

# 4814

## 82F/10W

COMINCO LTD.

EXPLORATION

NTS: 82F/10W

WESTERN DISTRICT

19 DECEMBER 1973

GROUND GEOPHYSICAL SURVEYS

ON THE CRAW GROUP

SLOCAN M.D., B.C.

REPORT BY

JOHN G. HAYLES

WORK PERFORMED DURING THE PERIODS

JUNE 6 TO JUNE 12 AND NOVEMBER 1 TO NOVEMBER 12, 1973

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. **4814** MAP.....

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STATUTORY DECLARATION RELATING TO EXPENDITURES  
STATEMENT OF EXPENDITURES

COMINCO LTD.

EXPLORATION  
NTS: 82F/10W

WESTERN DISTRICT  
19 DECEMBER 1973

GROUND GEOPHYSICAL SURVEYS

ON THE CRAW GROUP

SLOCAN M.D., B.C.

SUMMARY:

About 22 miles of horizontal loop EM surveys, 6 miles of magnetometer surveys, and 1/4 mile of gravity on about 17 miles of cut line on the Craw Claim Group are reported on here.

The geophysics has found several conductors which follow roughly the local geologic formation but some conductors which occur on one line only have been found. These conductors may all be due to graphite which occurs in minor amounts in most of the local formations. The conductors show discontinuous weak magnetic association. Two short gravity traverses were done. One line is relatively flat while the other shows a 0.25 milligal high above the conductor.

INTRODUCTION:

The Craw Claim Group is located on the Crawford Peninsula which juts out on the the east side of Kootenay Lake about 25 miles east north east of Nelson, B.C.

In 1973 a detail ground geophysics survey was done to search the area for conductors which could be due to near surface massive sulphide deposits. In addition, magnetic surveys were run over much of the EM grid, and two short gravity traverses were run. This report describes the data acquired during that program.

GEOLOGY:

The Craw claims lie within the Kootenay Arc structural belt of south-eastern B.C. The rocks are early Cambrian carbonates and clastics which have been subjected to polyphase folding, granitic intrusion, and high grade metamorphism. Rock formations strike north-north-east and have shallow dips west. An extension of the Jurassic Age Bayonne intrusive outcrops at the west side of the claims. The rock formations are believed to be overturned and so from west to east rocks get younger. The Hamill Formation then overlies the Badshot Formation and the Lardeau group of sediments in this area. The Hamill Formation is an impure sandstone recrystallized to a gneiss. The Badshot Formation is a fairly pure recrystallized limestone about 200 feet thick in the area. The Lardeau Group consists of metamorphosed limestones, shales greywackes, and sandstones.

Graphitic horizons have been observed at numerous localities within this sequence of sediments.

GROUND GEOPHYSICAL SURVEYS

(a) Methods

The geophysics surveys were performed by B. Rumsey and J.M. Hamilton from June 6 to June 12 and by T.G. Kauppenin, J.M. Hamilton and J.G. Hayles from November 1, to November 12, 1973.

Horizontal loop electromagnetic surveys were done using two different instruments. A Geonics EM-17 system was used in June and in November an ABEM Demigun was used for the survey. The Geonics EM-17 operates at 1600 HZ and was used at 200 foot coil separations with minor spot checks using 100 foot coil separations. The ABEM Demigun operates at 880 HZ and at 2640 HZ but only the higher frequency was used on this survey, with 100 feet and 200 feet coil separations. The November EM surveys were done in between lines surveyed in June to give a more detailed location of conductive zones. No lines surveyed with the Geonics EM-17 at 200 foot coil separations were resurveyed with the ABEM Demigun at the same coil separation although the two instruments have slightly different responses due to different frequencies used. Station spacing was one half the coil separation over non conducting areas and one quarter coil separation over conductive areas. Usually the transmitter preceded the receiver along each line and care was taken to orient coils properly and maintain proper separation.

Lines were oriented at an oblique angle to local strike in order to intersect any conductive zones transverse to local bedding. Lines were cut by Martinson Linecutting and Staking. Stations along lines are 100 feet apart measured along slope and are marked by wooden pickets and labelled with a felt tipped marking pen.

A magnetometer was only briefly used in June over interesting areas and in November a detail magnetometer survey was done. The magnetometers used were a Sharpe MF-1 and two Scintrex MF-2 instruments.

These magnetometers measure the vertical magnetic field strength in gammas and were all tied into the same base station reading. These instruments have exactly the same reading scales and have a maximum sensitivity of 20 gammas per scale division, and a maximum readability of 5 gammas. Readings were paced in at 25 foot intervals between pickets along the lines. Instrument drift and diurnal effects were monitored using a standard survey looping procedure. Drift encountered was less than 300 gammas in 5 hours and was usually erratic. Readings along lines have slight errors relative to each other while whole lines may be out relative to each other but not more than  $\pm 200$  gammas.

In November two 600 foot gravity traverses were done at 50 foot station spacing. The gravity meter is a Wordeu Pioneer # 620 model 115 with instrument constant of 0.0896 milligals per scale division. Instrument heights were measured to the nearest 0.01 foot above a solid ground point marked by fluorescent plastic ribbon and labelled by felt tipped pen. Station elevations were measured by Kern automatic level which has a reading accuracy of  $\pm 0.01$  feet over 500 feet. Elevations were tied in or double checked, largest tie in error being + 0.08 feet. Gravity meter drift was monitored at established base stations and was less than 0.1 milligals over the longest survey leg of 40 minutes.

Gravity reductions were done assuming a Bouguer density of  $2.67 \text{ gm/cm}^3$  of rocks beneath the survey area and readings were reduced to a common datum approximately 100 feet below the survey line. Latitude corrections were not done on such short lines. Terrain corrections were not attempted due to lack of sufficiently precise topographic detail around the survey lines.

(b) Data Presentation

The following plates and profiles are included with this report.

<u>Plate No.</u>	<u>Description</u>	<u>Scale</u>
1	Location Map	1 : 50,000
2	Horizontal Loop EM-200' coil spacing	1" = 200'

<u>Plate No.</u>	<u>Description</u>	<u>Scale</u>
3.	Horizontal Loop EM - 200' coil spacing	1" = 200'
4.	Horizontal Loop EM - 100' coil spacing	1" = 200'
5.	Magnetometer Survey	1" = 200'

<u>Profile No.</u>	<u>Description</u>	<u>Scale</u>
1.	Composite Gravity, EM & Mag. Line 156S	1" = 200'
2.	Composite Gravity, EM & Mag. Line 136S	1" = 200'

(c) Results

(i) Horizontal Loop EM - Plates 2, 3, & 4

Several bands of anomalous conductivity which closely follow local geology were found in the southern section of the area. Much of the area shown on Plate 3 does not give any interesting EM responses and so more detailed surveys were done to the south shown on Plates 2 & 4. Conductor positions are in agreement for 100 foot and 200 foot surveys but of course conductor widths and strengths appear differently to different coil separations. On line 96N a large interpreted conductor width found on 200 foot coil spacings appears as two narrow closely spaced conductors with 100 foot coil spacing. This occurs on line 132S as well. Interpreted conductors found on 200 foot coils often appear weakly on 100 foot coil spacings or not at all.

Some conductors appear to extend from line to line closely following the geology while other conductors appear to be quite short and erratic. Graphite is suspected to cause most of these conductive anomalies as it is visible in most of these formations.

