which failed might be brought into line by use of High Gradient Magnetic Separation. This process might also convert some of the better clays into Brightness ranges applicable to the filling of finer papers.

Pilot work with a 5 Tesla system might be arrangeable in a U.K. University but would require upwards of 10 kg. of refined clay.

(ii) Clays typified by GV, GB and LB would seem suitable as lower grade ceramic materials i.e. for sanitary ware production at best.

Here again magnetic separation is a beneficiation process worth piloting.

If there is a reasonably local ceramic market it should be explored as a potential consumer. Serving two industries rather than just one gives added security.

Indicative U.K. ex works prices per bulk tonne are:

Paper fillers	High Brightness	£54
	Low Brightness	£46
Sanitary Ware Clays		£42 to £47
Tile Clays		£25 to £30 (very approximately)

(iii) The deposit is unusual and problematical. The writer is of the opinion that such a deposit situated in Europe would be unlikely to be exploited. Its being where it is, near markets and remote from other clay deposits in production, might well provide the feature which makes exploitation feasible.

One adverse feature which must require continuing attention is the high overburden to refined clay ratio. From existing drilling logs this does seem unusually high. The deposit is very non-uniform regarding clay quality and a dry-mining, selective stock-piling operation seems essential.

Clays are normally sold as 10% moist lump which assumes filtration and evaporative drying. With very local paper-filling markets the idea of selling concentrated slurries (65-70% solids) should be explored. This is accomplished in U.S.A. and UK. It has the advantage of obviating the need for drying, with its high capital and running costs.

(iv) In any feasibility study a variety of features can indicate that the project is not viable. Clay quality is one of these. The writer is of the opinion that in this case clay quality leaves something to be desired but it does not, per se, render the project obviously unviable.

