

GEOCHEMICAL: GEOPHYSICAL REPORT
ON
(WHITE GROUP)
WHITE BULL, BLACK BULL, BLUE BULL CLAIMS

LIARD MINING DIVISION
NTS 94L/13W
LAT. 58°54'N LONG. 127°54'W

by

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DATED: MAY 10, 1983

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

11,190

TABLE OF CONTENTS

	<u>Page</u>
Summary.....	1 /
1.0 Introduction.....	3 /
1.1 Location and Access.....	3 /
1.2 Property.....	3 /
1.3 History of Property.....	6 /
1.4 Regional Geology.....	6 /
1.5 Details of 1982 Program.....	9 /
2.0 Technical Data and Interpretation of Results.....	11 /
2.1 Introduction.....	11 /
2.2 Geology.....	11 /
2.3 Soil Geochemistry.....	13 /
2.4 Geophysics.....	16 /
Statement of Qualifications.....	28 /
Summary of Costs: White Group.....	30 /
List of Personnel.....	32 /
Appendix	
A. Geochemical Methods /	
B. Geophysical Surveys: Theory and Procedures /	

LIST OF TABLES/FIGURES

Page

Table

1	Land Record.....	4
2	1982 Work Summary.....	9
3	White Bull 1982 HLEM Survey (100 metre coil spacing)....	25
4	White Bull 1982 HLEM Survey (50-75 metre coil spacing)..	27

Figure

1	Location Map: White Bull Project.....	2
2	Claim Location Map.....	5
3	Regional Geology Summary.....	8
4	HLEM (50 m) 2W.....	19
5	HLEM (50 m) 0.....	20
6	HLEM (50 m) 2E.....	21
7	HLEM (75 m) 0.....	22
8	HLEM (75 m) 4E.....	23
9	EM Anomaly Compilation.....	24

MAPS

1. White Bull - Soil Geochem - Sample Location Map: East
2. White Bull - Soil Geochem - Sample Location Map: West
3. White Bull Soil Geochemistry: East Cu
4. White Bull Soil Geochemistry: West Cu
5. White Bull Soil Geochemistry: East Pb
6. White Bull Soil Geochemistry: West Pb
7. White Bull Soil Geochemistry: East Zn
8. White Bull Soil Geochemistry: West Zn
9. HLEM West
10. HLEM East
11. HLEM Extensions
12. Magnetics: East
13. Magnetics: West

Summary

The White Bull prospect (White Group claims) is located near the junction of the Turnagain and Major Hart Rivers in North Central B.C.

Several broad Fe sulphate and ferricrete crust zones occur on the property. This report documents soil geochemical, HLEM and proton magnetometer surveying of the showings to test for base metal concentrations below the acid leached cover.

Spotty lead anomalies and high electromagnetic responses were found in these zones. Severe acid leaching accounts for the depletion of most metals in this environment. Copper and zinc geochemical results are below background when compared to results obtained from unleached portions of the property. Lead is considered to be a less mobile element and might remain in-situ. The high EM responses cannot be attributed to being caused by massive sulphides. Black shale beds, resistant to acidic solutions, occur throughout the sulphate crusts. They are often graphitic and might represent the source for the high EM responses.



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WHITE BULL
PROPERTY LOCATION MAP

0 100 200 MILES
0 100 200 400 KILOMETRES

FIGURE I

1.0 Introduction

1.1 Location and Access

The White Bull property is located 80 km (azimuth 100⁰) east of Cassiar B.C. and 140 km (azimuth 158⁰) southeast of Watson Lake, Yukon. Access to the property is by fixed wing and or rotary aircraft from Watson Lake or Dease Lake, B.C.

The claims occupy a east-west trending valley, draining easterly into the Turnagain River. Elevations vary between 760 and 1370 metres. A prominent cliff scarp and broad acid leached zones characterize the property. The area has been burned and is now covered by stunted poplars and a few pines.

1.2 Property

The property consists of 8 mineral claims aggregating 106 contiguous units. Locations of the claims are shown on figure #2. The land record is listed in Table #1. This report documents exploration on the White Group claims only. No work is filed for the Brown Bull, Grey Bull, Red Bull, Tan Bull and Yellow Bull mineral claims.

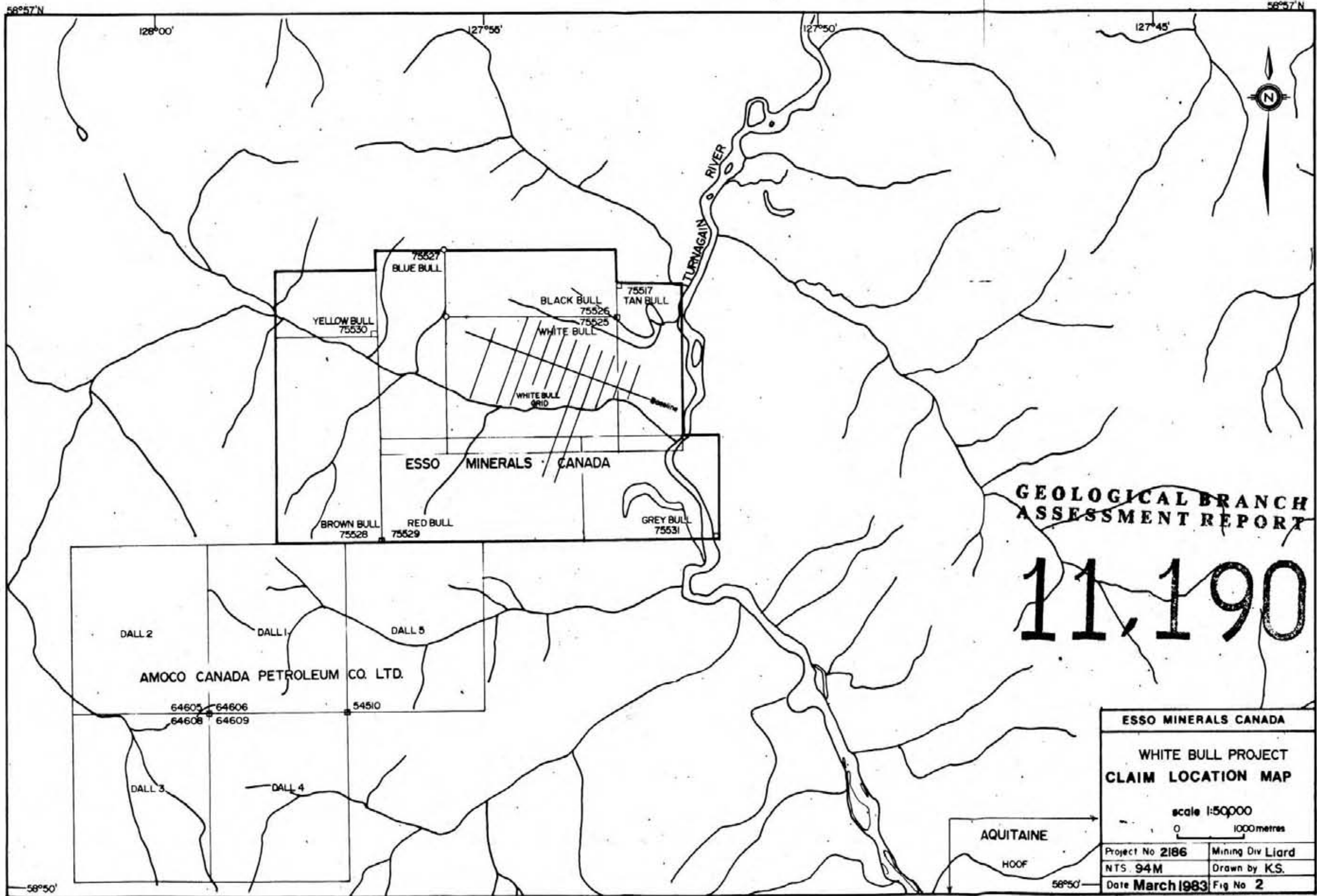
(Table 1)

Land Record

Property: White Bull - 2186

Mining Division: Liard

<u>Name</u>	<u>Record #</u>	<u>No. of Units</u>	<u>Date of Record</u>	<u>Expiry Date</u>	<u>Group</u>
Black Bull	2307	10	May 6, 1982	May 6, 1983	White
Blue Bull	2305	12	May 6, 1982	May 6, 1983	White
Brown Bull	2466	18	Sept. 16, 1982	Sept. 16, 1983	Red
Grey Bull	2469	12	Sept. 16, 1982	Sept. 16, 1983	Red
Red Bull	2467	18	Sept. 16, 1982	Sept. 16, 1983	Red
Tan Bull	2465	10	Sept. 16, 1982	Sept. 16, 1983	Red
White Bull	2306	20	May 6, 1982	May 6, 1983	White
Yellow Bull	2468	6	Sept. 16, 1982	Sept. 16, 1983	Red
		<u>106</u>			



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT CLAIM LOCATION MAP	
scale 1:50000	
0 1000metres	
Project No 2186	Mining Div Liard
NTS. 94M	Drawn by K.S.
Date March 1983 Fig No 2	

AQUITAINE
HOOF

1.3 History of Property

The White Bull property was originally staked by Amoco Canada Petroleum Company Limited in 1977 as a shale hosted lead-zinc target. Field work comprised B-horizon soil sampling, soil profile sampling and prospecting. Generally low and erratic Cu, Pb and Zn results were found over the acid leached zones. The property was allowed to lapse in the fall of 1981.

Esso Resources Canada Limited staked the property in May 1982. Details of the 1982 exploration program are listed in section 1.5.

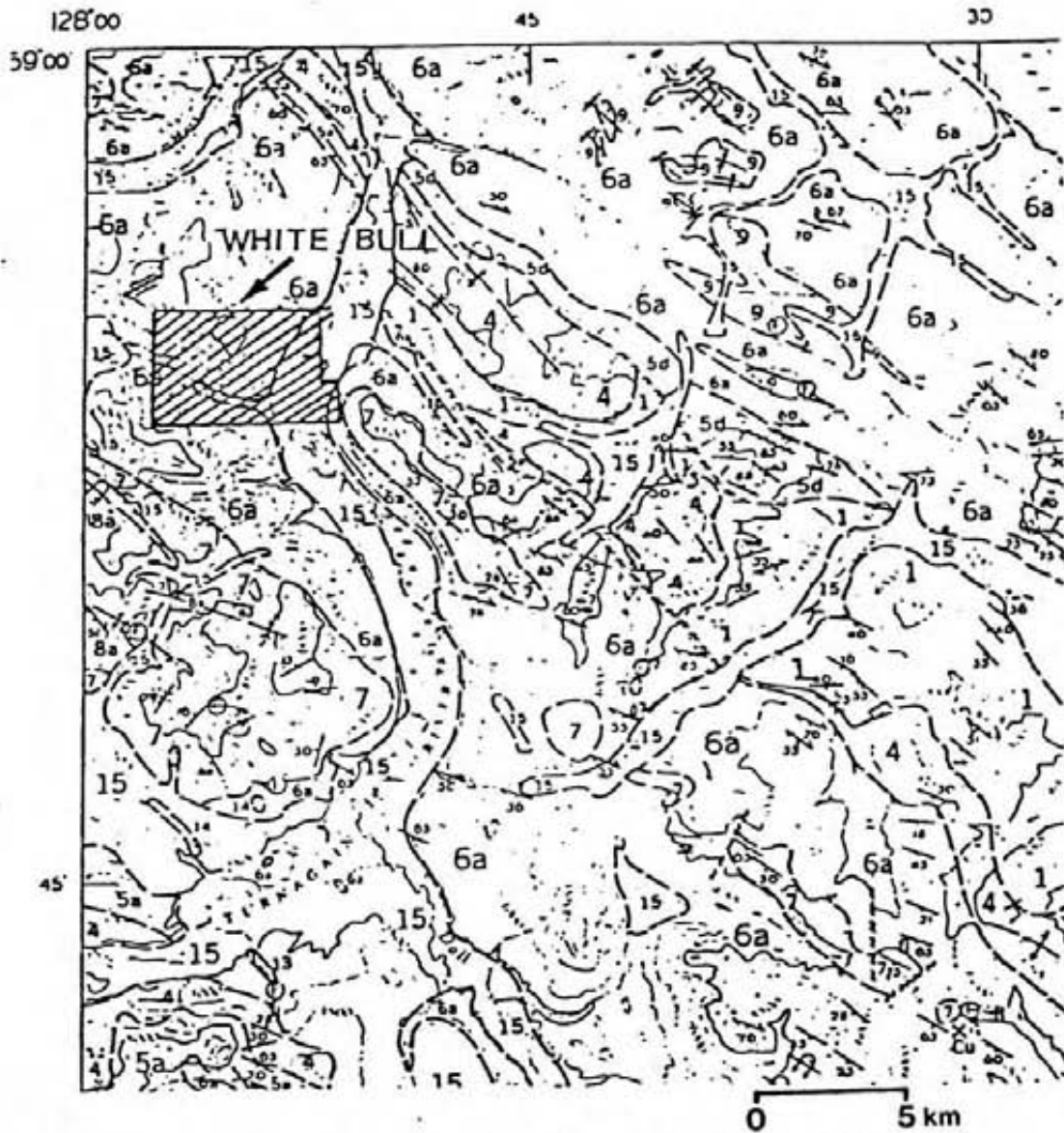
1.4 Regional Geology

The regional geology of the Kechika 94L map sheet is presented on G.S.C. map 42-1962 by H. Gabrielse. Figure #3 represents the northwest portion of the 94L map sheet; north latitude $58^{\circ}40' - 59^{\circ}00'N$ and west longitude $127^{\circ}27' - 128^{\circ}00'W$.

The White Bull project area is underlain by Cambro-Ordovician Road River and Kechika Group black shales, argillaceous limestones, slate, phyllite with minor greenstone sills and dykes. These rocks trend northwest-southeast, parallel to the other Paleozoic sedimentary units shown on figure #3. Dips are highly variable, to the northeast and southwest, and are complicated by folding and inter-formational thrusting.

Glassy, pisolitic rhyolites of Tertiary age occur 30 km south of the property. There is no evidence of these volcanics in the White Bull area.

WHITE BULL PROJECT - 2186



Tertiary

14 Glassy pisolitic rhyolite
rhyolite breccia

Lower-Middle Mississippian

9 Limestone, chert, siltstone

Upper Devonian - Lower Mississippian

8A argillite, sandstone, minor
agglomerate and greenstone

Middle Silurian

7 Sandpile Group-dolomite,
sandy dolomite, quartzite

Cambrian and Ordovician

6A Road River and Kechika Groups
- black shale, argillaceous
limestone, slate, phyllite,
minor greenstone sills and
dikes

Cambrian

5A, 5D limestone, shale, argillite
4 quartzite, shale, conglomerate

REGIONAL GEOLOGY

Figure... 3

1.5 Details of 1982 Program

Field work completed in 1982 (Aug. 1-14) included linecutting, soil sampling, HLEM and proton magnetometer surveying. Table #2 is a summary of the work directly applied to the White Group claims.

(Table #2)

1982 Work Summary

<u>Section</u>	<u>Samples (geochem)</u>	<u>Linecutting (km)</u>	<u>Geophysics (km)</u>
White Group	784 soil	3.0 km picket 13.1 km (flagged)	12.98 km HLEM 9.78 km proton mag

Soil samples were taken at 25 metre intervals on 200 and 400 metre line spacings. The B-horizon and C-horizon was sampled in each hole. Geochemical sampling methods are described in detail in Appendix C. Baseline 0+00 is the only cut line on the property. All cross lines are flagged with 25 metre stations. All results are plotted at a 1:2000 scale.

The HLEM survey was carried out with a Scintrex SE 88 Genie EM system, using a coil spacing of 100 m and transmitting frequency ratios of 3037.5 Hz/112.5 Hz, 1012.5 Hz/112.5 Hz and 337.5 Hz/112.5 Hz. Selected lines were surveyed using coil spacings of 50 m and 75 m. The magnetometer survey was carried out with a Geometrics G816 proton precession magnetometer.

2.0 Technical Data and Interpretation of Results

2.1 Introduction

The detailed exploration of the White Bull prospect was completed (Aug. 1-14) by a 7 man reconnaissance crew. A fly camp was built at the 1280 metre elevation to make access to the broad sulphate crust zones easier. Water was flown into the campsite by helicopter from the Turnagain River as streams draining the property were too sour for human consumption.

The 1982 field program comprised soil geochemistry, HLEM and proton magnetometer surveying. Soil geochemical results are on maps 1-8. Geophysical profiles are shown on maps 9-13 and figures 4-9.

2.2 Geology

The White Bull prospect is underlain by Cambro-Ordovician sediments and volcanics, in thrust contact with Silurian carbonates.

Argillaceous phyllitic limestones represent the uppermost member of the Cambro-Ordovician rocks. They cap the White Bull ridge top. Quartz-dolomite interbeds are common along its basal contact.