(ii) Magnetometer Survey - Plate 5

The vertical magnetic field strength is fairly flat over the whole survey area with only a dozen or so sporadic highs or lows which do not show any great formational preference.

(iii) Gravity Surveys - Profiles 1 & 2

The two short gravity traverses on lines 156S and 136S are shown on Profiles 1 and 2 along with the EM and magnetometer responses for the line.

Bouguer gravity on line 156 has an average slope of + 0.08 milligals per 100 feet northeast of station 4 east, and is relatively undefinitive. Terrain corrections are probably necessary near station 6E due to the steep local topography.

Line 136S shows a fairly broad 0.25 milligal gravity high centered right above an EM conductor with a fairly choppy magnetic response. If end points of the traverse are joined as regional than the slope so determined is about 0.1 milligas per 100 feet northeast, very similar to the average slope on Line 156S.

CONCLUSIONS:

1. Electromagnetic surveys on the Crow Group have located numerous conductors over a portion of the claim group, underlain by a sedimentary sequence known to contain graphite horizons.

2. Magnetic coverage of the portion of the claim group where conductors occur has located some responses. Some of these correlate with conductive zones while others do not.
3. Two short gravity traverses where run. A weak anomaly of about 0.25 milligals was located over a conductor on one line.

Submitted by: J.G. Hayles  
J.G. Hayles, Geophysicist,  
Western District

Endorsed by: J.M. Hamilton  
J.M. Hamilton, P.Eng.  
Supervising Geophysicist

Endorsed for  
Release by: W.T. Irvine  
W.T. Irvine, P.Eng.  
Manager, Exploration  
Western District

JGH/pm  
19 December 1973

Distribution:  
Administration, Van. (1)  
Mining Recorder, Van.(2)  
Western District (1)  
Geophysics File, Van.(1)

.....

DOMINION OF CANADA:  
PROVINCE OF BRITISH COLUMBIA.  
To Wit:

**In the Matter of**

STATUTORY DECLARATION RELATING  
TO EXPENDITURES ON A GEOPHYSICAL  
SURVEY AND LINE CUTTING ON CER-  
TAIN MINERAL CLAIMS LOCATED IN  
THE SLOCAN MINING DIVISION.

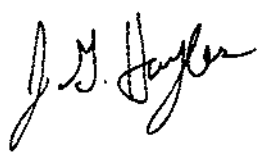
I, JOHN G. HAYLES  
of CITY OF VANCOUVER

in the Province of British Columbia, do solemnly declare that

1. I DID PERSONALLY PREPARE THE ACCOMPANYING REPORT AND DID SUPERVISE THE GEOPHYSICAL SURVEYS CARRIED OUT ON THE CRAW GROUP MINERAL CLAIMS SITUATED IN THE SLOCAN MINING DIVISION, BRITISH COLUMBIA.
2. TWO COPIES OF THE SAID REPORT ARE BEING FILED WITH THE MINING RECORDER.
3. ATTACHED HERETO AND MARKED WITH THE LETTER "A" UPON WHICH I HAVE SIGNED MY NAME AT THE TIME OF DECLARING HEREOF, IS A STATEMENT OF EXPENDITURES INCURRED IN CONNECTION WITH THE GEOPHYSICAL SURVEY AND LINECUTTING ON THE SAID CLAIMS.

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the CITY  
of VANCOUVER, in the  
Province of British Columbia, this 25  
day of DECEMBER 1973, A.D.



*A Commissioner for taking Affidavits within British Columbia or  
A Notary Public in and for the Province of British Columbia*

**In the Matter of**

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.....

.....

.....

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**Statutory Declaration**  
(CANADA EVIDENCE ACT)

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COMINCO LTD.

EXPLORATION

WESTERN DISTRICT  
19 DECEMBER 1973

EXHIBIT A

STATEMENT OF EXPENDITURES

CRAW CLAIM GROUP

SLOCAN MINING DIVISION

LINECUTTING

Performed by Martinson Linecutting and Staking Ltd. \$ 2,739.00  
18.26 miles at \$150

GEOPHYSICS

Salaries: - B. Rumsey, Exploration Assistant  
June 4 to June 13 inclusive 10 days @ \$30 \$300.00  
- J.M. Hamilton, Supervising Geophysicist  
June 5 to June 12 inclusive  
8½ days @ \$75 \$637.50  
- T.G. Kauppinen, Technician,  
November 1 to November 13 inclusive  
13 days @ \$50 \$650.00  
- J.G. Hayles, Geophysicist,  
November 1 to November 13 inclusive  
13 days @ \$75 \$975.00

SUPERVISION, REPORT PREPARATION

14 operating days @ \$75 \$1,050.00 \$ 3,612.50

INSTRUMENT RENTAL

Geonics EM-17 9 days @ \$10 \$ 90.00  
ABEM Demigun 14 days @ \$10 \$140.00  
Sharpe MF-1 Magnetometer 8 days @ \$ 5.00 \$ 40.00  
2 Scintrex MF-2 Magnetometer 7 days @ \$20.00 \$140.00  
Worden Pioneer gravity meter 10 days @ \$20 \$200.00 \$ 610.00

ROOM AND BOARD COSTS,

44 days x \$10 \$ 440.00

TRANSPORTATION

Air fares, truck rental - \$ 350.00

\$ 7,751.50

TOTAL COST \$7,751.50

THIS IS EXHIBIT "A" TO THE STATUTORY DECLARATION OF JOHN G. HAYLES DECLARED  
BEFORE ME THIS 25 DAY OF DECEMBER 1973.

*John G. Hayles*  
A NOTARY PUBLIC IN AND FOR THE PROVINCE  
OF BRITISH COLUMBIA.

*A Commissioner for taking  
depositions in British Columbia.*

COMINCO LTD.