A P P E N D I X

C O N T E N T S

* * * *

PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION LANG RAY -20μ CODE GW

DATE

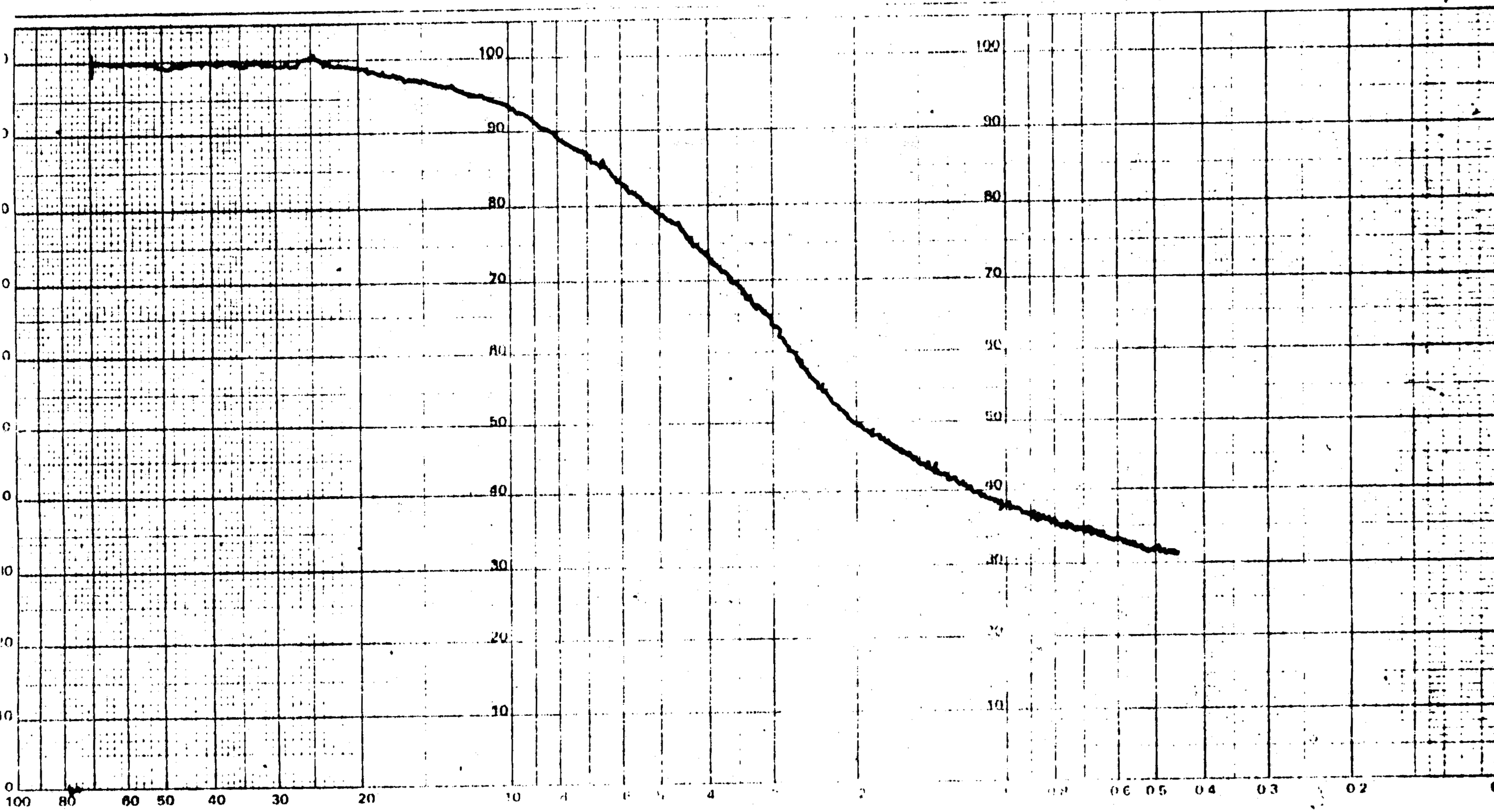
BY

Density g/cc LIQUID

TEMPERATURE °C

Preparation

RATE START DIA. 70 μm



EQUIVALENT SPHERICAL DIAMETER, μm

micromeritics instrument corporation

COULTER ELECTRONICS LIMITED

PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION LANGBAY -20µ CODE GG

DATE ____________

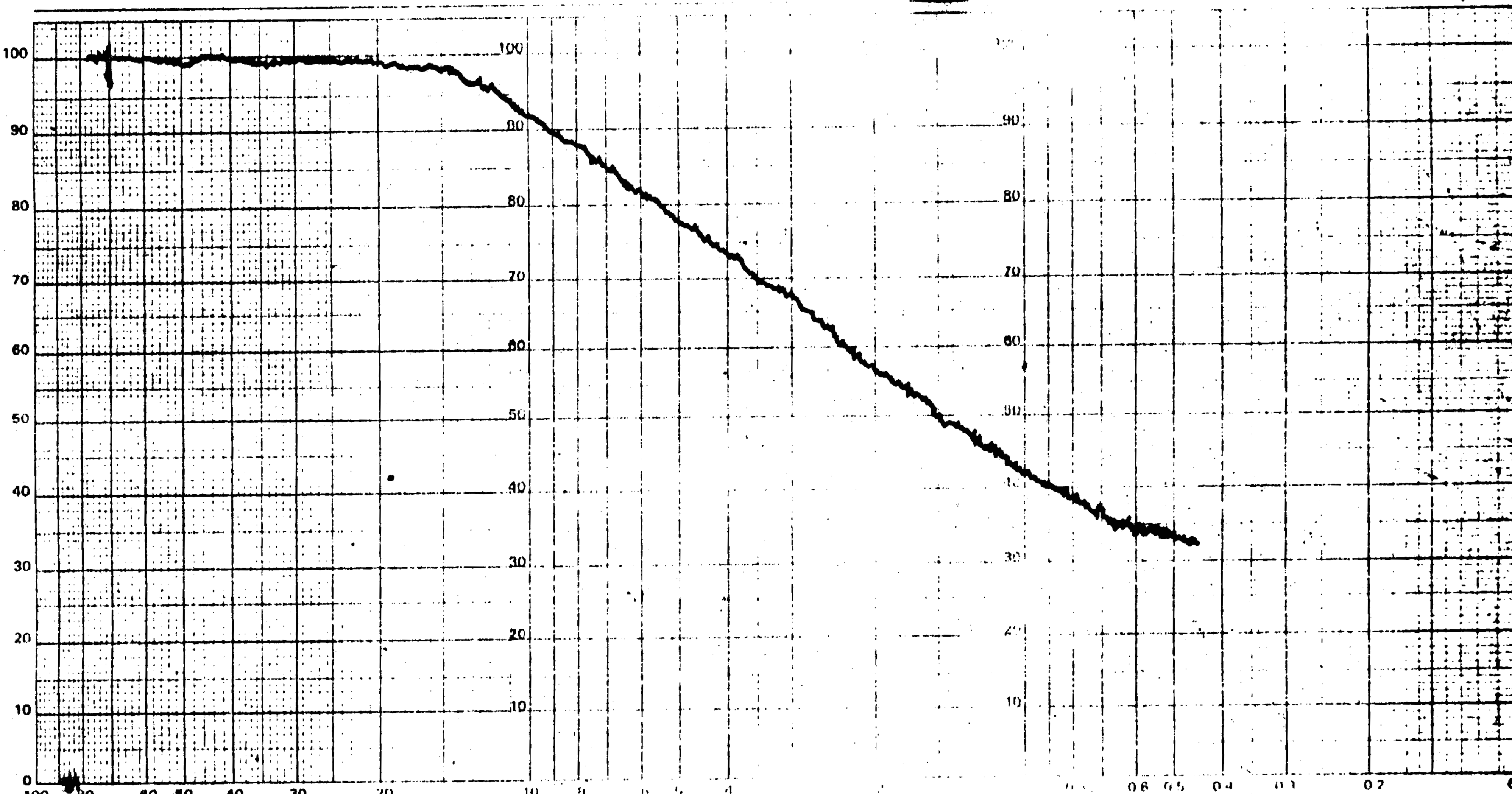
Density ________ g/cc LIQUID ____________ Density ________ g/cc Viscosity ________ cp