Black, locally graphitic shales underlie the impure limestone horizon. This horizon is outlined by the HLEM survey as a zone of moderate conductivity. Its estimated true width is \sim 200 metres.

A siliceous rhyolitic volcanic (?), marks the top of a 600 metre intercalated sequence of sulphate crusts and black shale beds. It occurs as an Fe stained resistant bluff parallel to the sulphate zone. Contacts to the overlying shales or lower leached areas were not found.

The sulphate crusts are estimated to be 5-15 metres thick. Severe acid leaching has destroyed the original outcrop resulting in a thick pile of totally leached talus cemented by Fe sulphates and ferricrete.

A narrow 20 metre thick black graphitic shale bed occurs at the base of this zone. It is highly conductive, thus affecting the assessment of conductivity for the sulphate rich horizons.

The Cambro-Ordovician sedimentary sequence trends east-west, dipping 75-90° to the north.

Silurian Sandpile Group dolomites and grey limestones are in thrust contact with these rocks along the southern and eastern portions of the grid. Fault dips vary significantly from 30° to 90°. The contact is usually sheared with minor amounts of a clay-like gouge.

2.3 Soil Geochemistry

The 1982 Esso soil survey covered the sulphate crust zones and overlying/underlying Cambro-Ordovician sediments. Soils were taken at the B and C horizons at each sample site to test for enrichment or depletion of base metals at depth. Results are shown on maps 1-8. Estimated background and threshold results for each horizon are listed below.

<u>Element</u>	<u>Background</u>		<u>Threshold</u>	
	(ppm)		(ppm)	
	<u>B Horizon</u>	<u>C</u>	<u>B Horizon</u>	<u>C</u>
Cu	15-25	15-30	75	90
Pb	25-40	30-60	120	120
Zn	15-40	20-50	120	150

Copper:Soil Geochemical Results

Two B horizon samples (80, 98 ppm) and 3 C horizon samples (85, 150, 171 ppm) were anomalous within the boundaries of the leached zone. Copper content tends to decrease with depth. Background for this element increases 2-3 times in the areas underlain by unleached sediments. Copper soil geochemistry is considered very low for the property.

Lead:Soil Geochemical Results

Spotty lead anomalies were found in the sulphate crusts. Lead content generally increases with depth. Twenty-five samples were anomalous between grid lines 0+00 and 8+00E. The highest result obtained in the survey (B-Horizon: 2300 ppm, C-Horizon: 2700 ppm) was found along line 0+00. There is also a slight enrichment of lead downslope of the leached material.

A second lead anomaly was discovered between grid locations 6+00E:4+00N and 8+00E:3-4+00N. This area is underlain by Cambro-Ordovician black shales. B-horizon results (148-930 ppm) are generally lower than the C-horizon results (123-1350 ppm).

Zinc:Soil Geochemical Results

Zinc has been totally wiped out of the sulphate crusts by acidic waters. Results are extremely low and decrease to trace amounts with depth. The well developed zinc halo around this zone is coincident with the black shales. In this area zinc content tends to be lower in the C-horizon. The results probably represent geochemical background for the shales and should not be considered as anomalous.

Soil Geochemical Survey: Conclusions

- A. Extreme acid leaching affects copper, lead and zinc geochemistry in the sulphate crust zones. Copper and zinc are totally wiped out of these areas. Lead is only partially removed and occurs only as spotty one sample highs.

- B. Soil geochemistry is an inadequate exploration technique in extremely acidic environments. The degree of element depletion in soils is hard to interpret. Apparent anomalies may represent geochemical background or assumed background values may be anomalous in these zones.

2.4 Geophysics

Approximately 12.98 km of a reconnaissance HLEM and 9.78 km of magnetometer surveying were carried out on the White Bull Prospect. The purpose of the HLEM survey was to outline EM conductors caused by massive sulphides. The objective of the magnetometer survey was to provide additional information to aid in geological mapping.

2.4.1 HLEM and Magnetometer Surveys

The HLEM survey was carried out with a Scintrex SE 88 Genie EM system, using a coil spacing of 100 m and transmitting frequency ratios of 3037.5 Hz/112.5 Hz, 1012.5 Hz/112.5 Hz and 337.5 Hz/112.5 Hz (description found in Appendix). Selected lines were surveyed using coil spacings of 50 m and 75 m.

The results of the HLEM survey are presented on maps 9, 10 and 11 (100 m coil spacing) and figures 4, 5 and 6 (50 m coil spacing) and figures 7 and 8 (75 m coil spacing).

The magnetometer survey was carried out using a Geometrics G816 proton precession magnetometer (description found in Appendix B). The data was corrected for diurnal variations and is presented on maps 12 and 13.

2.4.2 Interpretation

Results from the magnetometer survey show that the magnetic response to the rocks is the same as that for a homogeneous medium. The mean geomagnetic field strength (58670) is as would be predicted from the total magnetic intensity chart of Canada; therefore the rocks on the property are not strongly magnetic. No anomalous magnetic responses are observed.

Conductive EM responses are observed on all of the survey lines with the exception of line 18E. Some EM responses indicate single conductors while others indicate multiple conductors.

Correlating individual conductors from line to line cannot be made due to the large line spacing (200 m) and the complexity of the EM responses. However, an attempt has been made to try and delineate areas which contain conductors. These areas are labelled 1 to 18 on maps 9, 10 and 11 and figure 9.

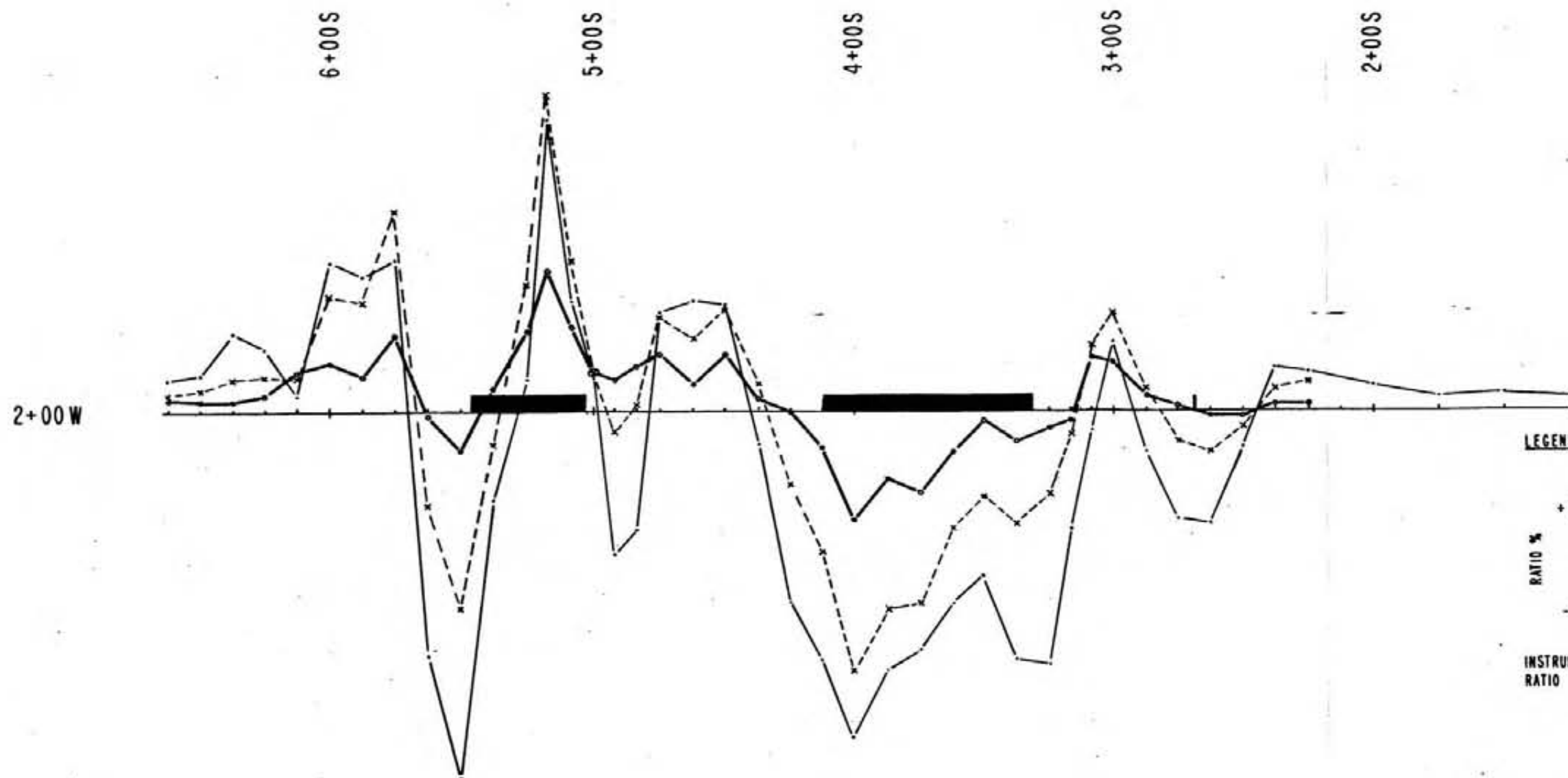
Table 3 lists the interpretation of the HLEM survey using a coil spacing of 100 m, Table 4 lists the interpretation of the HLEM survey using shorter coil spacings over selected lines.

The conductive areas correlate with those areas that have been mapped as being in part black shales. Samples of black shale were tested with an ohm-meter and were found to be conductive, which is probably caused by carbonaceous material contained within them. If a massive sulphide body was located within these shales, the HLEM method would not be able to distinguish a conductor caused by it from those caused by the conductive shales.

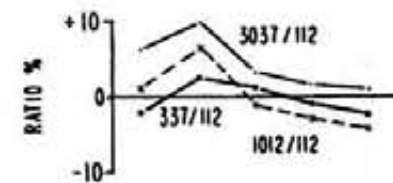
2.4.3 Summary

HLEM and magnetometer surveys were carried out on the White Bull prospect in 1982. The results from the magnetic survey show that the rocks are "magnetically" homogeneous and have low magnetic susceptibilities. No anomalies are found.

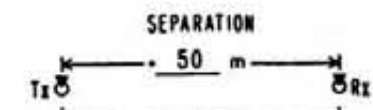
The HLEM survey has outlined numerous EM conductors, the majority of which are located at a depth of 10 m. These conductors can be explained as being caused by conductive black shales; none are interpreted as being caused by massive sulphides. If a massive sulphide body was located within these shales, the HLEM method would not be able to distinguish a conductor caused by it from those caused by the conductive shales.



LEGEND



INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIO
 • 3037 Hz / 112 Hz
 • 1012 Hz / 112 Hz
 • 337 Hz / 112 Hz



PLOTTING POINT

— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY

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 DIV. OF ESSO RESOURCES CANADA LIMITED

PROSPECT: WHITE BULL

HORIZONTAL LOOP EM SURVEY

ACCOUNT # MA 86 FILE # B.C. 86 TORONTO

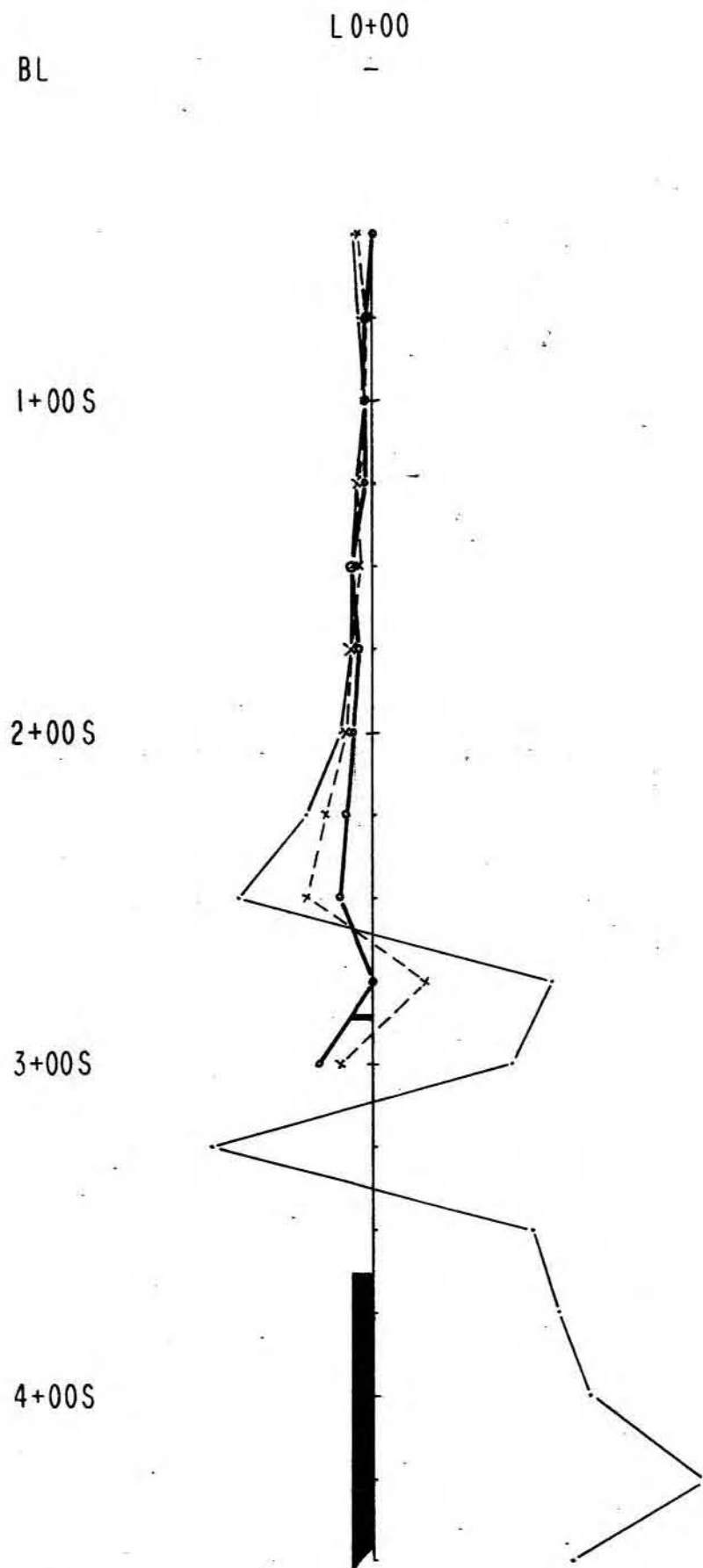
SCALE 1:2000 0 50 M DATE JAN. '83

AUTHOR G. COOPER RTS 94M DRG. #

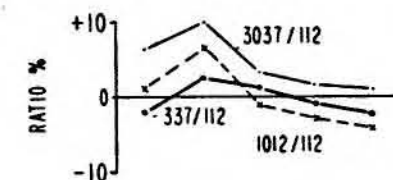
FIG. 4

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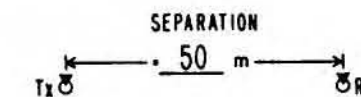
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LEGEND



INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIO • 3037 Hz / 112 Hz
 • 1012 Hz / 112 Hz
 • 337 Hz / 112 Hz



PLOTTING POINT

— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY

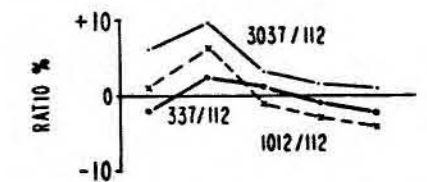
ESSO MINERALS CANADA DIV'N OF ESSO RESOURCES CANADA LIMITED		
PROSPECT: WHITE BULL		
HORIZONTAL LOOP EM SURVEY		
ACCOUNT N° MA 86	FILE N° B.C. 86	TORONTO
SCALE 1:2000	0 50 M	DATE JAN. '83
AUTHOR G. COOPER	NTS 94M	DWG. N°

FIG. 5

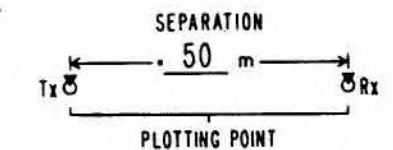
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11,190