EXPLORATION

WESTERN DISTRICT

STATEMENT OF QUALIFICATIONS

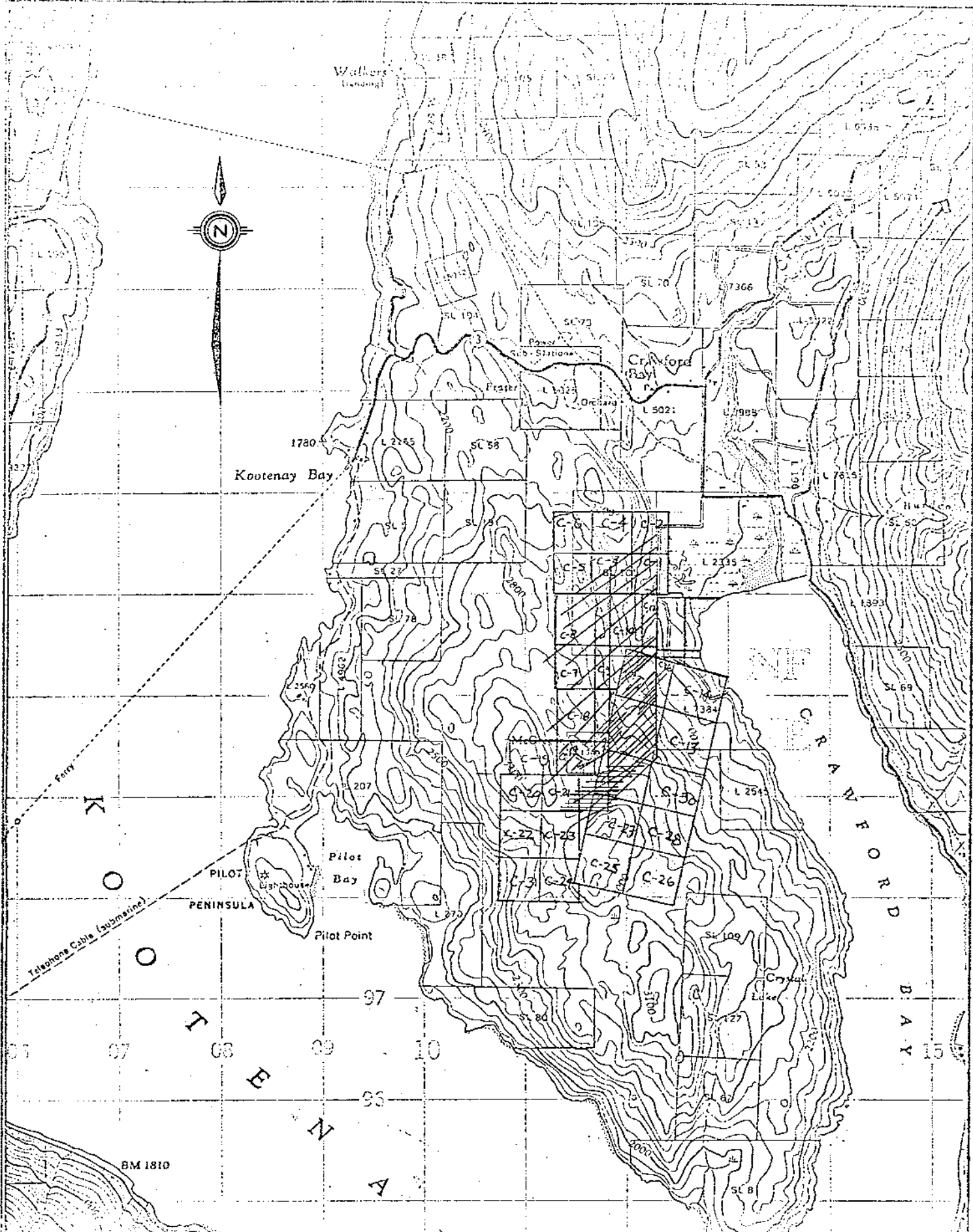
Mr. Hayles received his B.Sc. in engineering geology, geophysics option, from Queen's University in Kingston Ontario in 1970, and an M.A.Sc. from U.B.C. in geophysics in 1973. He has worked for Cominco on geophysical surveys for one and a half years and is a competent geophysicist.

Signed by:



J. M. Hamilton, P.Eng.  
Supervising Geophysicist  
Cominco Ltd.

20 DECEMBER 1973



Department of  
**Mines and Petroleum Resources**  
**ASSESSMENT REPORT**  
**NO. 4814 MAP #1**