BY ____________

TEMPERATURE ________ °C

Preparation ____________

RATE ________ START DIA 70 µm



micromeritics instrument corporation

COULTER ELECTRONICS LIMITED

PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION LB. -20μ BROWN CLAY CODE LB

DATE 24 NOV 87

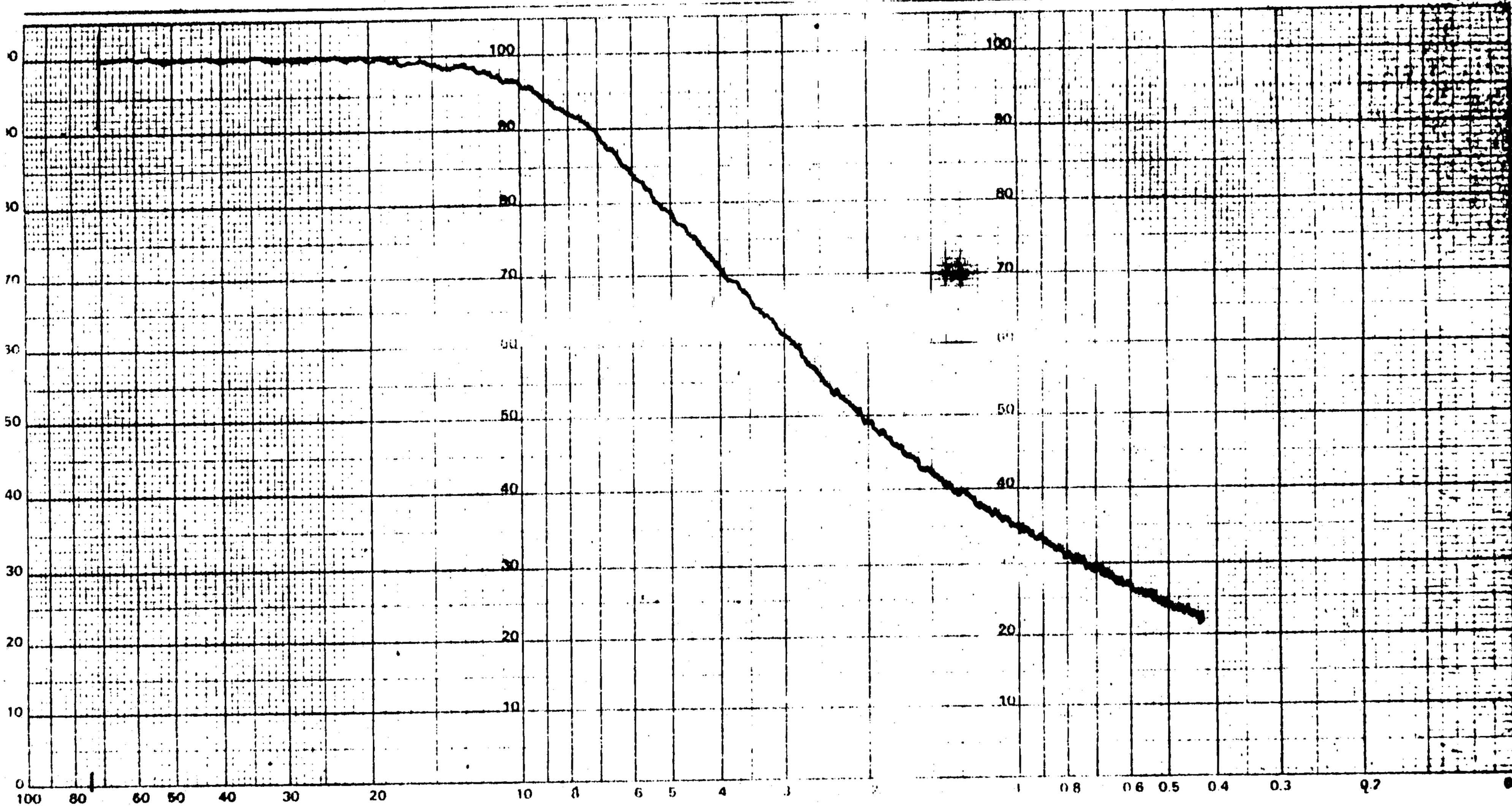
BY

Density ______ g/cc LIQUID ______ Density ______ g/cc Viscosity ______ cp