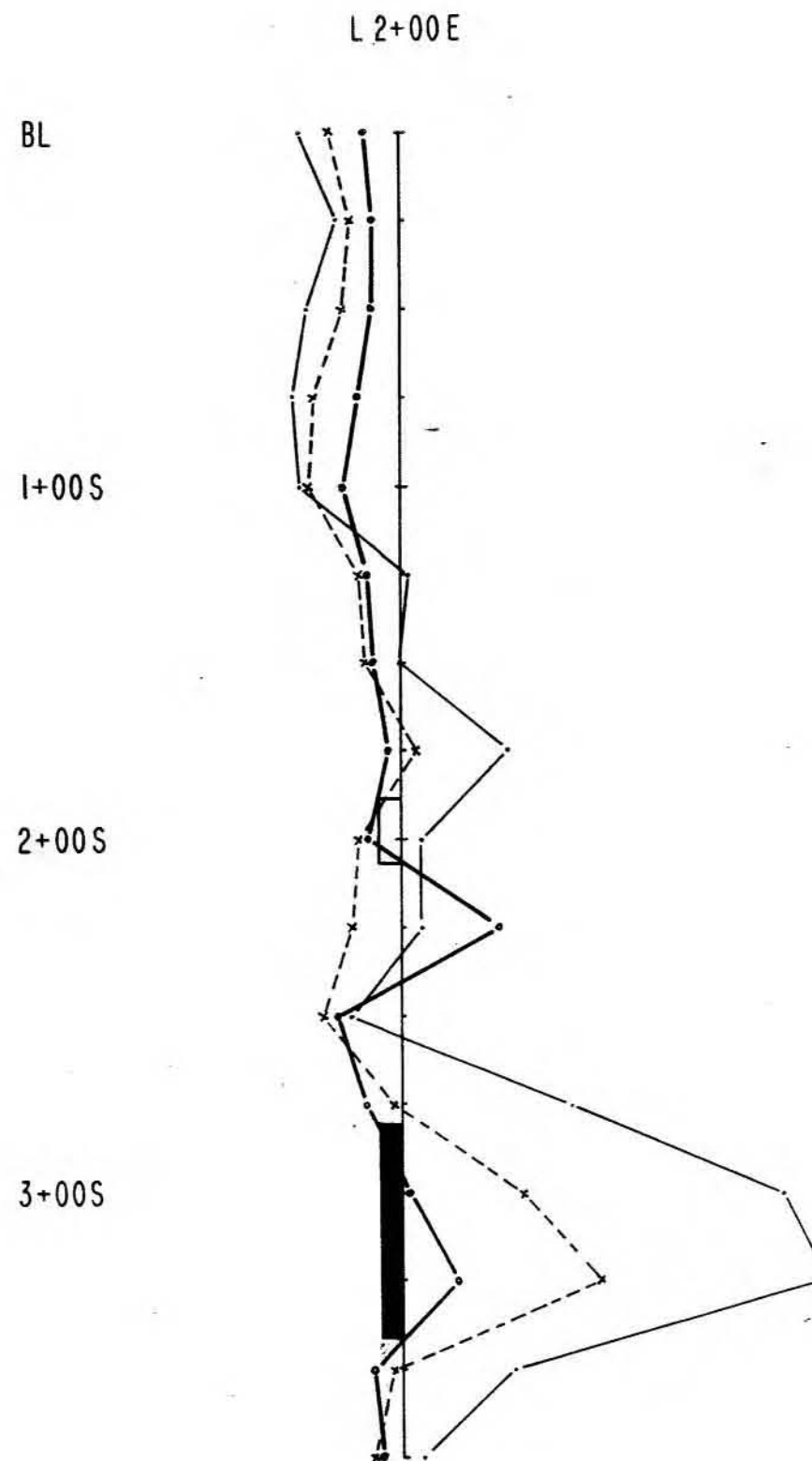
LEGEND



INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIO - 3037 Hz / 112 Hz
 * 1012 Hz / 112 Hz
 • 337 Hz / 112 Hz



— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY



ESSO MINERALS CANADA DIVN. OF ESSO RESOURCES CANADA LIMITED		
PROSPECT: WHITE BULL		
HORIZONTAL LOOP EM SURVEY		
ACCOUNT N° MA 86	FILE N° B.C. 86	TORONTO
SCALE 1:2000	0 50M	DATE JAN. '83
AUTHOR G. COOPER	HTS 94M	DWG. N°

FIG. 6

L 0+00

BL

1+00 S

2+00 S

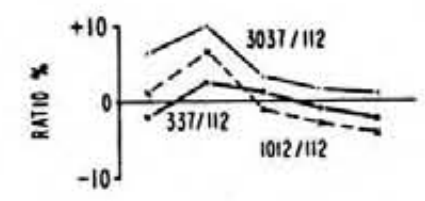
3+00 S



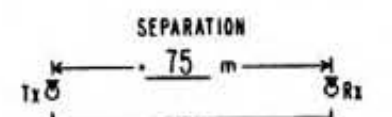
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11,190

LEGEND



INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIO
 • 3037 Hz / 112 Hz
 • 1012 Hz / 112 Hz
 • 337 Hz / 112 Hz



PLOTTING POINT

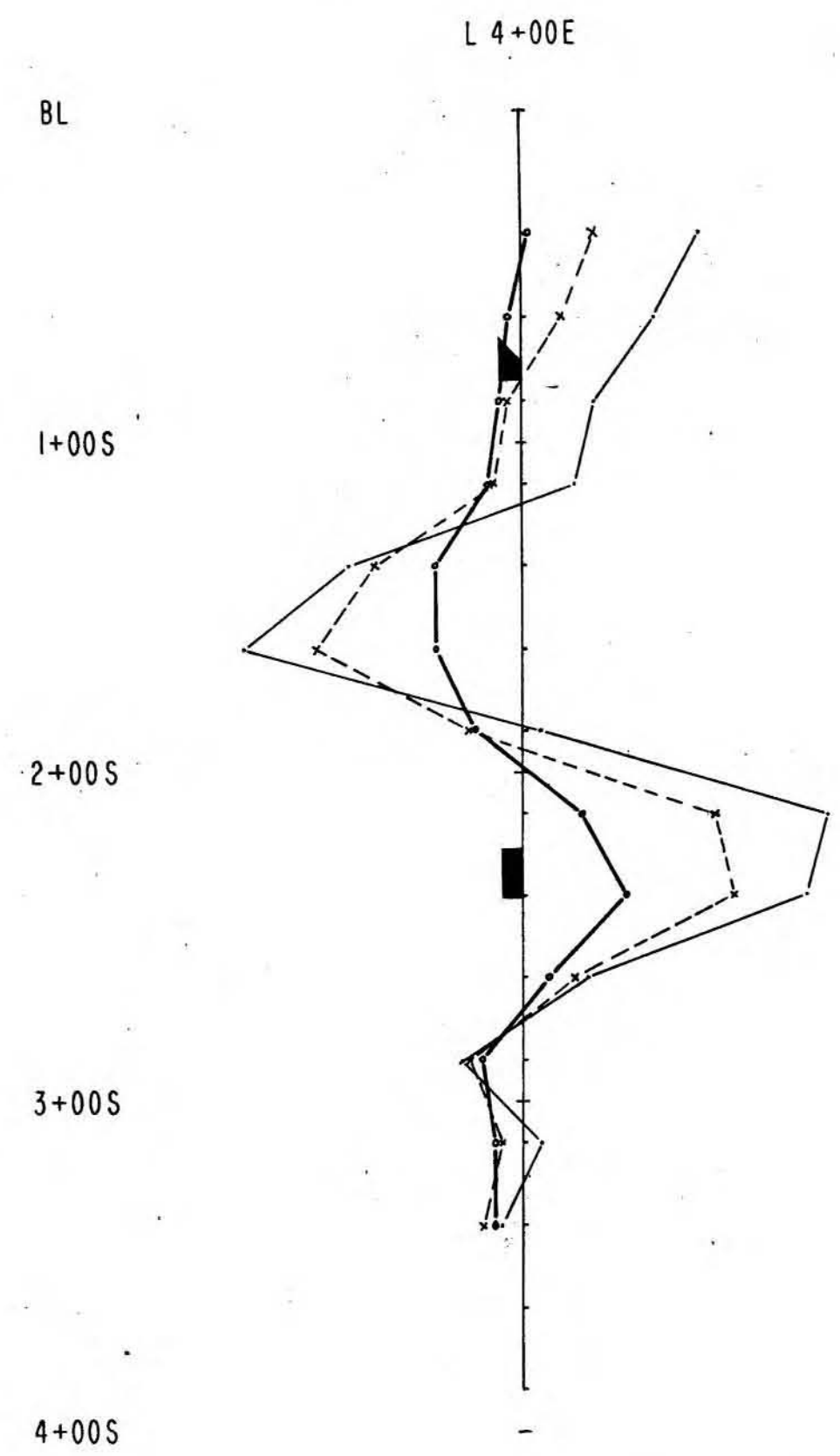
— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY

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PROSPECT: WHITE BULL		
HORIZONTAL LOOP EM SURVEY		
ACCOUNT N° MA 86	FILE N° B.C. 86	TORONTO
SCALE 1:2000	0 50 M	DATE JAN. '83
AUTHOR G. COOPER	RTS 94 M	DWG. N°

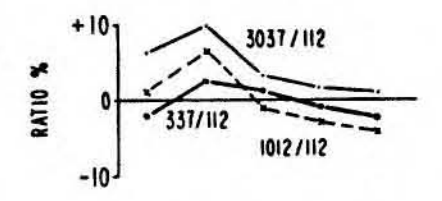
FIG. 7

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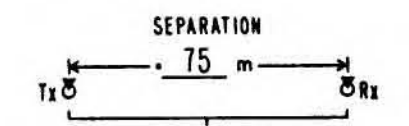
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LEGEND



INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIO
 • 3037 Hz / 112 Hz
 x 1012 Hz / 112 Hz
 • 337 Hz / 112 Hz



— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY

ESSO MINERALS CANADA DIVN. OF ESSO RESOURCES CANADA LIMITED		
PROSPECT: WHITE BULL		
HORIZONTAL LOOP EM SURVEY		
ACCOUNT N° MA 86	FILE N° B.C. 86	TORONTO
SCALE 1:2000	0 50M	DATE JAN. '83
AUTHOR G. COOPER	NTS 94M	DWG. N°

FIG. 8

WHITE BULL PROSPECT

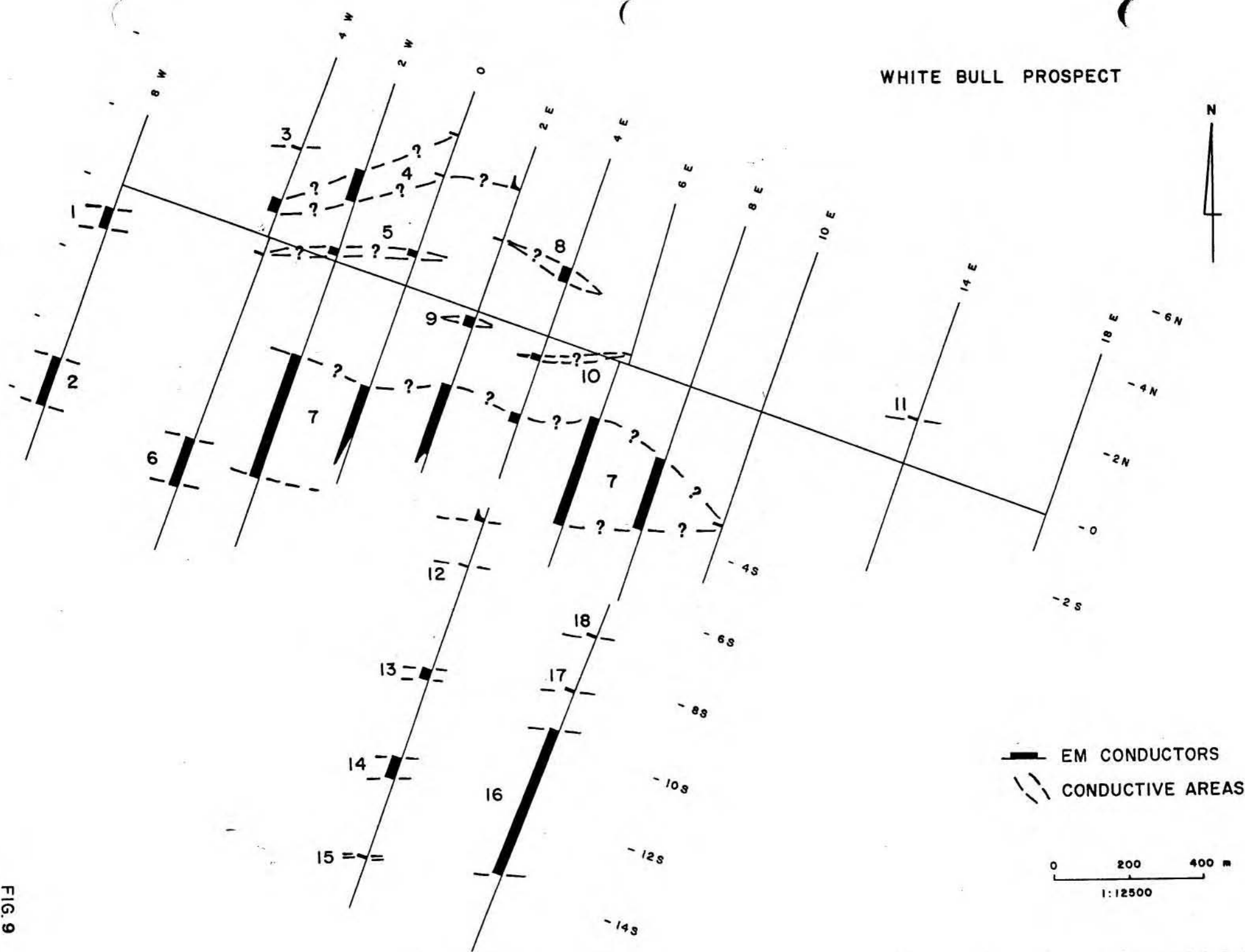


FIG. 9

TABLE 3

WHITE BULL 1982 HLEM SURVEY

INSTRUMENT: SCINTREX SE88 GENIE

COIL SEPARATION: 100 M

FREQUENCY RATIOS: 3037.5/112.5, 1012.5/117.5, 337.5/112.5

LINE	AREA	LOCATION	DESCRIPTION	DEPTH
			S = Single Conductor M = Multiple Conductor () = Possible # of Conductors	
8W	1	68S to 124S	M (2)	<10M
	2	483S to 614S	M (3)	<10M
4W	3	250N	S	30M
	4	98N to 65N	M (2)	10M
	5	42S	S	<10M
	6	575S to 705S	M (3)	<10M
2W	4	257N to 165N	M (3)	<10M
	5	40N to 15N	M (2)	<10M
	7	263S to 596S	M (7)	<10M
0	4	? to 433N	M (?)	10M
	4	320N	S	15M
	5	97N to 79N	M (2)	15M
	7	285S to ?	M (5)	<10M
2E	4	? to 335N	M (?)	?
	8	197N	S	15M
	9	21S to 45S	M (2)	25M
	7	195S to ?	M (4?)	<10M
4E	8	192N to 153N	M (2)	<10M
	10	51S to 65S	M (2)	<10M
	7	220S to 295S	M (3)	<10M
	7	? to 515S	M (?)	?

TABLE 3 CONTINUED

WHITE BULL 1982 HLEM SURVEY

INSTRUMENT: SCINTREX SE88 GENIE

COIL SEPARATION: 100 M

FREQUENCY RATIOS: 3037.5/112.5, 1012.5/117.5, 337.5/112.5

LINE	AREA	LOCATION	DESCRIPTION	DEPTH
4E	12	637S	S	15M
	13	930S to 956S	M (2)	10M
	14	1168S to 1236S	M (3)	<10M
	15	1450S	S	<10M
6E	10	25N	S	?
	7	159S to 530S	M (6)	<10M
8E	7	205S to 350S	M (2)	<10M
	18	695S	S	<10M
	17	850S	S	<10M
	16	960S to 1370S	M (6)	<10M
10E	7	315S	S	?
14E	11	117N	S	?
18E		No Conductors		

TABLE 4

WHITE BULL 1982 HLEM SURVEY

INSTRUMENT: SCINTREX SE88 GENIE

FREQUENCY RATIOS: 3037.5/112.5, 1012.5/117.5, 337.5/112.5

LINE (Coil) (Spacing)	AREA	LOCATION	DESCRIPTION S = Single Conductor M = Multiple Conductor () = Possible # of Conductors	DEPTH
2W (50W)	7	269S 331S to 412S	S M (3)	8M < 6M
0 (50)	7	286S 363S to ?	S M (2) ?	8M ?
0		The data along this line is suspect. The plotting locations are shifted and amplitude of response is weaker than expected. Conductor suggested at 75S not present on the 100m or 50m data.		
2E (50)	7	190S to 207S 280S to 342S	M (2) M (3)	? < 6M
4E (75)	10 7	? to 80S 223S to 238S	M (?) M (?)	< 6M < 6M

Statement of Qualification

I am a Bachelor of Science graduate from the University of New Brunswick (May 1977) and have been employed as an exploration geologist within the mining industry for six years; the last 3 years with Esso Resources Canada Limited.

A handwritten signature in cursive script, appearing to read "C. Everett".

CAL C. EVERETT

STATEMENT OF QUALIFICATIONS

I attended the University of Waterloo, Waterloo, Ontario between 1975 - 1979 graduating with a B. Sc. (Honours) degree in Earth Sciences. From 1975 to 1979 I was employed during the summer months by Esso Minerals Canada to conduct Magnetic, Electromagnetic, Gravity and Induced Polarization surveys. Since graduating I have been employed by Esso Minerals as a geophysicist.