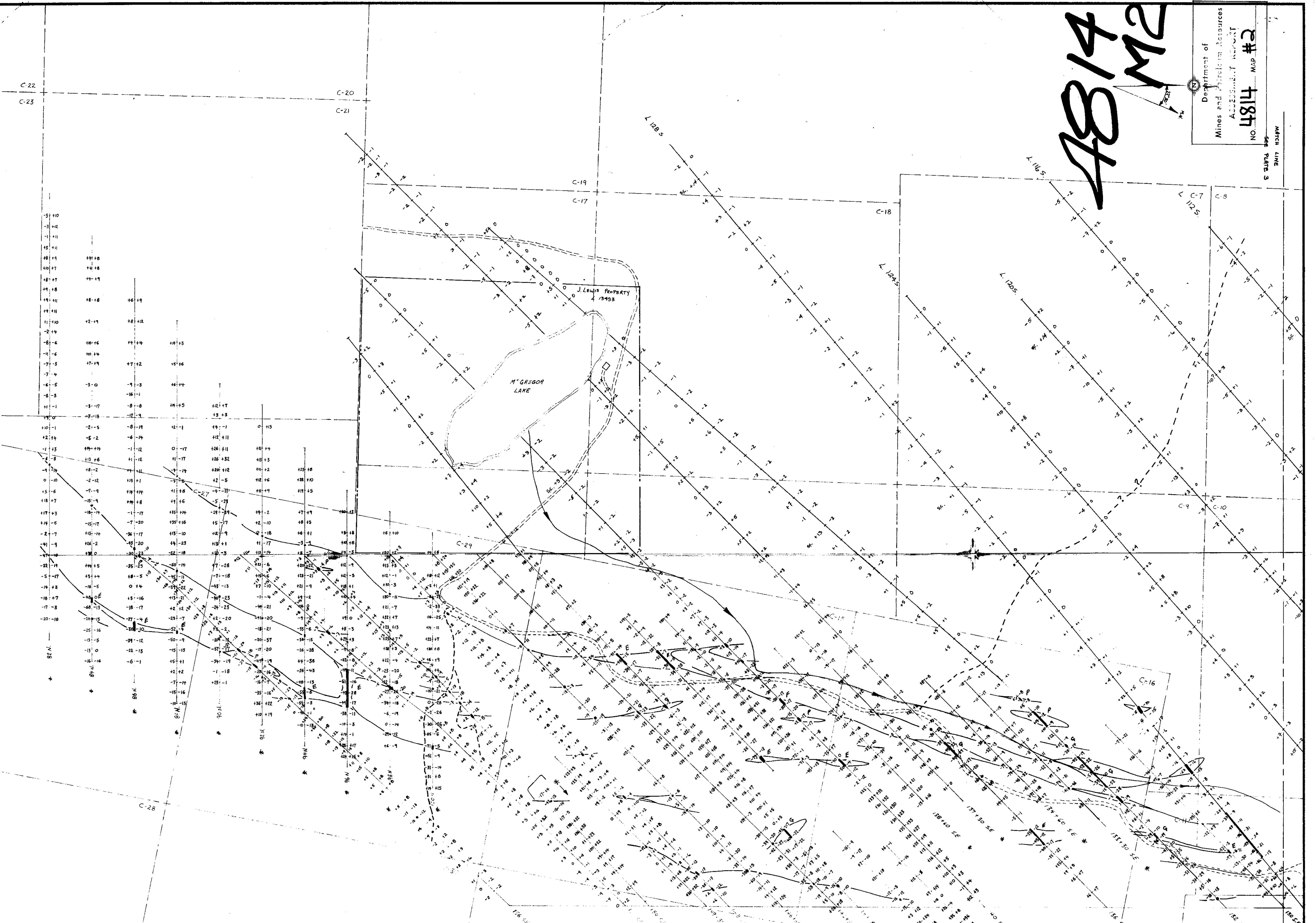
*J. J. Hingle*

**LOCATION MAP**  
**CRAW GROUP MINERAL CLAIMS &**  
**GEOPHYSICAL GRID, SLOCAN M.D., B.C.**

Drawn by:		Traced by:	
Revised by	Date	Revised by	Date

Scale: 1: 50,000      Date: DEC. 1973      Plate: 1

4814  
M2

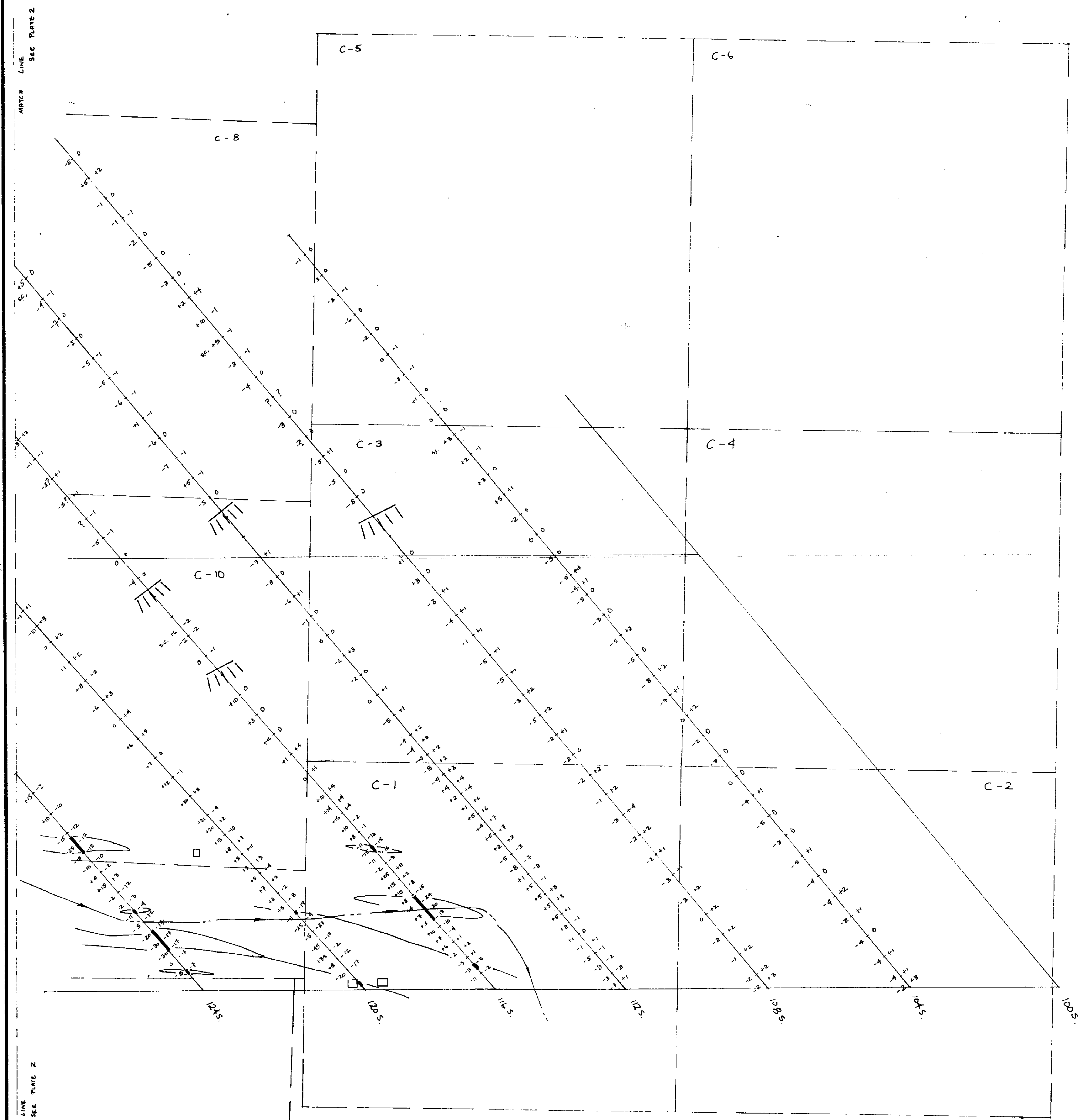
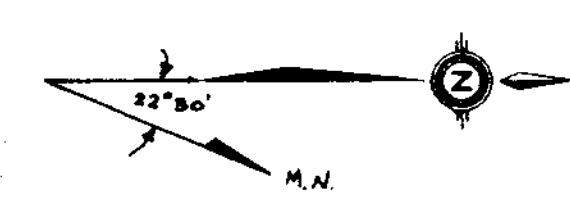


**LEGEND & NOTES**

- INSTRUMENT: ABEM DEMIGUN #, GEONICS E.M. 17  
 FREQUENCY: 2640, 1600 cps respectively  
 COIL SPACING: 200 feet  
 IN PHASE READINGS ON THE LEFT  
 OUT OF PHASE READINGS ON THE RIGHT  
 IMPROPER COIL SPACING s.c.  
 CONDUCTORS:  
 NO INDICATED WIDTH  
 WIDTH INDICATED  
 LOCATION UNCERTAIN  
 POSSIBLE CONDUCTOR  
 CONDUCTIVITY:  
 EXCELLENT  
 GOOD  
 FAIR  
 POOR  
 INDICATED CONDUCTOR DEPTH IN FEET  
 MARSHY AREA: LARGE, SMALL  
 GLAM POSTS: LOCATED, INFERRED  
 TRAIL  
 LAKE

CRAW GROUP		
Drawn by	Trace file	
HORIZONTAL LOOP ELECTROMAGNETIC SURVEY 200 foot coil separation CRAWFORD BAY AREA, SLOCAN M.D., B.C. 1:200 DEC. 73 2		

*J. D. Hughes*



**LEGEND & NOTES**

INSTRUMENT: Geonics EM-17  
 FREQUENCY: 1000 CPS  
 COIL SPACING: 200 feet  
 IN PHASE READINGS ON THE LEFT  
 OUT OF PHASE READINGS ON THE RIGHT