TEMPERATURE ______ °C

Preparation ______

RATE ______ START DIA. 10 μm



EQUIVALENT SPHERICAL DIAMETER, μm

micromeritics
instrument corporation

COULTER ELECTRONICS LIMITED

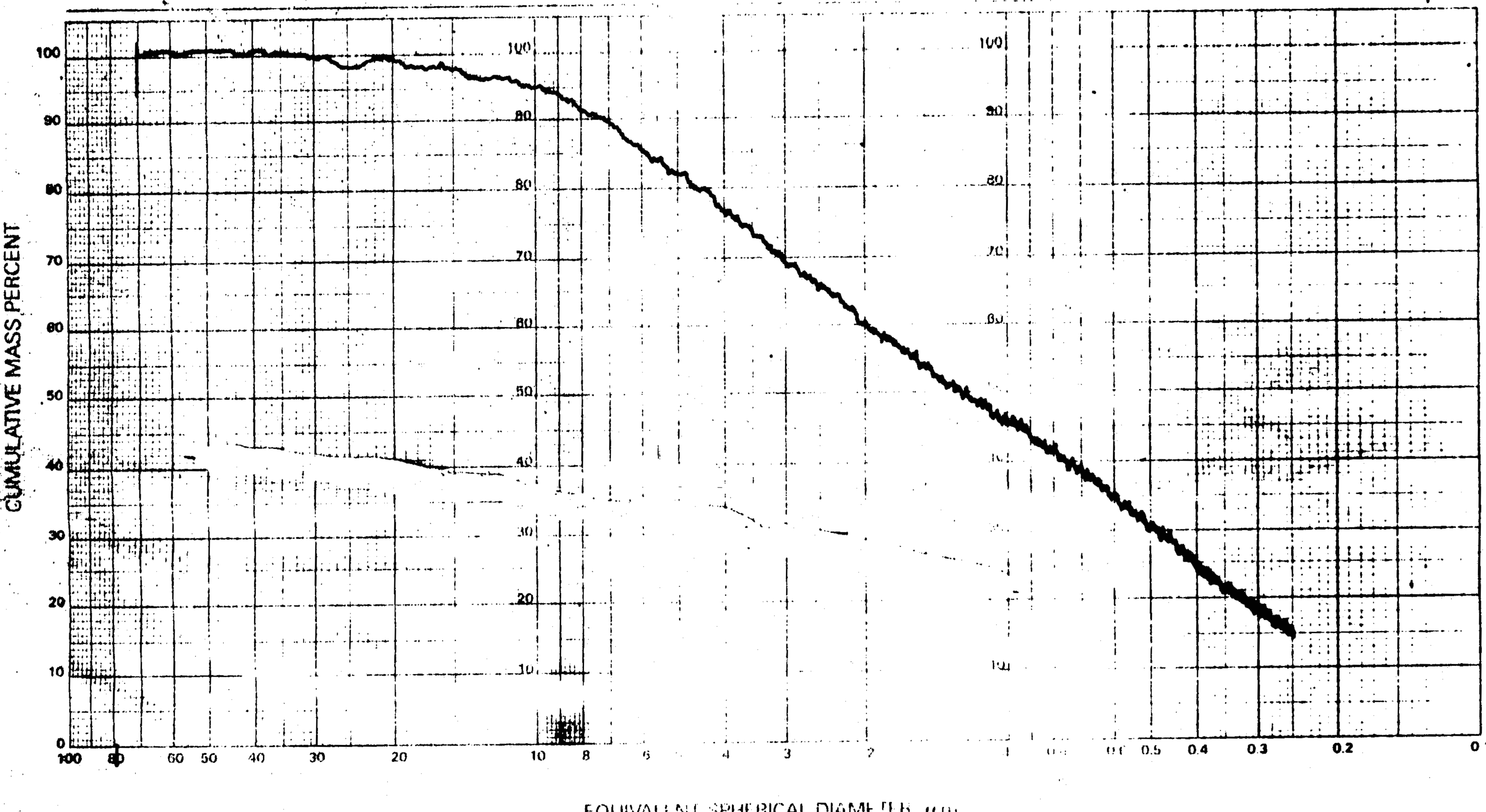
PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION LB -20µ BROWNISH GREY CLAY CODE GB DATE 24 NOV '87