W. S. Cooper

W. Gordon Cooper

SUMMARY OF COSTS

WHITE GROUP

<u>Type of Work</u>	<u>Man Days</u>	<u>Cost/Man Day</u>	<u>Cost</u>	<u>Total</u>
Geochemistry	2	\$ 145.00	\$ 290.00	
	4	138.00	552.00	
	7	82.00	574.00	
	18	72.00	1296.00	
	16	63.00	1008.00	
				\$ 3720.00
Geophysics	9	\$ 138.00	\$1242.00	
	8	82.00	656.00	
	8	72.00	576.00	
				\$ 2474.00
Linecutting	1	\$205.00	\$205.00	
	1	145.00	145.00	
	1	138.00	138.00	
	1	82.00	82.00	
	2	72.00	144.00	
	1	63.00	63.00	
				777.00
Laboratory - Assays				
784 soils @ \$4.50 per unit				\$ 3528.00
Transportation				
Helicopter (2068) 24 hours @ \$370.00 hour				
Fixed Wing + Fuel (Watson Lake to White Bull)				\$ 1479.00
Helicopter Fuel 24 hrs. @ \$90.00 hr.				
Geochemical Freight Charge				\$ 546.00
Travel Expenses: 3 man geophysical crew: Vancouver to White Bull Return				\$ 2359.00
Food and Accommodation:				
June 18, 22; July 24; Aug. 1-14				\$ 1975.00
79 man days @ \$25.00 per man/per day				
Materials and Supplies				\$ 1206.00
Report Preparation:				
Writing 6 days @ \$145.00 per day				\$ 870.00
Drafting 10 days @ \$138.00 per day				\$ 1380.00
Map Reproduction				\$ 200.00
				\$ 20,314.00

Cost Distribution

Geochemistry	3720.00
Geophysics	2474.00
Linecutting	777.00
Analysis	3528.00
Transportation	1479.00
Freight Charge	546.00
Travel Exp.	2359.00
Food and Accom	1975.00
Supplies	1206.00
Report Preparation	2250.00
TOTAL	\$ 20,314.00
TOTAL APPLIED	\$ 19,000.00

List Of Personnel

Calvin Everett - Project Geologist
111 - 269 West 4th
North Vancouver, B.C.

Gordon Cooper - Geophysicist
2103 - 25 Mabelle Avenue
Islington, Ontario
M9A 4Y1

Kirk Simpson - Technician
84 - 3441 East 49th Ave.
Vancouver, B.C.

Robert Baerg - Senior Geological Assistant
4043 Coast Meridian Road
Port Coquitlam, B.C.
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Kerry Archibald - Field Assistant
Q3 McNab Park
Saskatoon, Saskatchewan
S7L 5W7

Henry Marsden - Assistant
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N5Y 4J2

Hugh Geiger - Assistant
462 King St. West
Kingston, Ontario
K5L 2X4

APPENDIX A

GEOCHEMICAL METHODS

Soil samples were taken at the B and C horizons at each sample site to test for increasing Cu, Pb and Zn values with depth. Samples were taken with hand tools, stored in brown gusset bags, dried and shipped to Min En Laboratories in North Vancouver for geochemical analysis. Each sample was oven dried, sieved to obtain the -80 mesh fraction and then subjected to nitric perchloric acid digestion. Measurement of trace element concentrations was done by Atomic Absorption Analysis. Samples were analyzed for Cu, Pb and Zn. Pulps for all samples are stored at the Esso Minerals Canada office in Vancouver, B.C.

APPENDIX B

GEOPHYSICAL SURVEYS

THEORY AND PROCEDURES

MAGNETICS:

A Geometrics G816 portable proton precession magnetometer was used. This instrument measures the total magnetic field strength, by measuring the frequency at which protons (hydrogen atoms) precess about the axis of the earth's magnetic field. The magnetic field strength, which is directly proportional to the frequency, is digitally displayed.

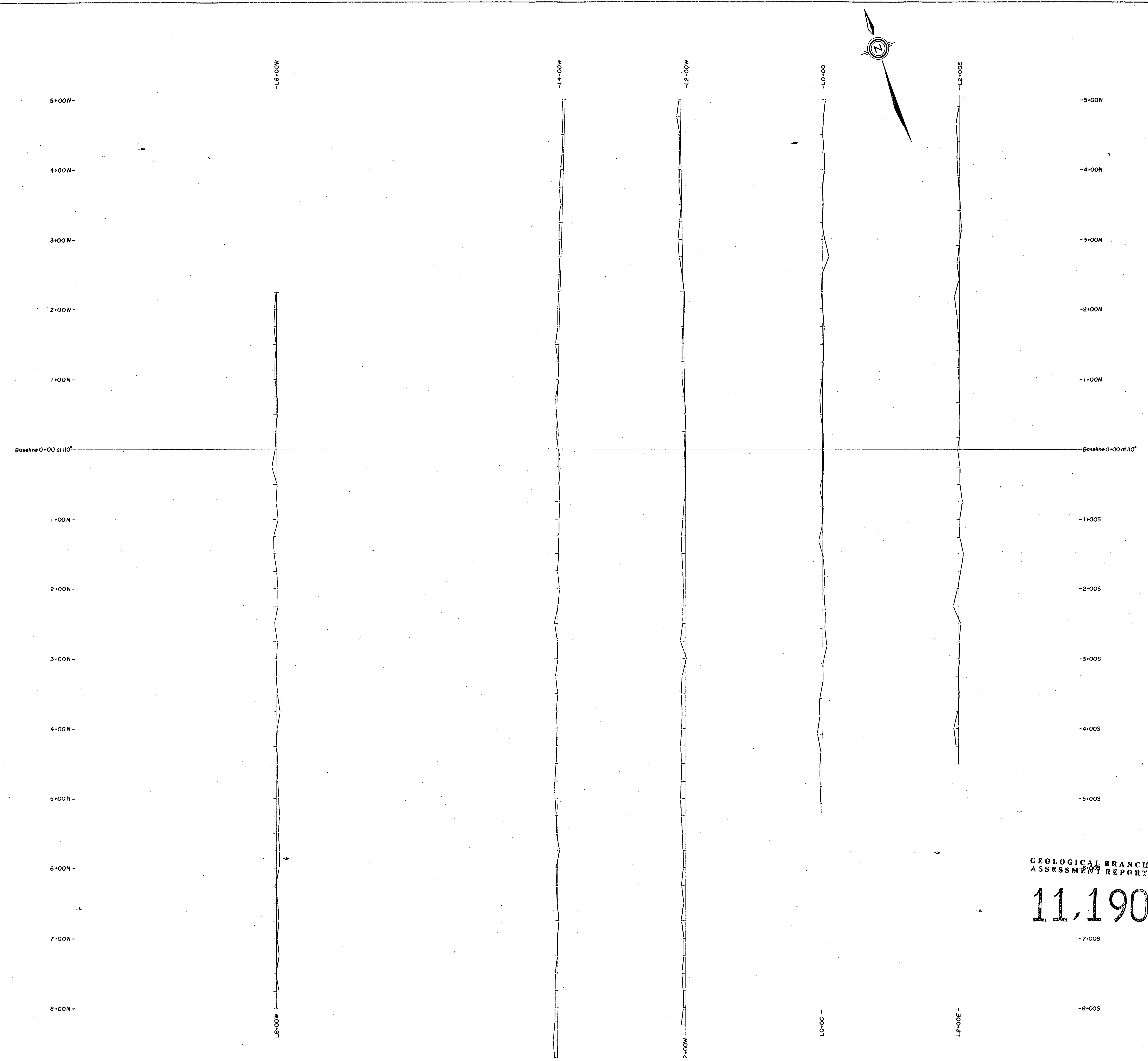
Readings were taken at 25 meter intervals along the survey lines. To correct time variations of the magnetic field (diurnal), base stations were first established within the survey area. Readings were taken at these base stations at the beginning and end of each traverse. The difference in the readings at these base stations were linearly distributed over the other readings along the traverse.

HLEM:

The Scintrex SE88 Genie EM system consists of a portable transmitter, with two transmitting coils and power supply, and a receiver with signal detection electronics. The transmitter and receiver coils are normally maintained in the vertical axis co-planar mode, commonly referred to as the horizontal loop mode.

The transmitter generates two alternating magnetic fields simultaneously - one referred to as the "signal frequency" and the other as the "reference frequency". The electromagnetic fields produced at these frequencies penetrates the earth and are detected by the receiver coil. The receiver measures the ratio of the received "signal frequency" amplitude, H_s , over the received "reference frequency" amplitude, H_r . The value of $(H_s/H_r - 1) \times 100$ is then digitally displayed on the receiver.

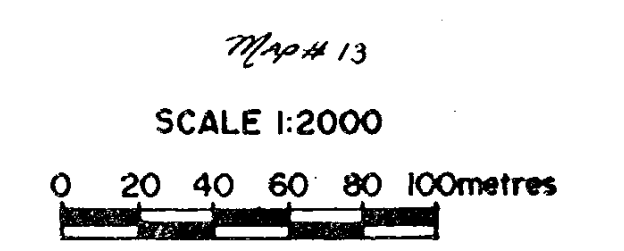
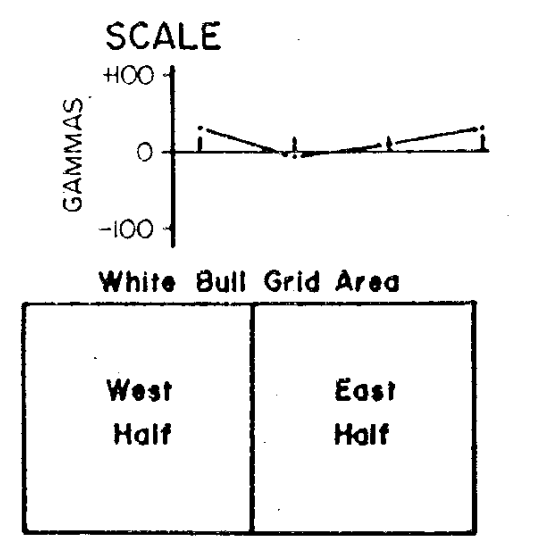
A constant separation is maintained between the two units by means of a signal meter located on the receiver. This signal meter is calibrated to the amplitude of the reference frequency in free space. The survey plotting point is considered to be at the mid-point of the transmitter-receiver separation (L). Readings were taken at station intervals of $1/2 L$ if no conductor was present and $1/4 L$ if a conductor was present.



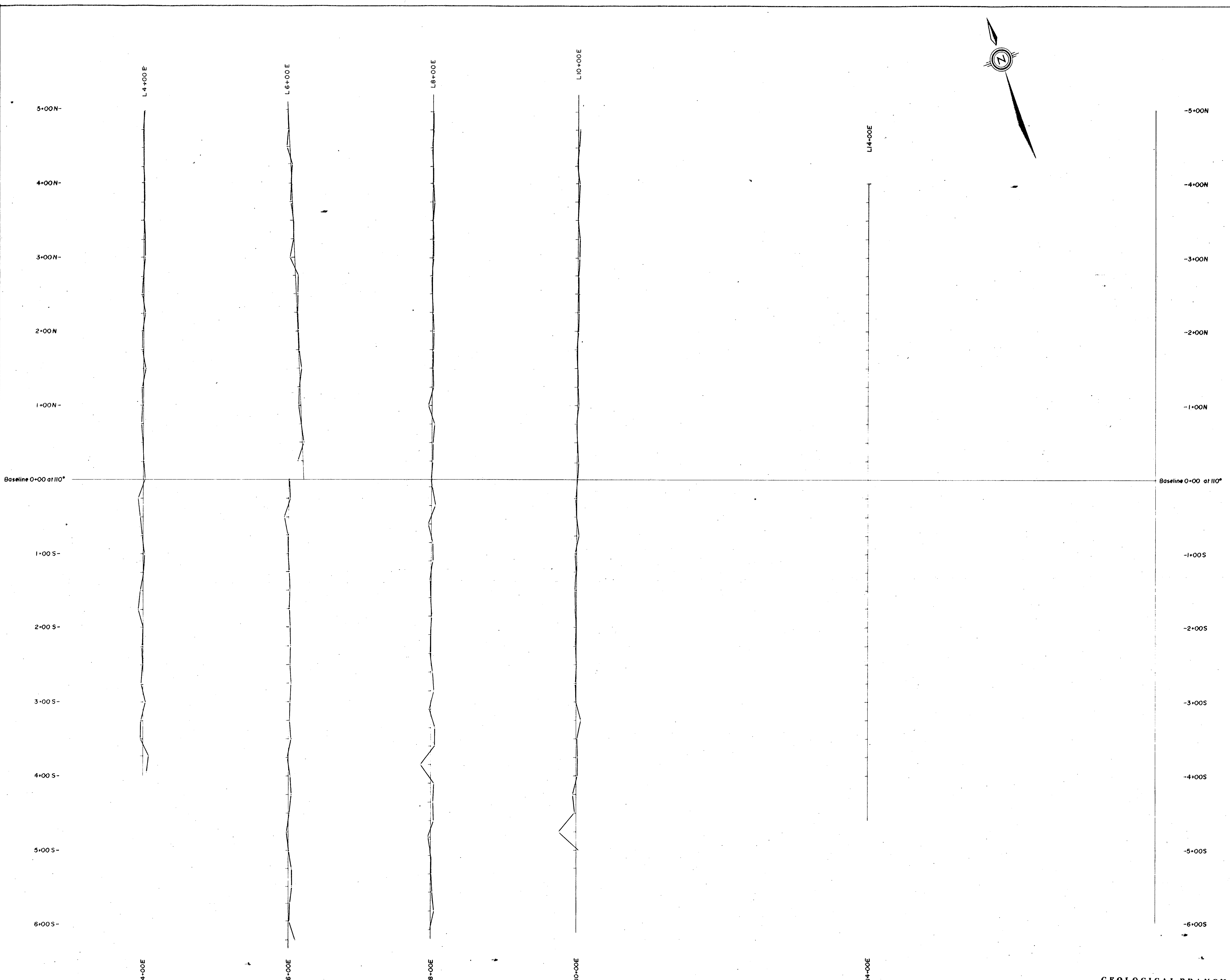
GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,190

LEGEND
INSTRUMENT: GEOMETRICS MODEL G816
PROTON PRECESSION
MAGNETOMETER
ACCURACY: ±10 GAMMAS
ASSUMED MEAN GEOMAGNETIC FIELD
STRENGTH IS ... 58680 GAMMAS



ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
MAGNETOMETER SURVEY PROFILES	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm = 20metres
NTS-94M	Drawn By: K. Simpson