CONDUCTORS:  
 NO INDICATED WIDTH  
 WIDTH INDICATED  
 LOCATION UNCERTAIN  
 POSSIBLE CONDUCTOR

CONDUCTIVITY:  
 EXCELLENT  
 GOOD  
 FAIR  
 POOR

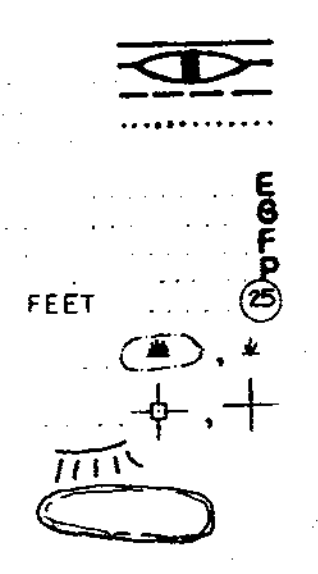
INDICATED CONDUCTOR DEPTH IN FEET

MARSHY AREA: LARGE, SMALL

CLAM POSTS: LOCATED, INFERRED

CLIFF

LAKE



4814  
M3

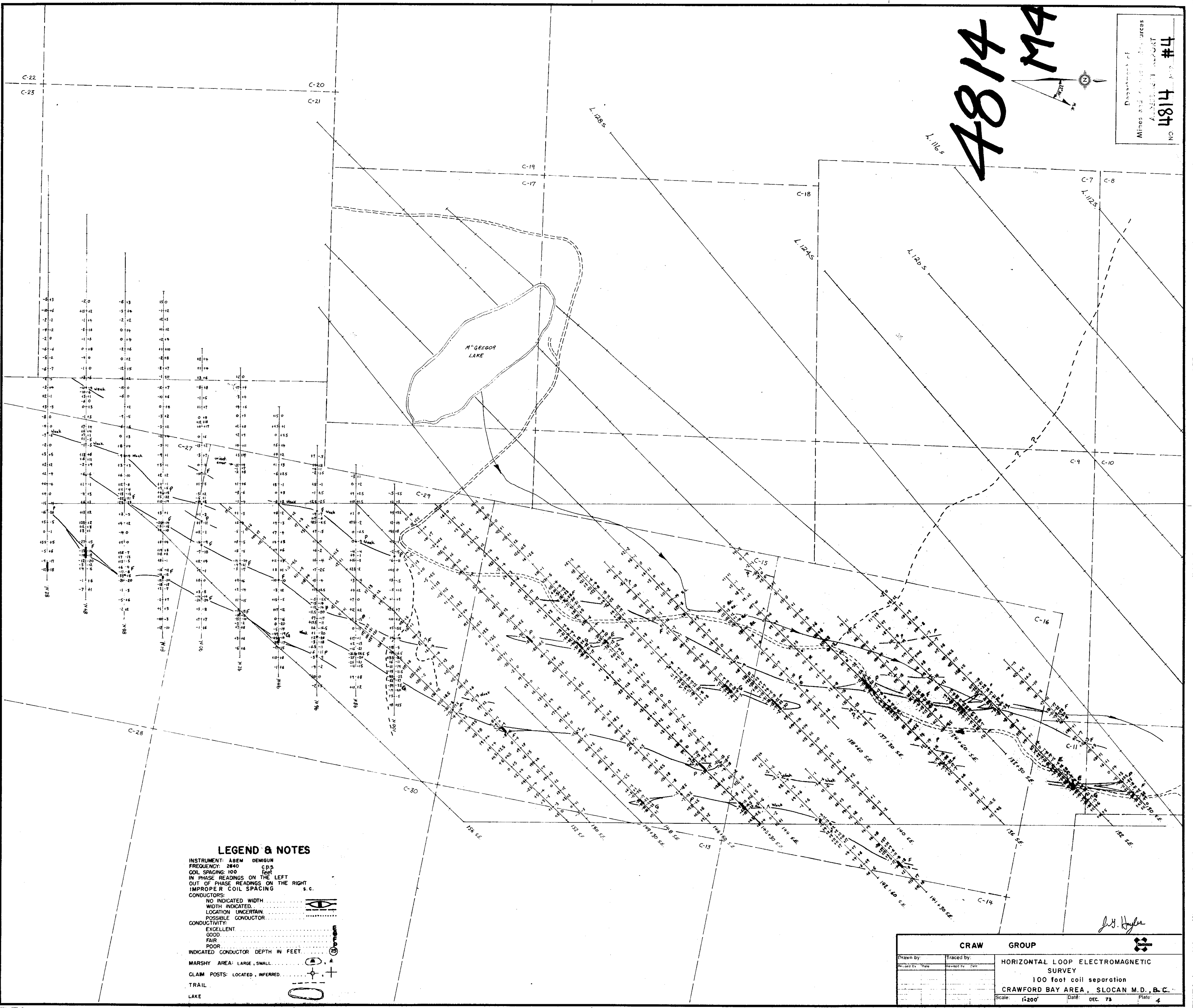
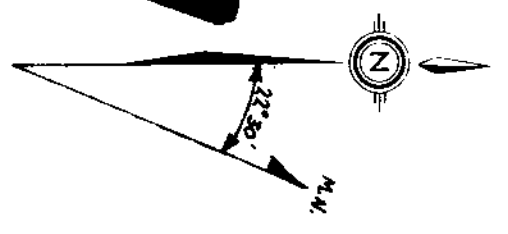
*J. S. Hughes*

**CRAW GROUP**

Drawn by:	Traced by:	HORIZONTAL LOOP ELECTROMAGNETIC SURVEY
Number by:	Date:	
200 foot coil separation		CRAWFORD BAY AREA, SLOCAN M.D., B.C.
Scale: 1" = 200'	Date: DEC. 1973	
		Plate: 3



4814  
MA



**LEGEND & NOTES**

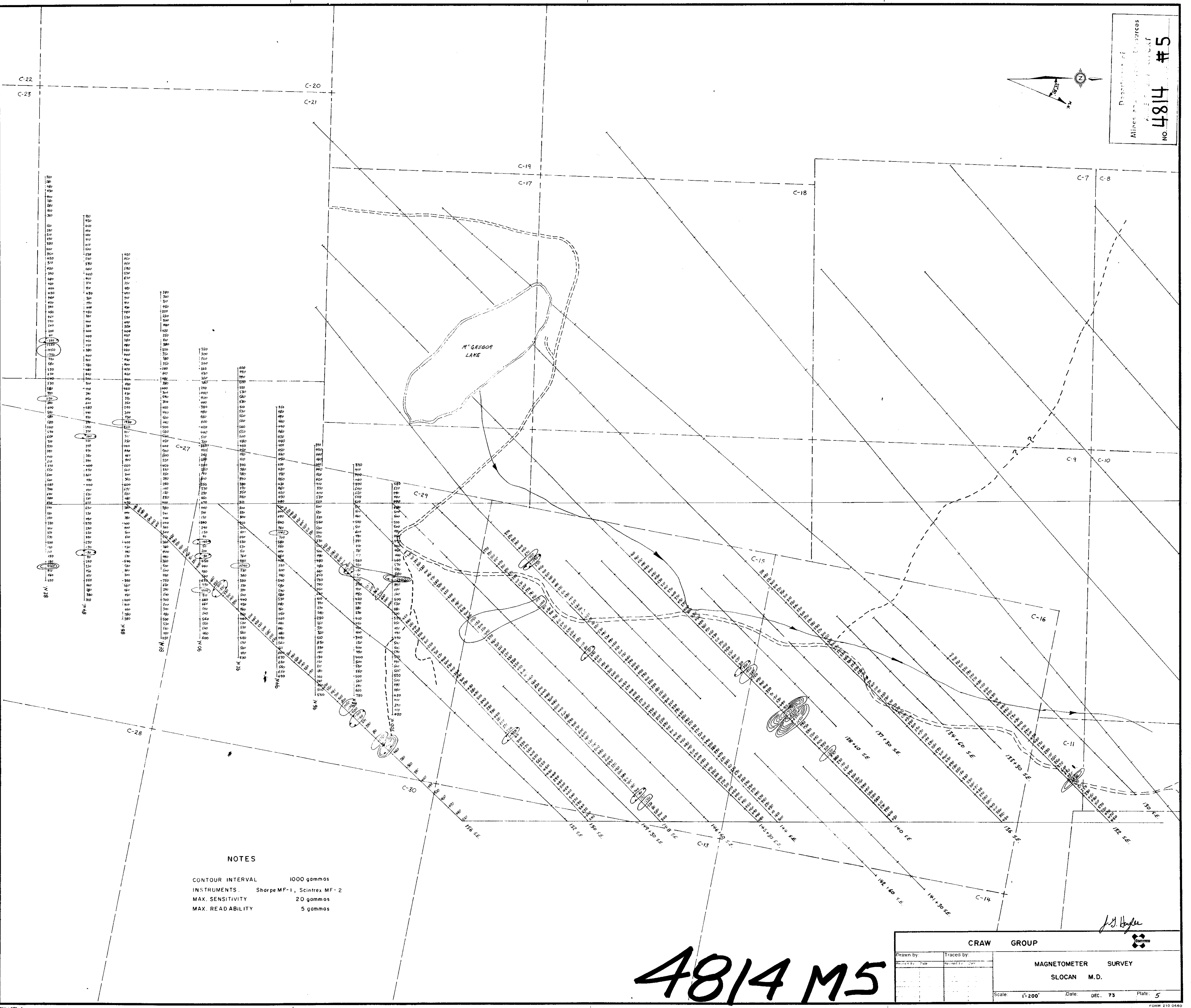
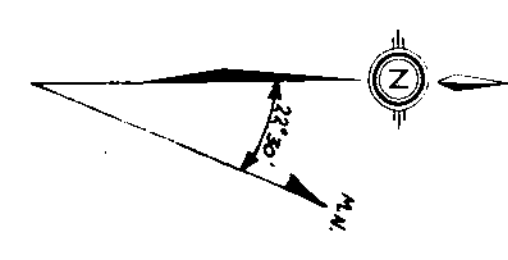
INSTRUMENT: ABEM DEMIGUM  
 FREQUENCY: 2840 C.P.S.  
 COIL SPACING: 100 feet  
 IN PHASE READINGS ON THE LEFT  
 OUT OF PHASE READINGS ON THE RIGHT  
 IMPROPER COIL SPACING s.c.