Density ____ g/cc LIQUID ____ Density ____ g/cc Viscosity ____ cp BY MAJ

Preparation ____ TEMPERATURE ____ °C

RATE ____ START DIA. 70 µm



micromeritics

COULTER ELECTRONICS LIMITED

PARTICLE SIZE DISTRIBUTION

SAMPLE IDENTIFICATION LANGRAY CODE G.W.

DATE

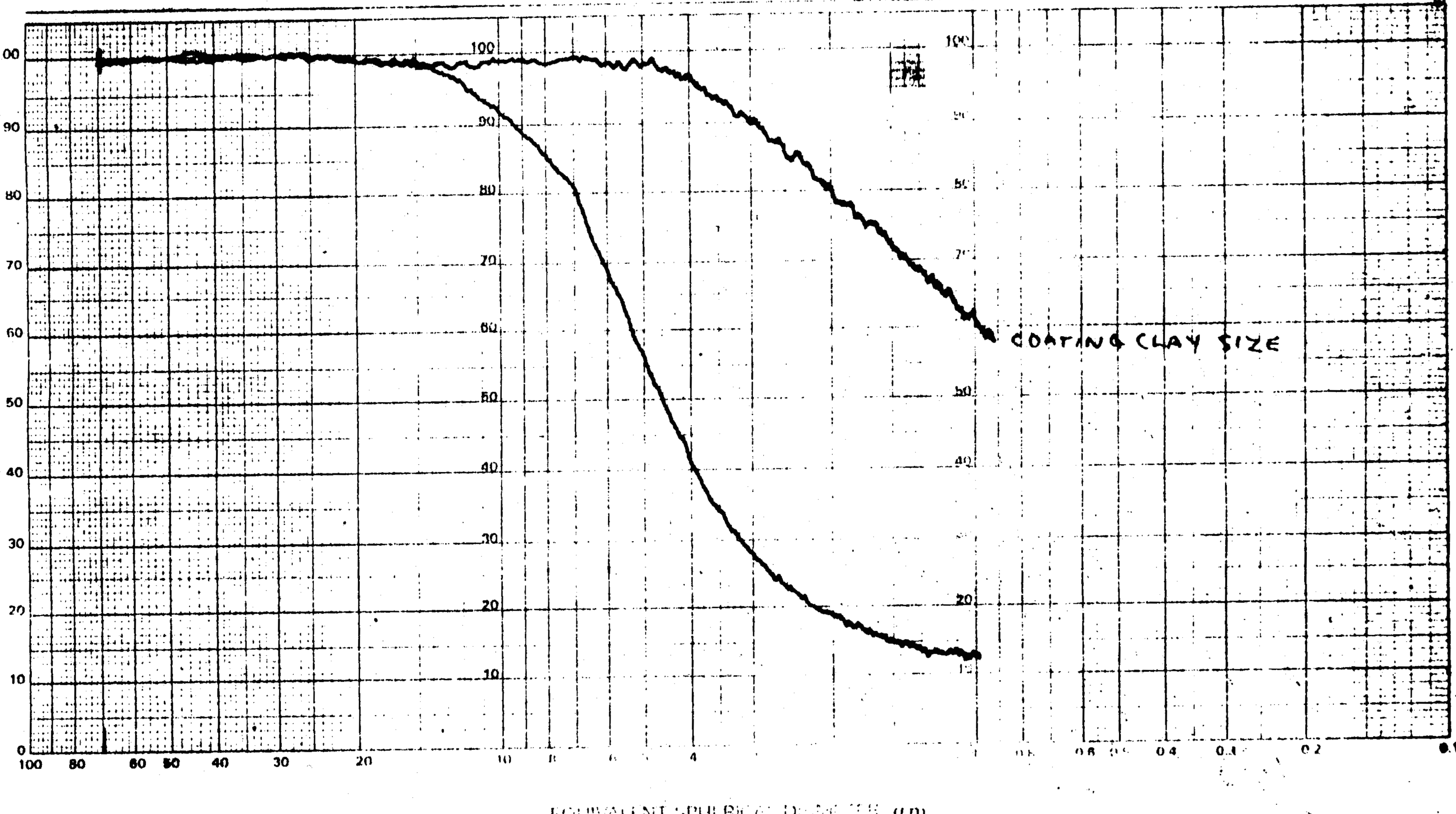
BY [illegible initials]