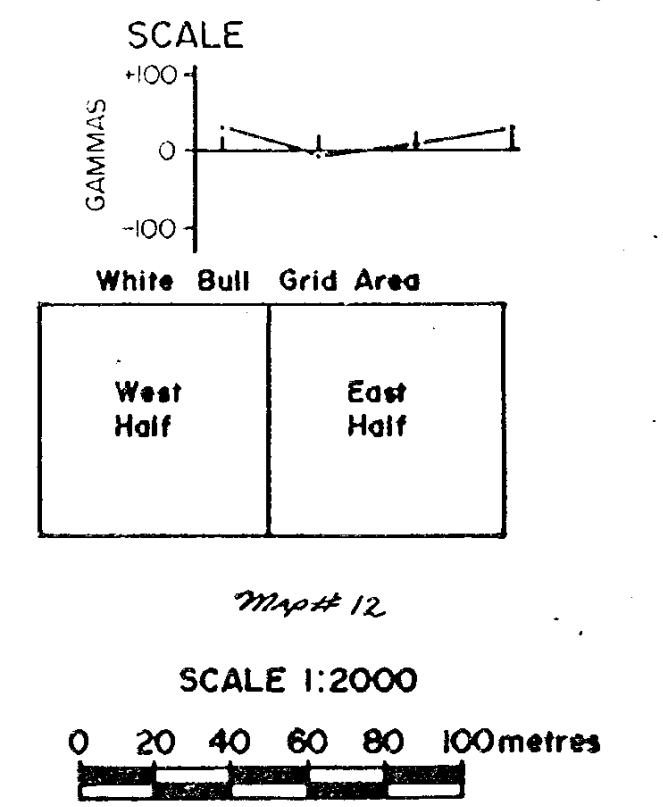


LEGEND

INSTRUMENT: GEOMETRICS MODEL G816
 PROTON PRECESSION
 MAGNETOMETER

ACCURACY: ±10 GAMMAS

ASSUMED MEAN GEOMAGNETIC FIELD
 STRENGTH IS... 58680 GAMMAS



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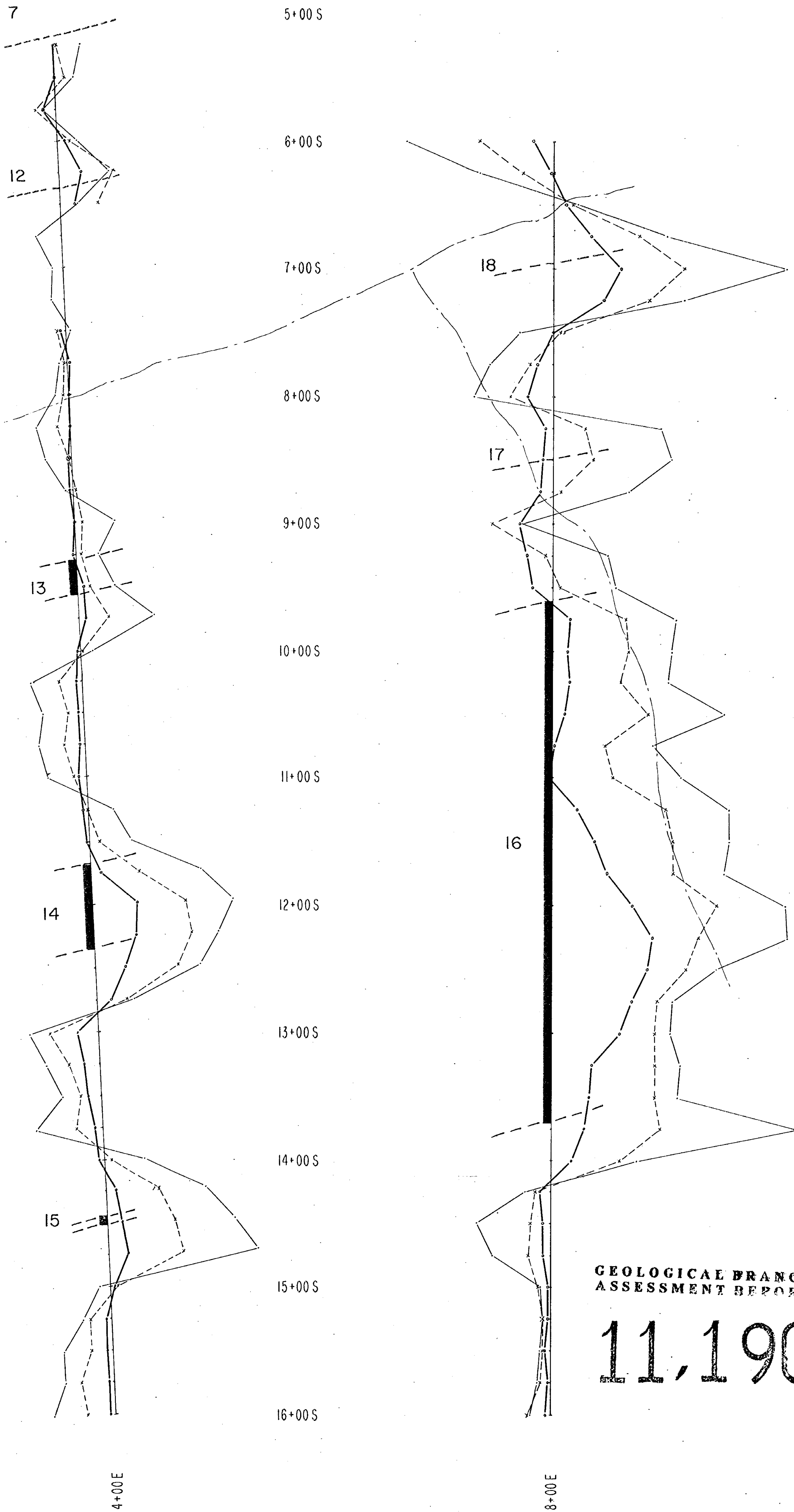
ESSO MINERALS CANADA

WHITE BULL PROJECT

EAST HALF

MAGNETOMETER SURVEY
 PROFILES

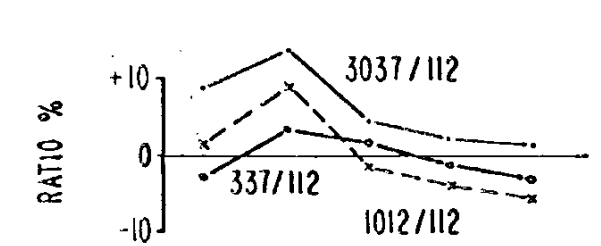
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Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94 M	Drawn By: K.Simpson



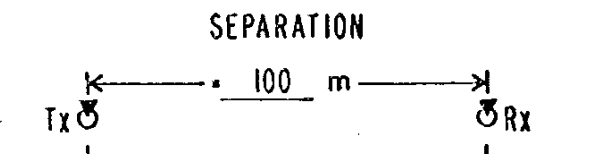
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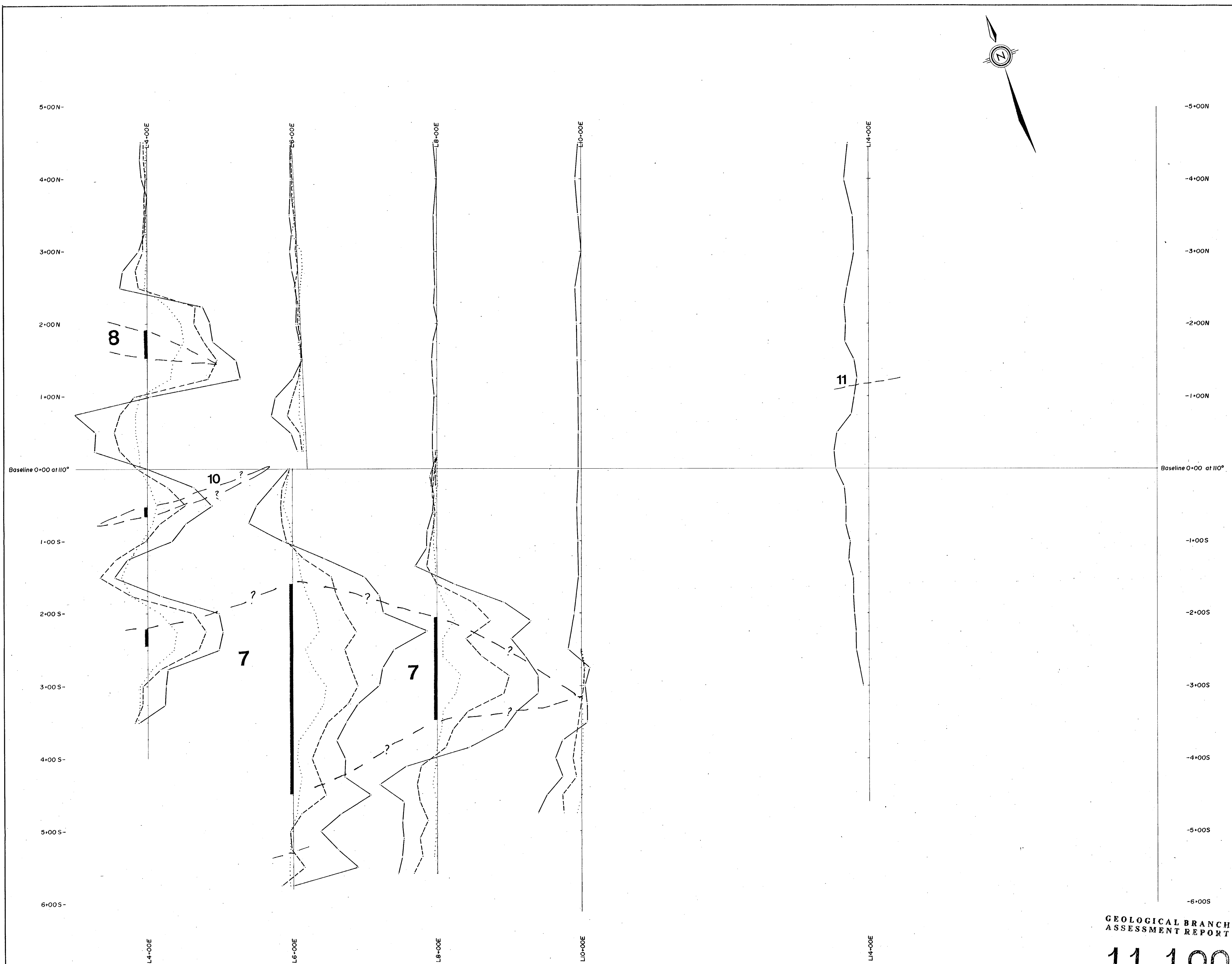


INSTRUMENT: SCINTREX SE-88 "GENIE" EM
RATIO
 • 3037 Hz / 112 Hz
 x 1012 Hz / 112 Hz
 o 337 Hz / 112 Hz

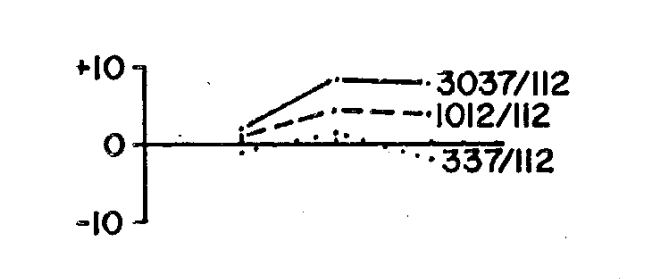


PLOTTING POINT
 ——— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY

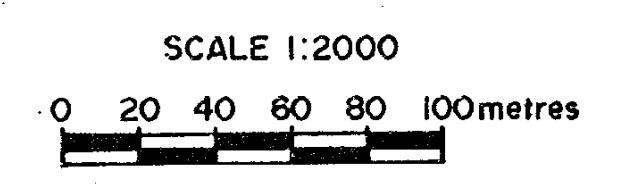
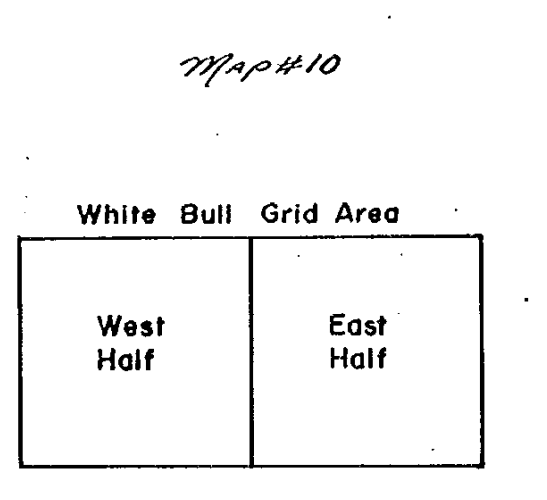
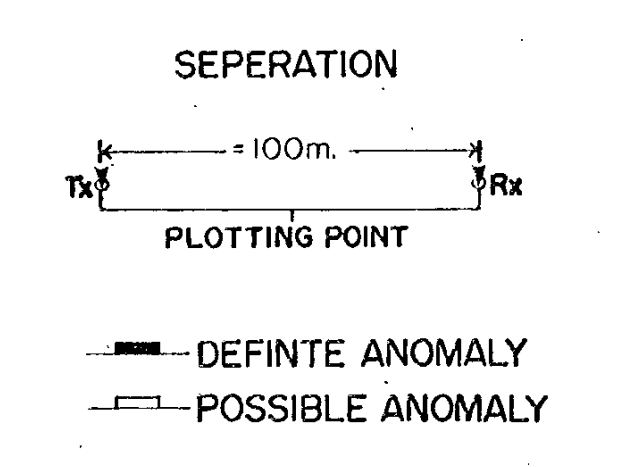
ESSO MINERALS CANADA DIVN. OF ESSO RESOURCES CANADA LIMITED		
PROSPECT: WHITE BULL		
HORIZONTAL LOOP EM SURVEY		
ACCOUNT N° MA 86	FILE N°	TORONTO
SCALE 1:2000	0 100M	DATE JAN. '83
AUTHOR G. COOPER	NTS 94M	DWG. N°



LEGEND



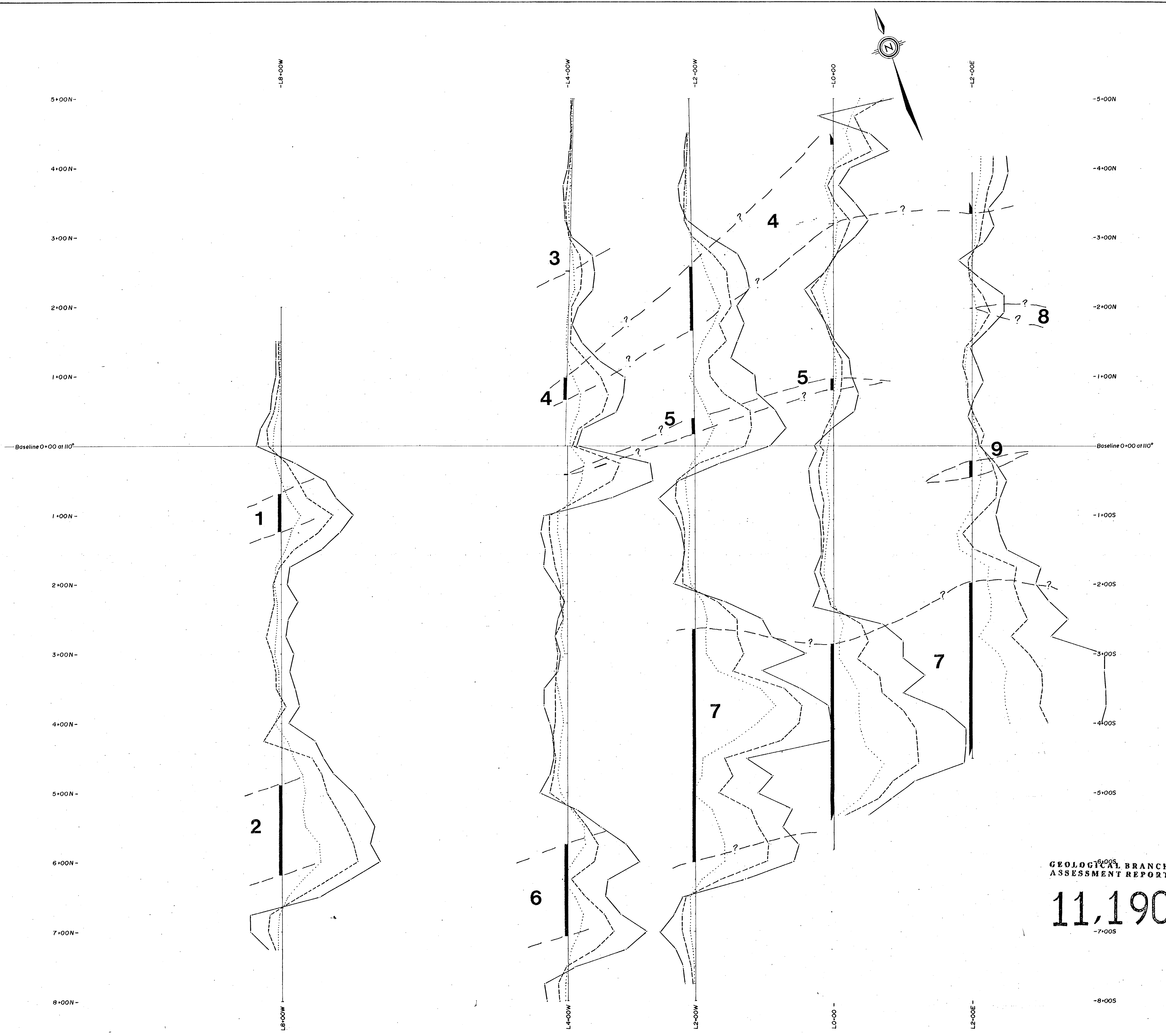
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 RATIOS: 3037Hz/112Hz
 1012Hz/112Hz
 337Hz/112Hz



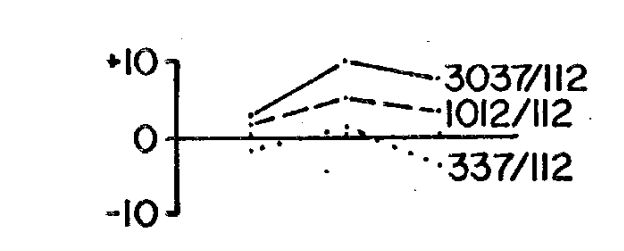
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11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
EAST HALF	
HORIZONTAL LOOP EM SURVEY	
Project No. 2186	Mining Division: LIARD
Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94M	Drawn By: K.SIMPSON