CONDUCTORS:  
 NO INDICATED WIDTH .....   
 WIDTH INDICATED .....   
 LOCATION UNCERTAIN .....   
 POSSIBLE CONDUCTOR .....   
 CONDUCTIVITY:  
 EXCELLENT .....   
 GOOD .....   
 FAIR .....   
 POOR .....   
 INDICATED CONDUCTOR DEPTH IN FEET .....   
 MARSHY AREA: LARGE, SMALL .....   
 CLAIM POSTS: LOCATED, INFERRED .....   
 TRAIL .....   
 LAKE .....

**CRAW GROUP**

Drawn by:	Traced by:	HORIZONTAL LOOP ELECTROMAGNETIC SURVEY 100 foot coil separation CRAWFORD BAY AREA, SLOCAN M.D., B.C.
Checked by:	Reviewed by:	
Scale: 1"=200'	Date: DEC. 73	Plate: 4

FORM 210-0660

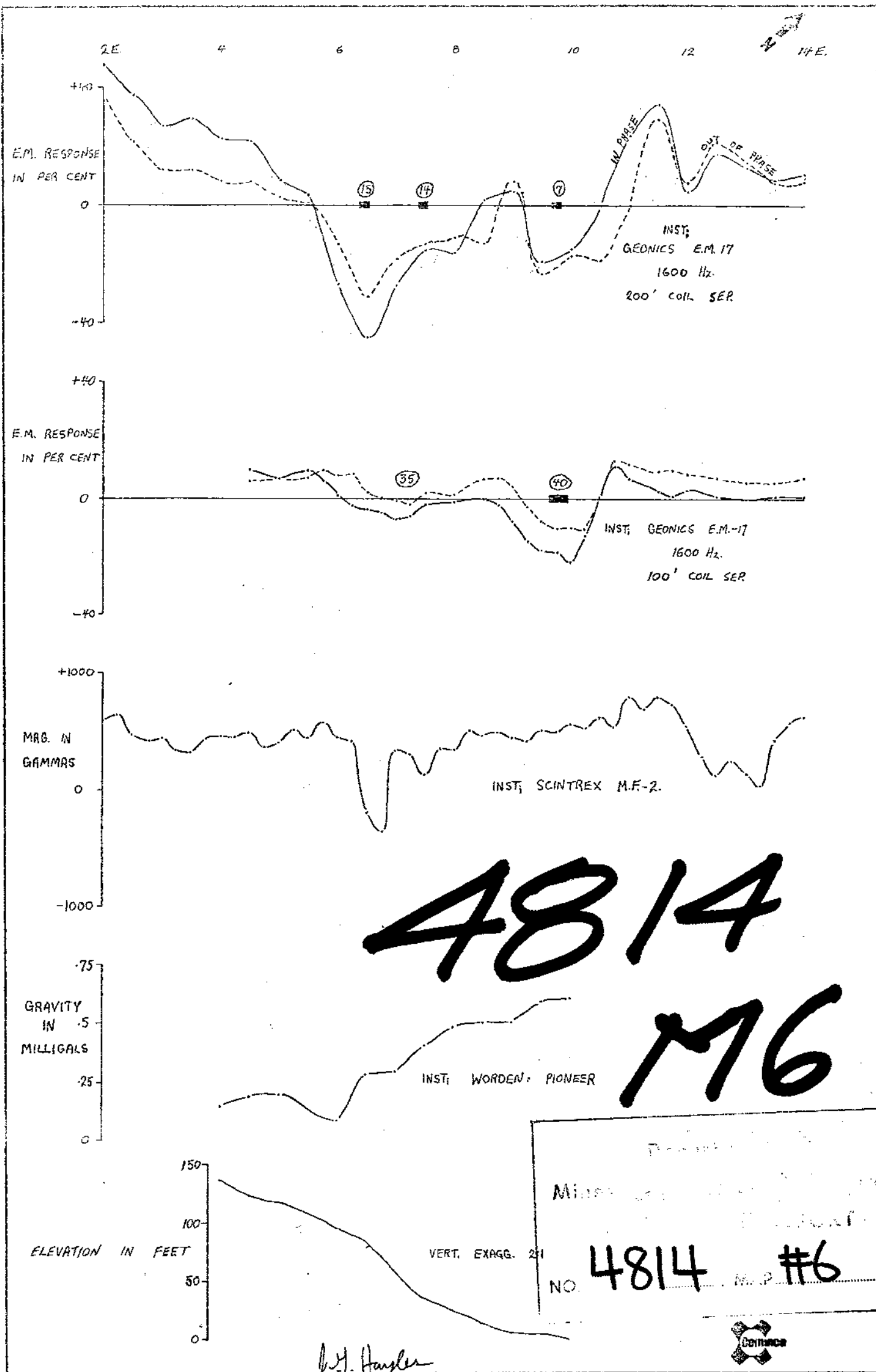


NOTES  
 CONTOUR INTERVAL 1000 gammas  
 INSTRUMENTS Sharpe MF-1, Scintrex MF-2  
 MAX. SENSITIVITY 20 gammas  
 MAX. READABILITY 5 gammas

4814 M5

*J.S. Boyle*

CRAW GROUP		MAGNETOMETER SURVEY	
Drawn by:	Traced by:	SLOCAN M.D.	
Register, Date:	Register, Date:	Scale: 1"=200'	Date: DEC. 73
		Plate: 5	