Density ______ g/cc LIQUID ______ Density ______ g/cc Viscosity ______

TEMPERATURE ______ °C

Preparation FRACTIONATED TO COATING CLAY AND RESIDUE CLAY

RATE ______ START DIA. 70 µm



2. HYDROS BLEACH

A clay slurry (about 10% solids) is brought to pH3.0 with sulphuric acid. Sodium Hydrosulphite is added with stirring. The amount is 0.5% based on clay solids. The pH is again reduced to 3.0 and the slurry is aged for 18 hours. The slurry is filtered (Buchner) and the filter cake is washed free of salts on the filter with hot water. The cake is dried at 80° for Brightness testing.

"X2" means that the Hydros dose is raised to 1.0%.

CHLORINATION

10 grams of clay is slurried with 100 ml. of water; 2 ml. of concentrated sodium hypochlorite solution is added and mixed. The pH is reduced to 3.0 with sulphuric acid and the slurry is aged for 18 hours. The treatment is then as for Hydros Bleach regarding washing etc.

HYDROCHLORIC ACID I

10 grams of clay is slurried with 100 ml. of water and treated with 2 ml. of concentrated hydrochloric acid. The liquid is brought to the boil, cooled and filtered (Buchner) and the cake washed with hot water.

HYDROCHLORIC ACID II

This increases the amount of acid and its concentration. 10 grams of clay are boiled with a mixture of 50 ml. of water and 50 ml. of concentrated acid.

MAGNETIC SEPARATION

A matrix is made up by forming a plug of fine iron wire wool in a glass tube. This plug is brought into a field provided by permanent magnets. A dilute, defloculated clay slurry is passed slowly through the matrix. After the passage of about 2 ml. of slurry, the clay feed is replaced by a water feed to remove clay from the matrix.

The magnets are then removed and the collected magnetic material is washed out with water into a separate container. The process is then repeated until all the clay slurry has passed through the matrix. The magnetic and non-magnetic fractions are floculated with acid, filtered and dried at 80°C for testing.

3. IRON

It was found possible to remove magnetic minerals from the sand and slimes fractions by means of a hand magnet.

Samples of the materials were repeatedly explored until the yield of magnetics was almost complete.

WEIGHT % OF REMOVABLE MAGNETICS IN FRACTIONS

	SAND	SLIMES
GW	0.65	4.58
GG	10.30	38.30
LB		Trace
GB	1.81	4.80

It seems that the GG stratum is very ferruginous and this condition extends into the clay fraction with its analysis of 7.04% Fe_2O_3.

It was found that two magnetic species existed. The most magnetic was black in colour and the less magnetic was green and tended to be more finely divided. When a sample of GG Slimes was treated with strong acid, there was marked effervescence and the liquour was dark green; on standing the liquour became yellower.

A reasonable hypothesis seems to be that the black material is magnetite and the green material is siderite (ferrous carbonate). The latter would account for the effervescence and being more basic it would be more quickly attacked by acid to give the green liquour. Subsequent slower dissolution of the magnetite would give rise to the yellow development. The filtered liquour was diluted and titrated with caustic soda solution. The first precipitate was blue in colour (ferrous hydroxide?) and the second was yellow brown and gelatinous - ferric hydroxide. This highly ferruginous condition is unseen in the usual china-clay deposits arising from alteration of acid granites and supports the theory that the Lang Bay parent rock is more basic in nature which in turn means that the feldspathic content was high in iron content.