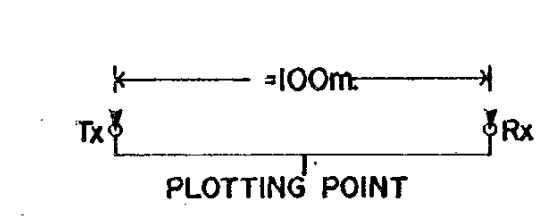


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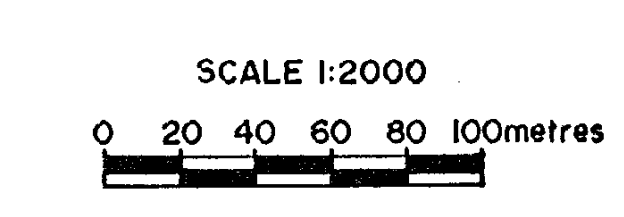
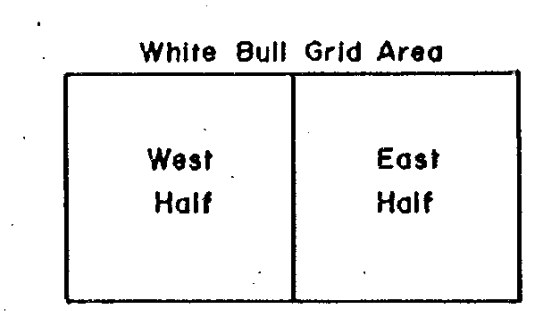


INSTRUMENT: SCINTREX SE-88 "GENIE" EM
 RATIOS: 3037Hz/112Hz
 1012Hz/112Hz
 337Hz/112Hz

SEPERATION



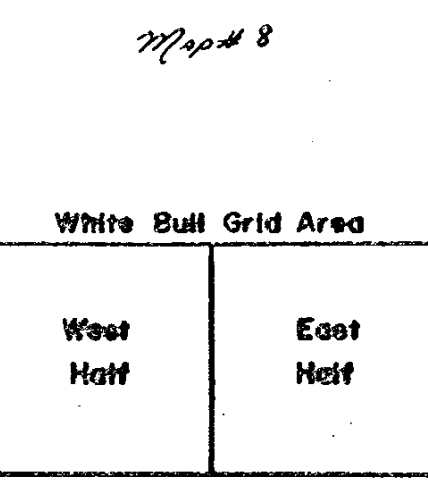
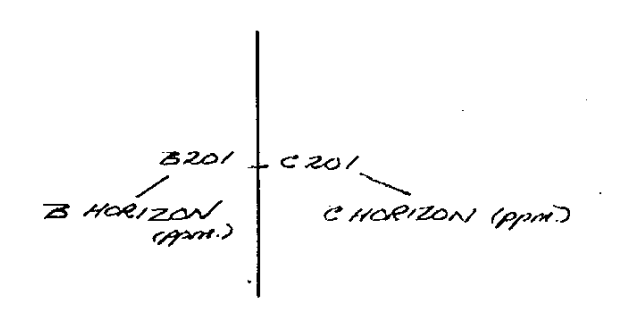
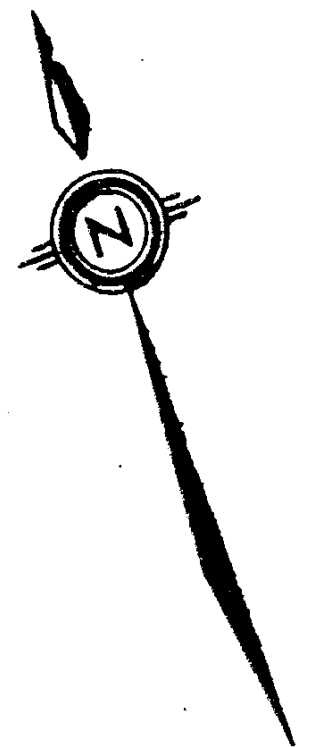
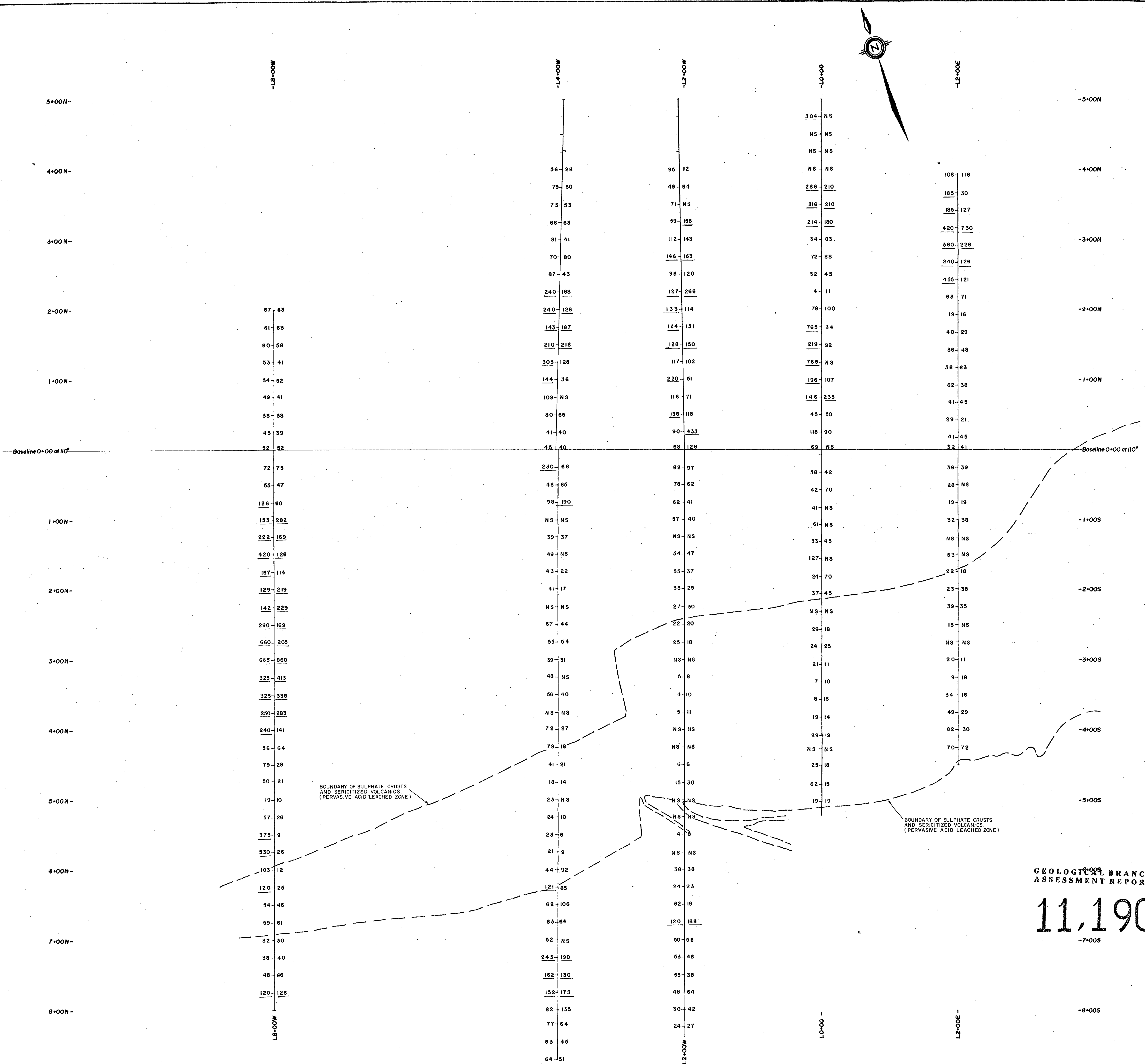
— DEFINITE ANOMALY
 - - - POSSIBLE ANOMALY



GEOLOGICAL BRANCH
 ASSESSMENT REPORT

11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
HORIZONTAL LOOP EM SURVEY	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm. = 20metres
NTS-94M	Drawn By: K. SIMPSON

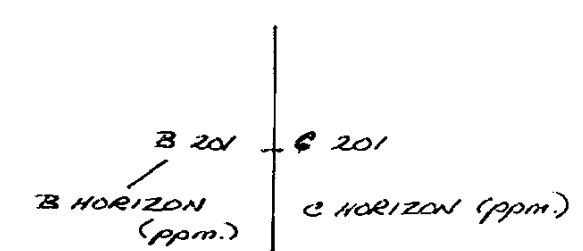
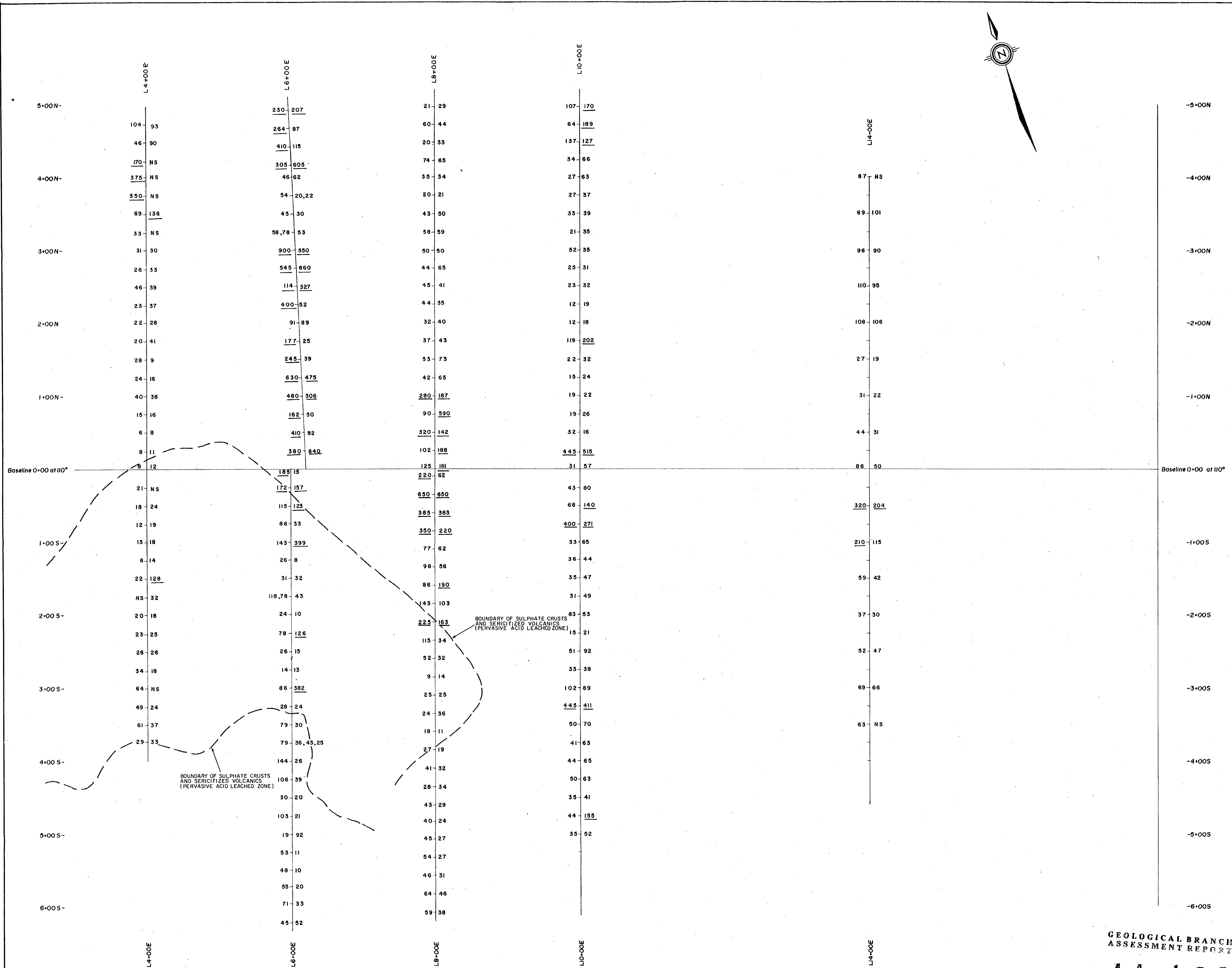
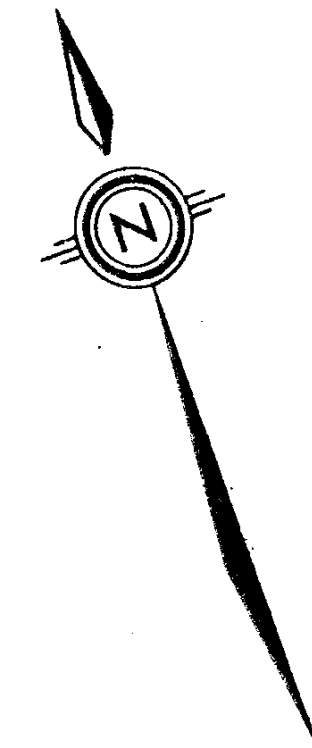


SCALE 1:2000
 0 20 40 60 80 100metres

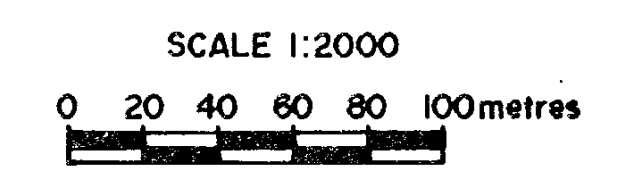
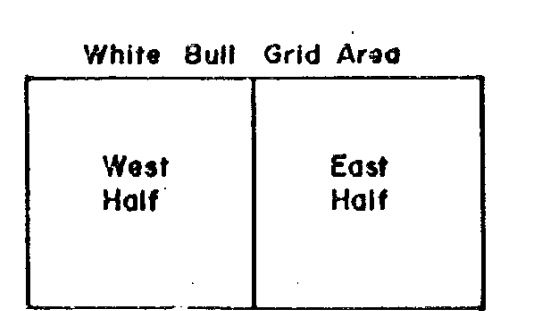
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11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
Zn SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm = 20metres
NTS: 34M	Drawn By: C.E.



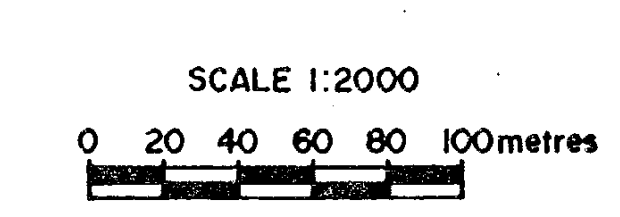
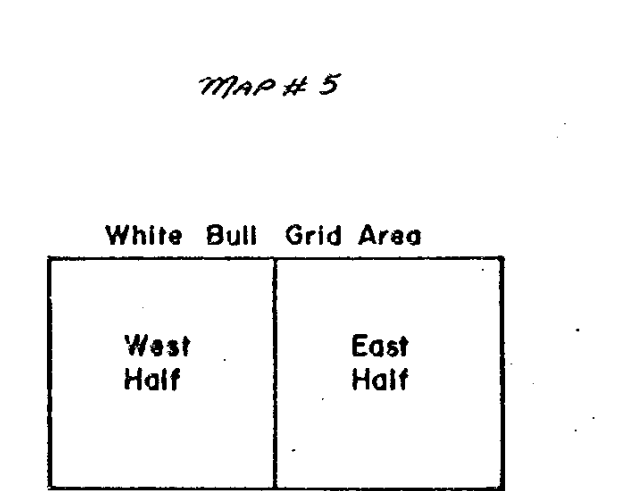
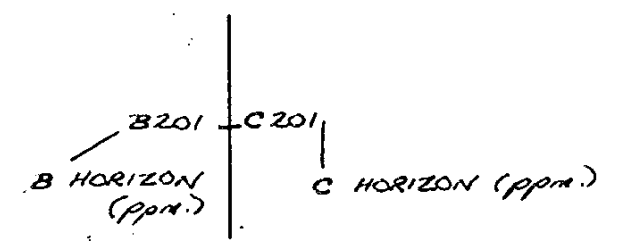
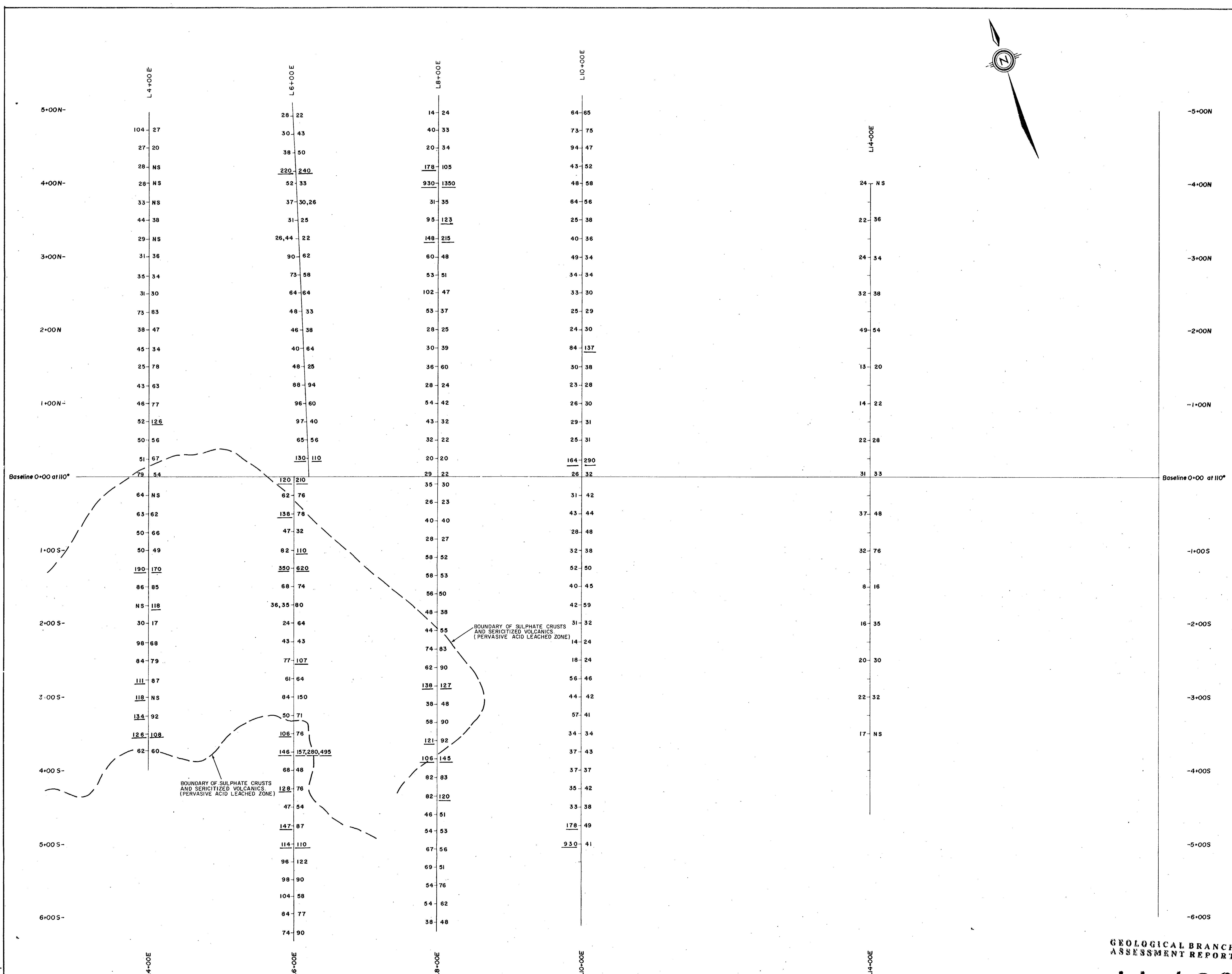
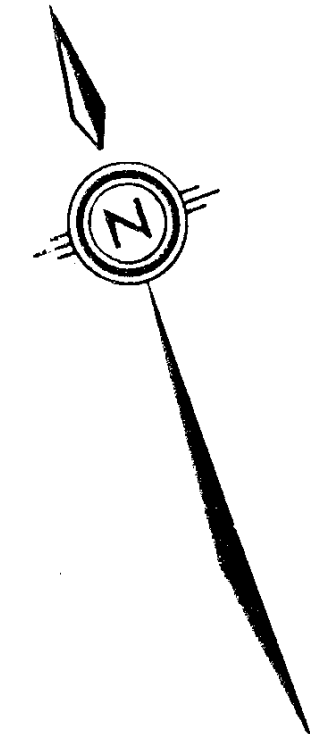
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ASSESSMENT REPORT