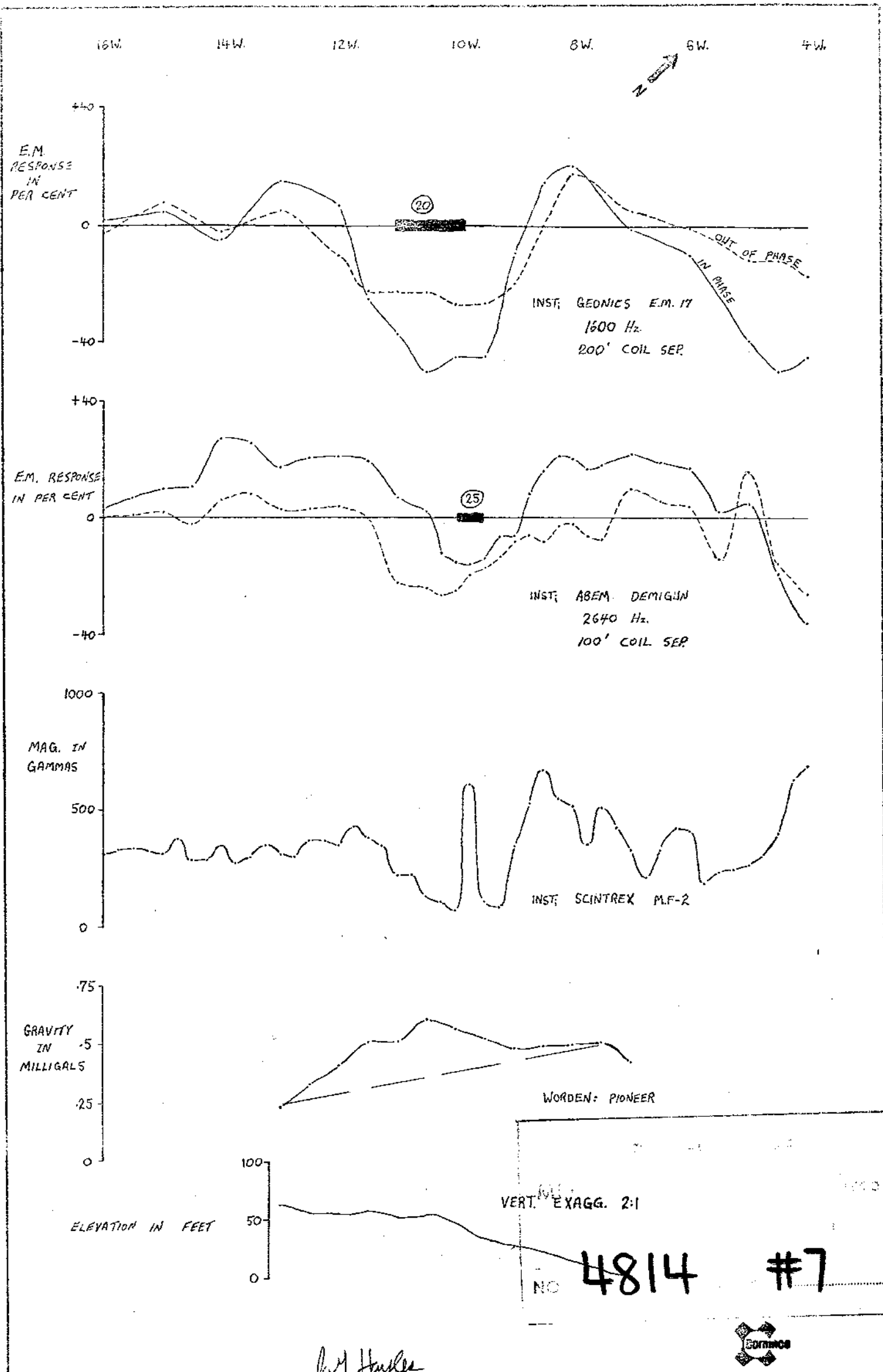


Drawn by: T.G.K.		Traced by: <i>J.H. Hayler</i>	
Revised by	Date	Revised by	Date

COMPOSITE GEOPHYSICS  
LINE 156 CRAW GROUP

Scale: 1" = 200'      Date: 20/11/73      Profile 1



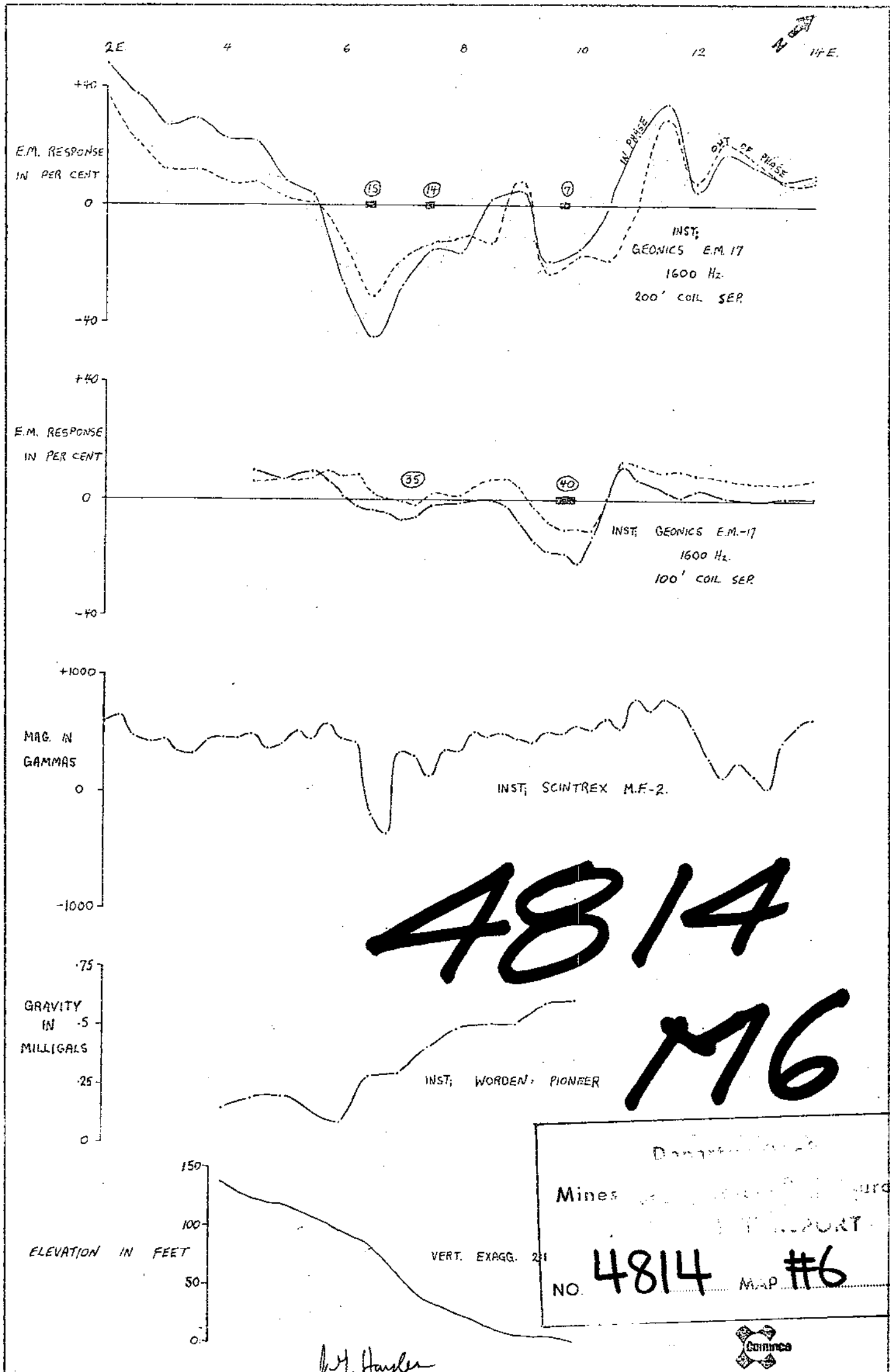


Drawn by: T.G.K.	Traced by: <i>J. J. Hays</i>		
Revised by	Date	Revised by	Date

COMPOSITE GEOPHYSICS  
LINE 136 CRAW GROUP

Scale: 1" = 200'      Date: 20/11/73      Profile 2

**4814 M7**



Mines and Geophysics  
REPORT  
NO. **4814** MAP #6

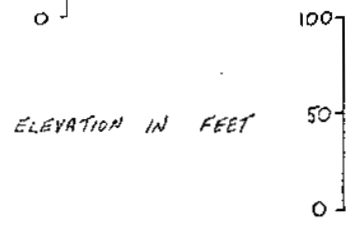