11,190

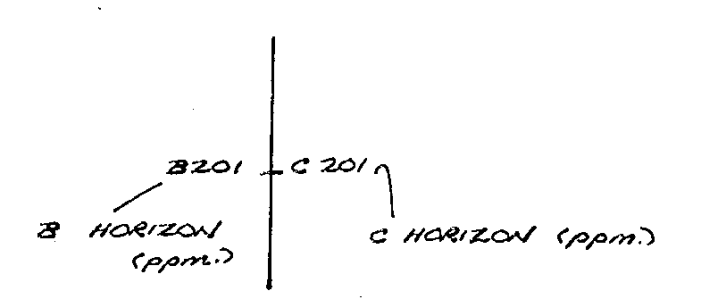
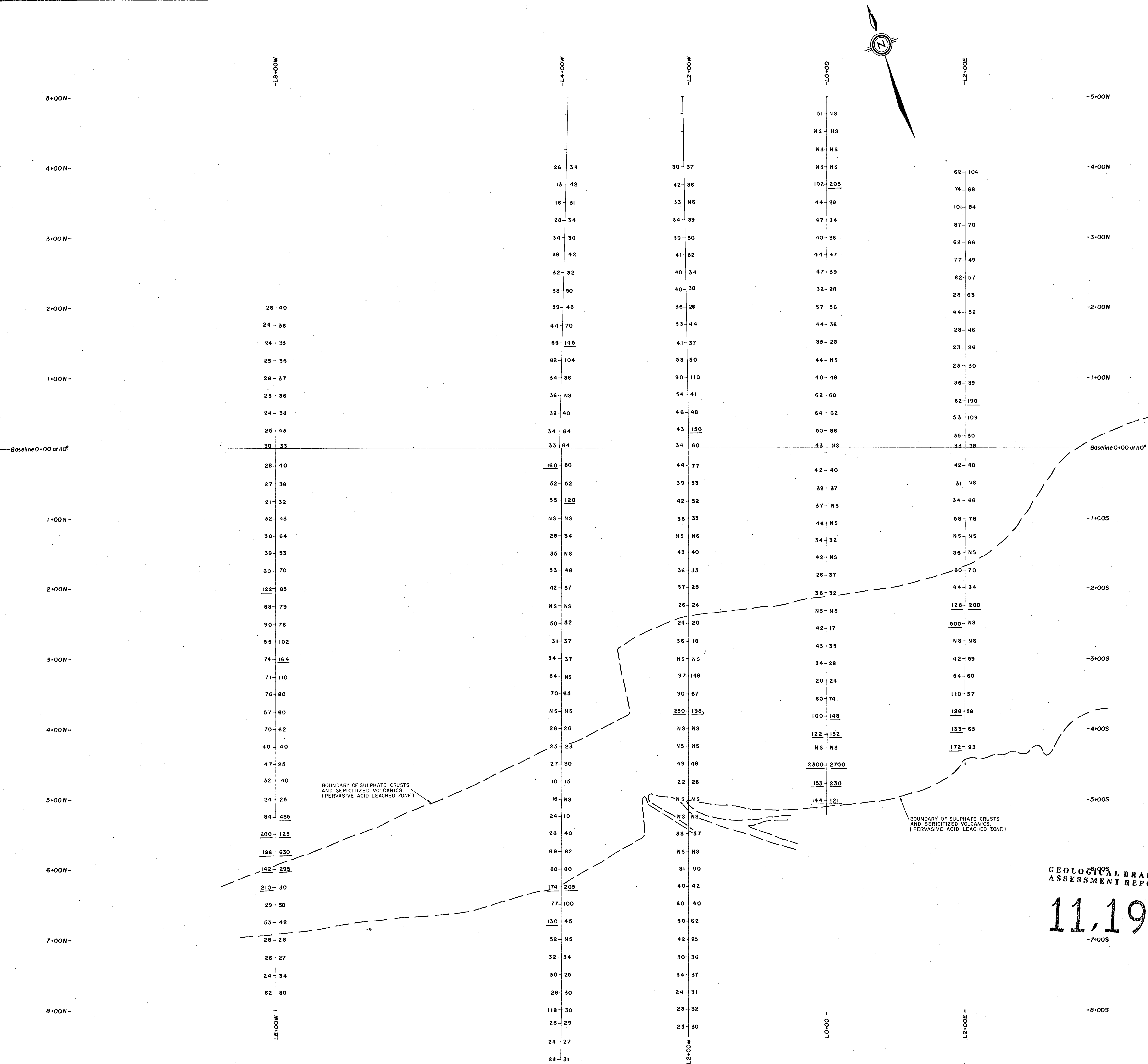
ESSO MINERALS CANADA	
WHITE BULL PROJECT	
EAST HALF	
Zn SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94 M	Drawn By: C.E.



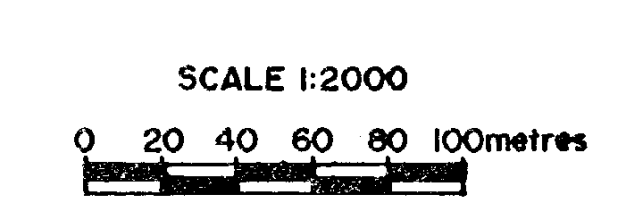
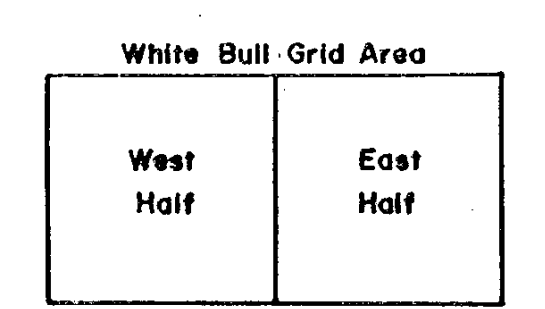
GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
EAST HALF	
Pb SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94M	Drawn By: C.E.



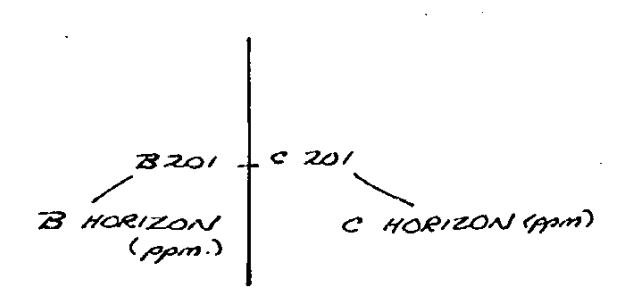
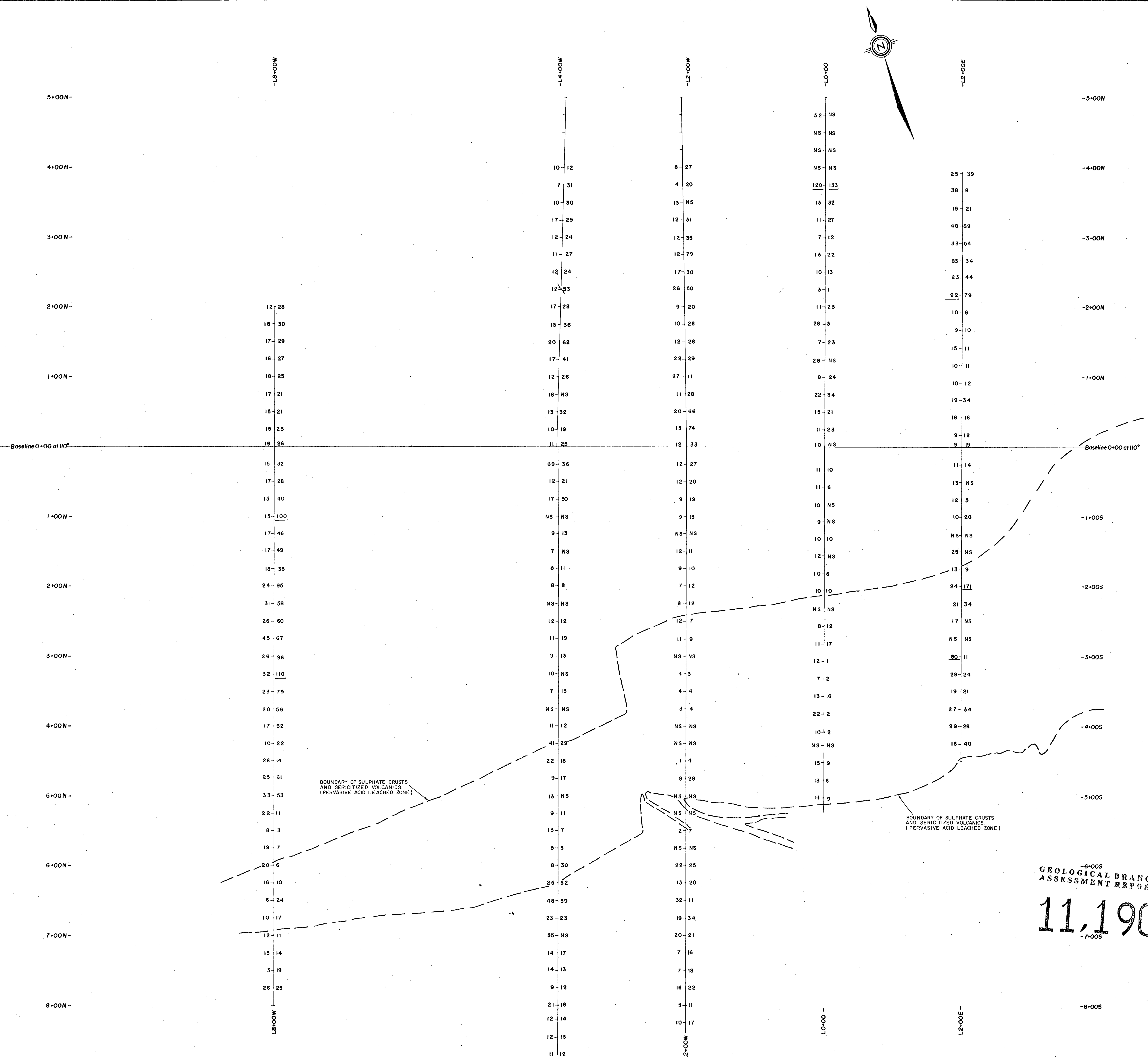
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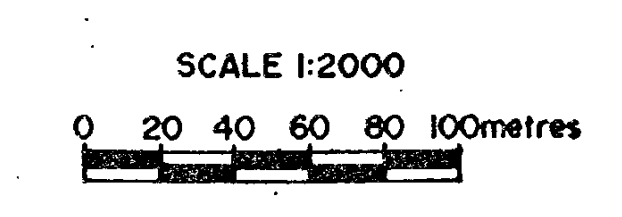
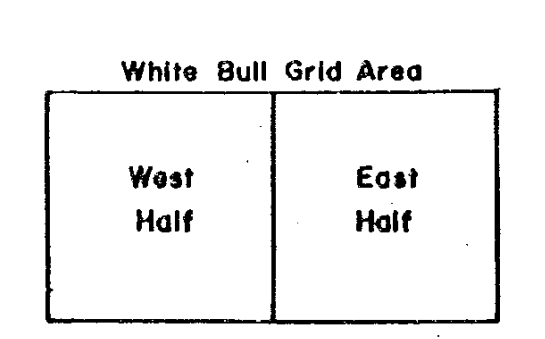
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ASSESSMENT REPORT

11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
Pb SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm. = 20metres
NTS: 94M	Drawn By: C.E.