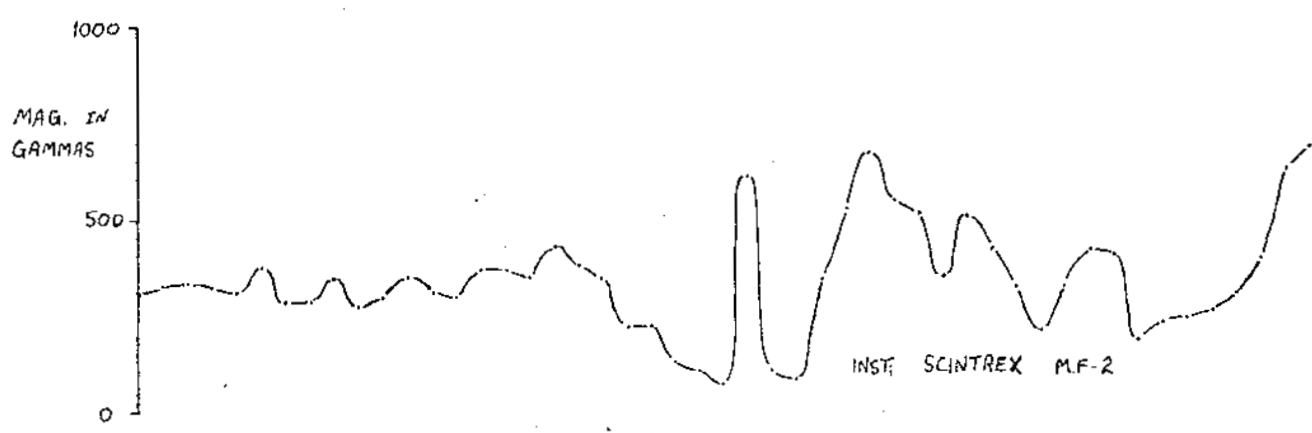
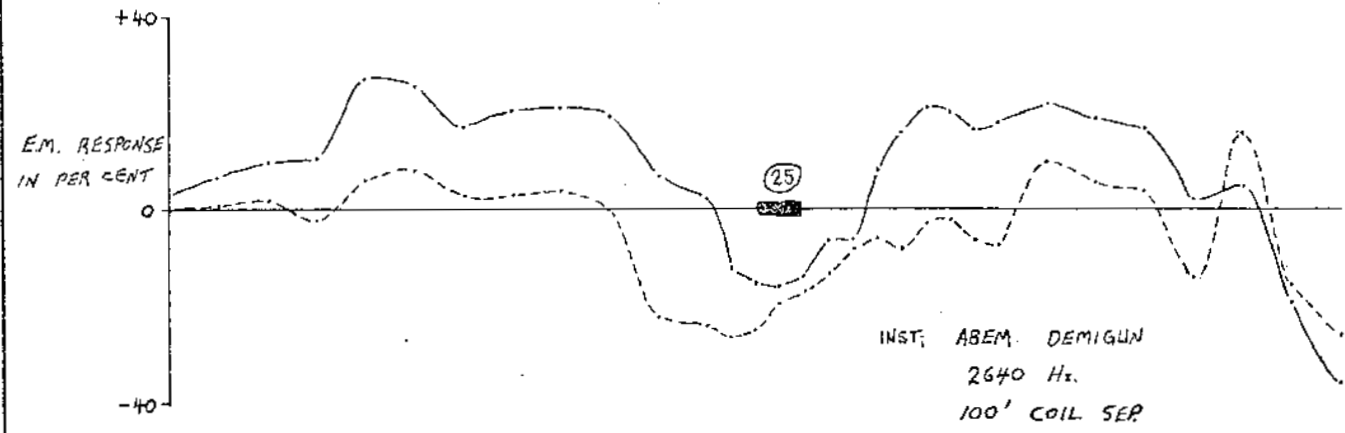
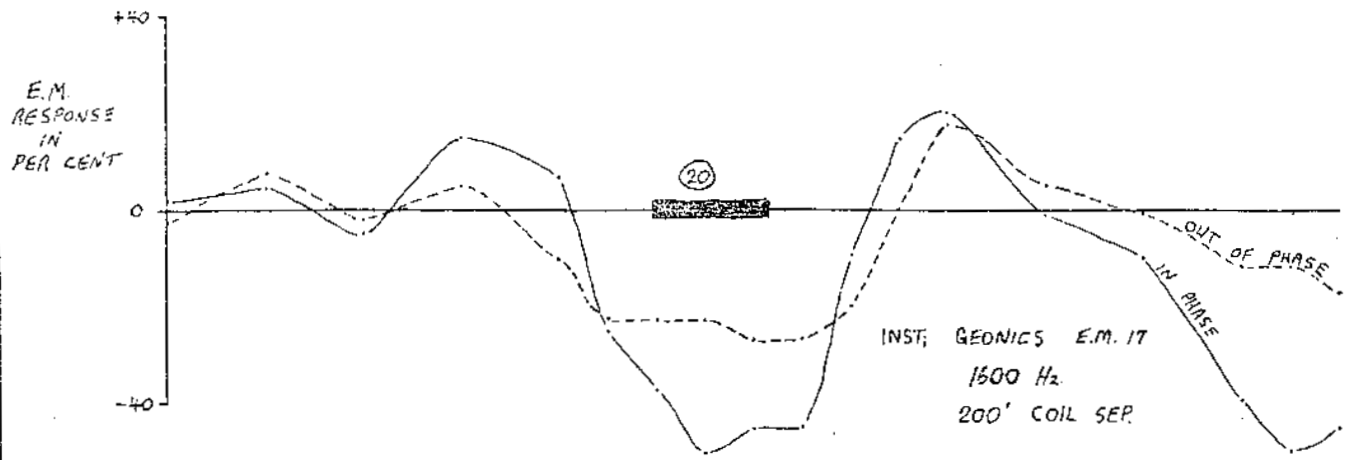
Drawn by: T.G.K. Traced by: *J.J. Hayler*

Revised by	Date	Revised by	Date

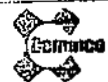
COMPOSITE GEOPHYSICS  
LINE 156 CRAW GROUP

Scale: 1" = 200' Date: 20/11/73 Profile 1

16W. 14W. 12W. 10W. 8W. 6W. 4W.



Department of  
 VERT. EXAGG. 2:1  
 NO 4814 #7



*J. W. Hayler*

Drawn by:	T.G.K.	Traced by:	
Revised by	Date	Revised by	Date

COMPOSITE GEOPHYSICS  
 LINE 136 CRAW GROUP

Scale: 1" = 200' Date: 20/11/73 Profile 2

**4814 M7**