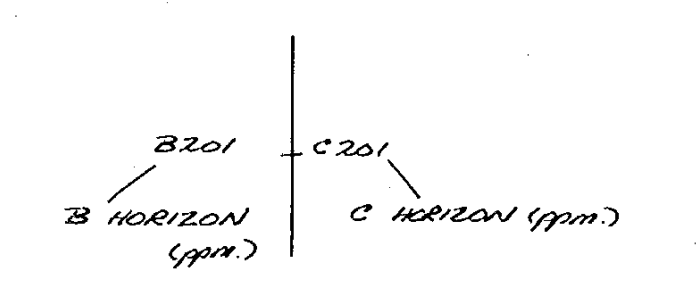
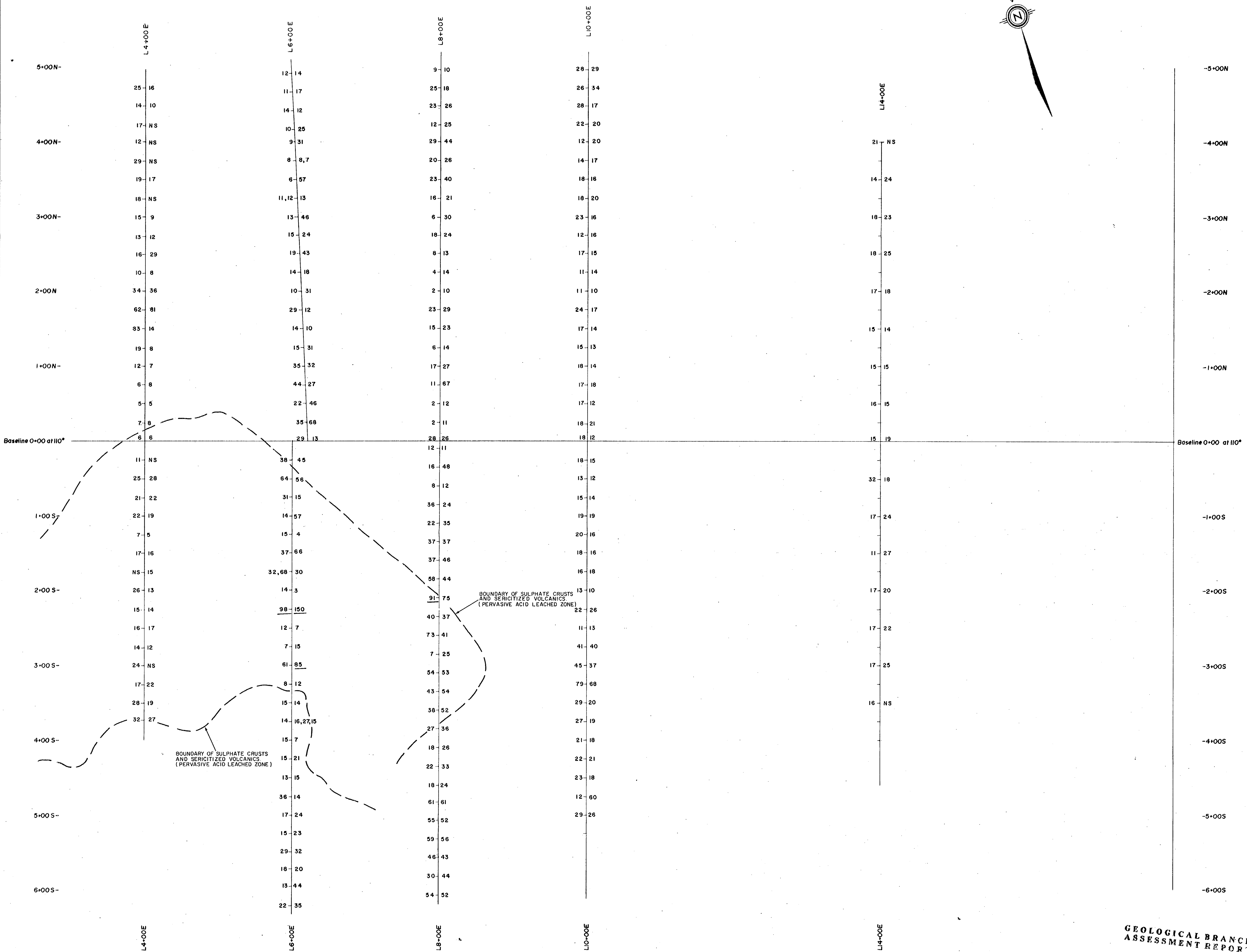
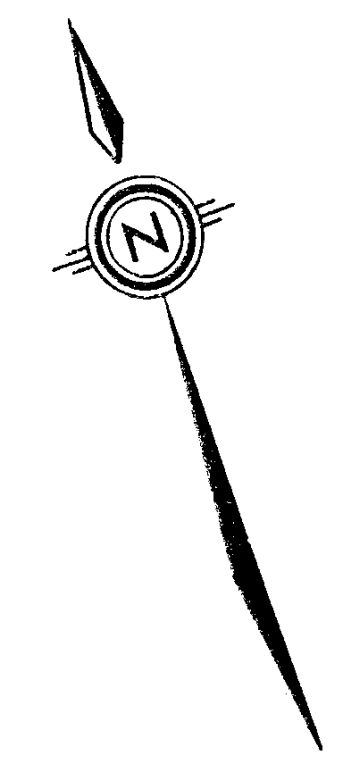


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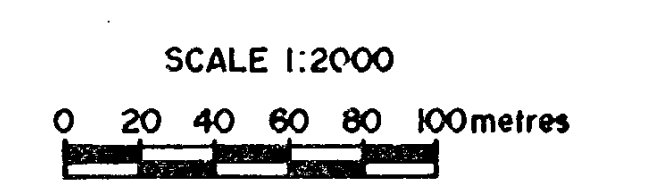
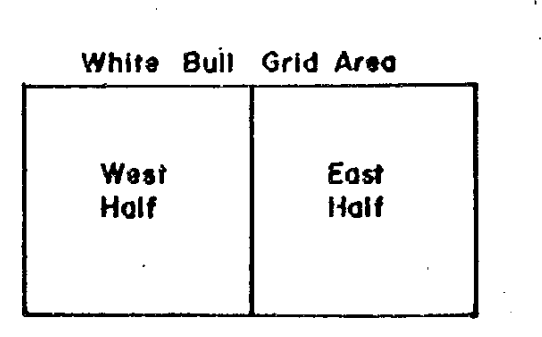


-6+00S
GEOLOGICAL BRANCH
ASSESSMENT REPORT
11,190
-7+00S

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
Cu SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm = 20metres
NTS: 94M	Drawn By: C.E.



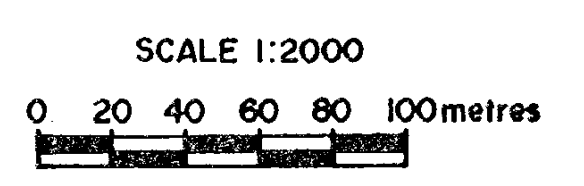
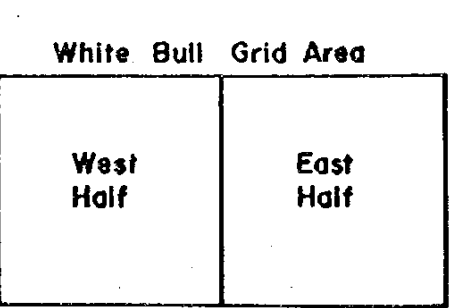
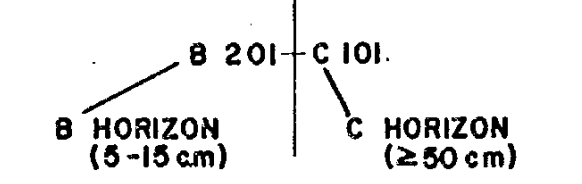
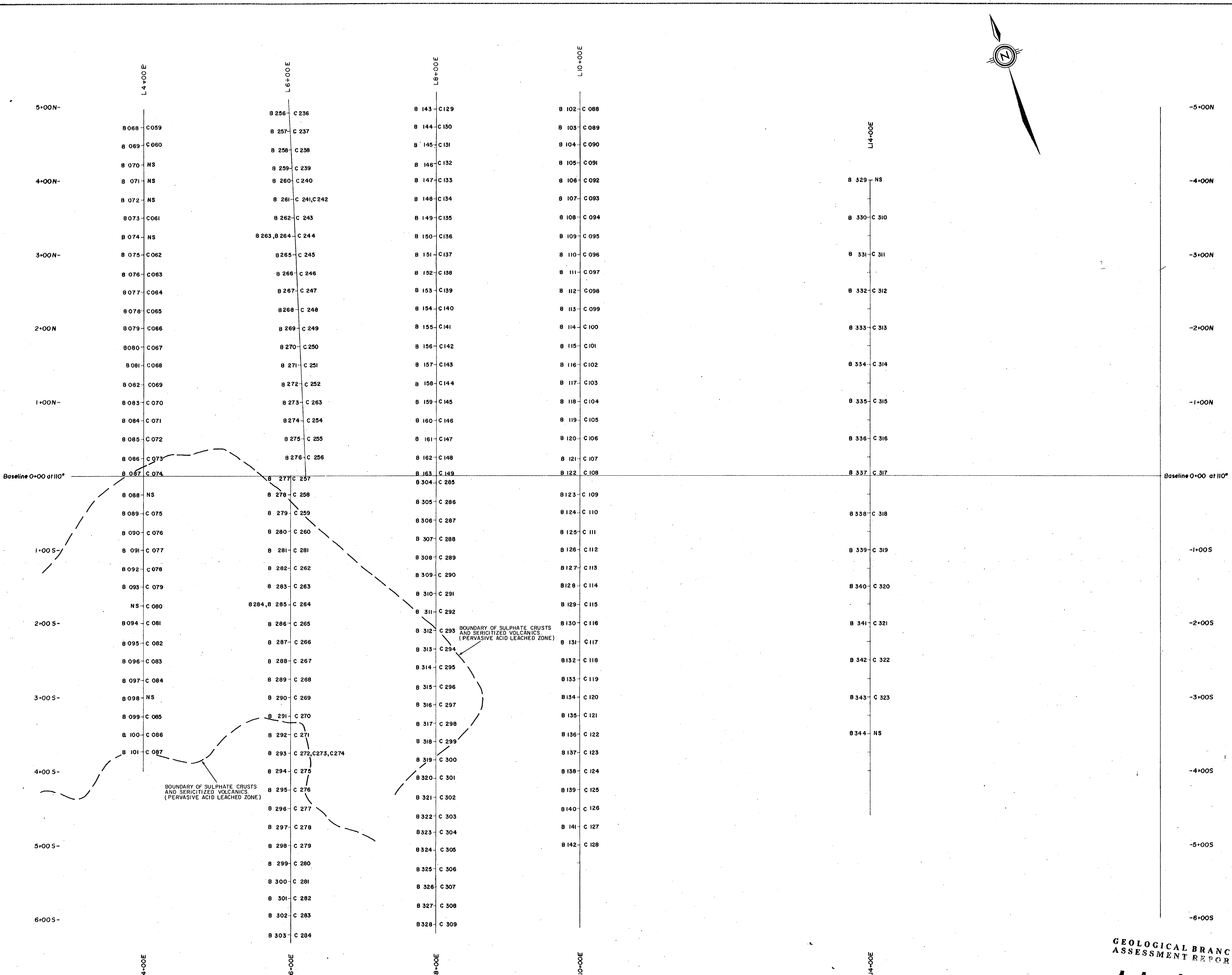
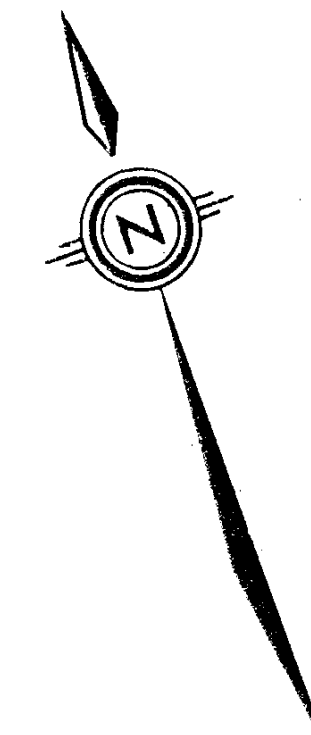
Map # 3



GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,190

ESSO MINERALS CANADA	
WHITE BULL PROJECT	
EAST HALF	
Cu SOIL GEOCHEMISTRY	
Project No. 2186	Mining Division: LIARD
Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94M	Drawn By: C.E.

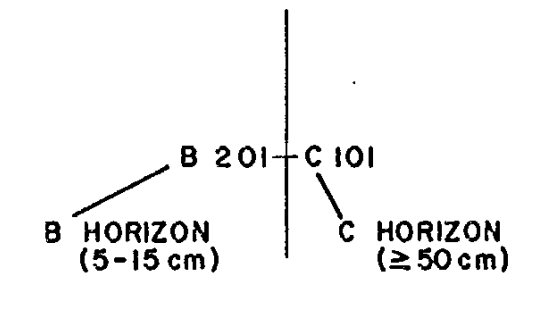
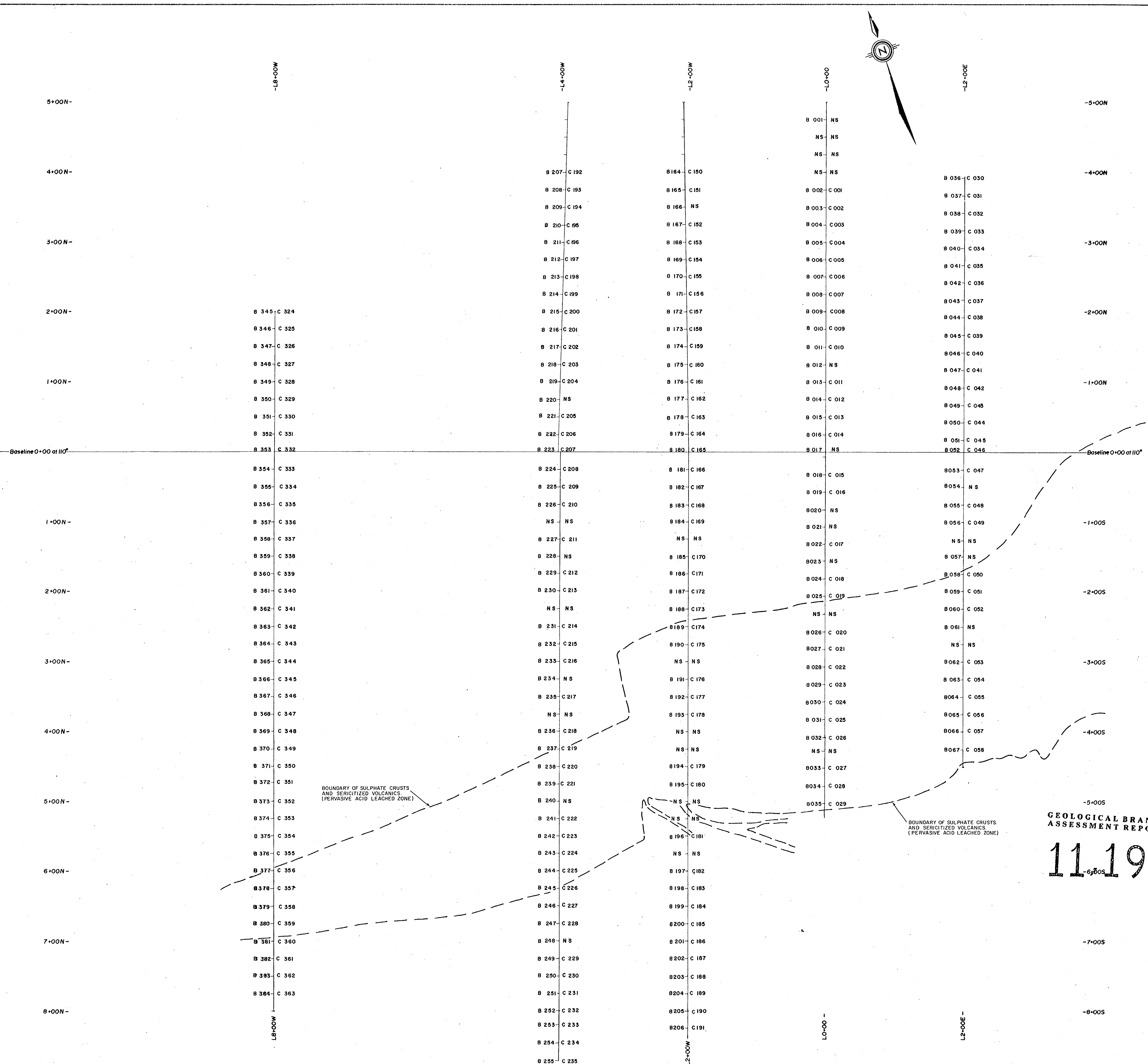


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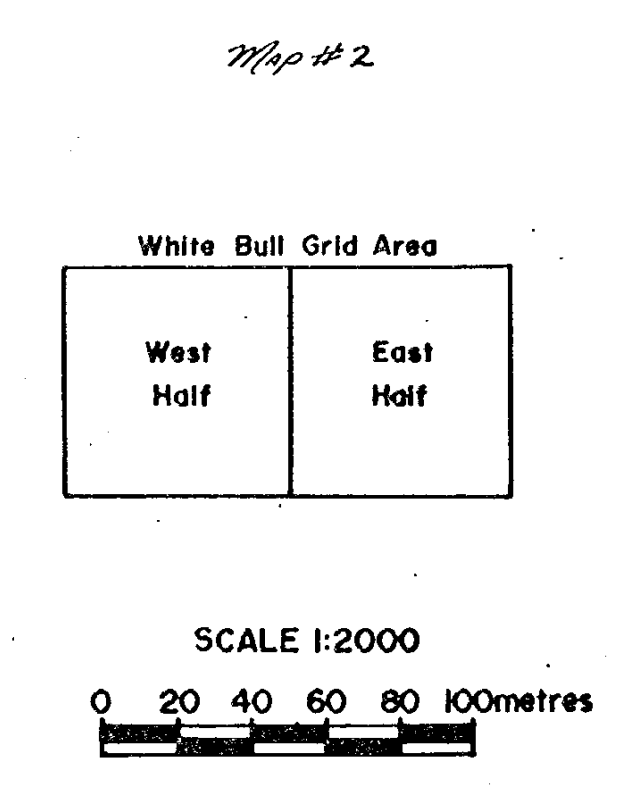
ESSO MINERALS CANADA
WHITE BULL PROJECT
EAST HALF
SOIL GEOCHEMISTRY
SAMPLE LOCATION MAP

Project No: 2186	Mining Division: LIARD
Date: DEC.1982	Scale: 1cm = 20metres
NTS: 94 M	Drawn By: C.E.



**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

11.190



ESSO MINERALS CANADA	
WHITE BULL PROJECT	
WEST HALF	
SOIL GEOCHEMISTRY SAMPLE LOCATION MAP	
Project No. 2186	Mining Division: LIARD
Date: DEC. 1982	Scale: 1cm = 20metres
NTS: 94M	Drawn By: C.E.