'79-#188-# 7286

PETRA GEM EXPLORATION of CANADA LTD.
3540 West 41st. Ave., Vancouver, B.C. V6N 3E6
BUS 263-2678 RES 733-6902

GEOLOGICAL AND GEOPHYSICAL REPORT

DELSANTO 1-6, DELSAUNTO 7-10
and
DELSANTO 31-33 CLAIMS

Mapsheet 93L10E, Smithers, B.C.
Lat: 54°45'N. Long: 126°40'W

for

Melvin Chapman, Frances Madigan
P.O. Box 852, Smithers, B.C.

by

B.J. PRICE, M.Sc., FGAC

PETRA GEM EXPLORATION OF CANADA LTD.
200-3540 W. 41st. Ave.,
Vancouver, B.C.

MAY 15, 1979

7286

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GEOLOGICAL REPORT - DEL SANTO PROPERTY

INTRODUCTION:

The writer first visited the Del Santo property in August 1969 while conducting exploration on an adjacent property. Since that time, theories regarding volcanogenic "exhalite" massive sulphide deposits have matured. Volcanogenic deposits have been explored in strata contemporaneous with the Hazelton Group (i.e. the Seneca Deposit near Harrison Mills). In addition, recent mapping by Tipper and Richards has led to the identification of a "shelf" facies favourable for volcanogenic deposits within the Early Jurassic Telkwa Formation, present in a broad area between Babine Lake and Bulkley River Valley. A great number of important showings are present in this belt, extending from Houston to Smithers.

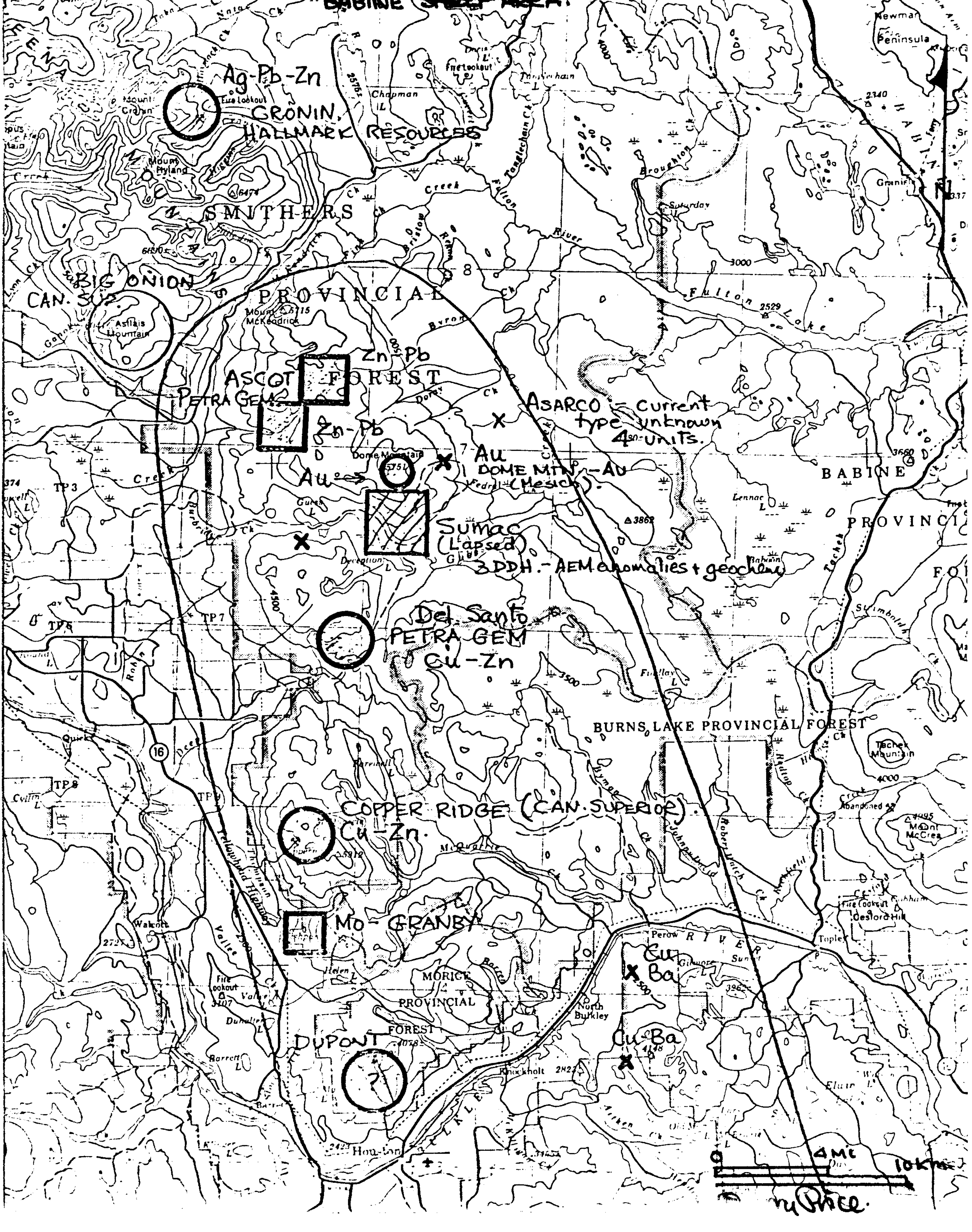
LOCATION AND ACCESS:

The property lies 20 miles southeast of Smithers, B.C. and 8 miles east of the small settlement of Quick, B.C. The road to the property extends from highway 16 through ranches adjacent to Deep Creek and along a gravel road originally used as a pack trail, then as a logging road connecting with the Deception Lake road. During winter, access to the claims is by snowmobile, although with plowing, the road could be used. A comfortable cabin is situated 2 miles from the property on the access road.

CLAIMS:

Six original claims are owned by Melvin Chapman and Frances Madigan, Smithers, B.C. In late February 1978 four additional claims were staked by Chapman and four by the writer, to protect

FIGURE 1
BABINE SHELF AREA.



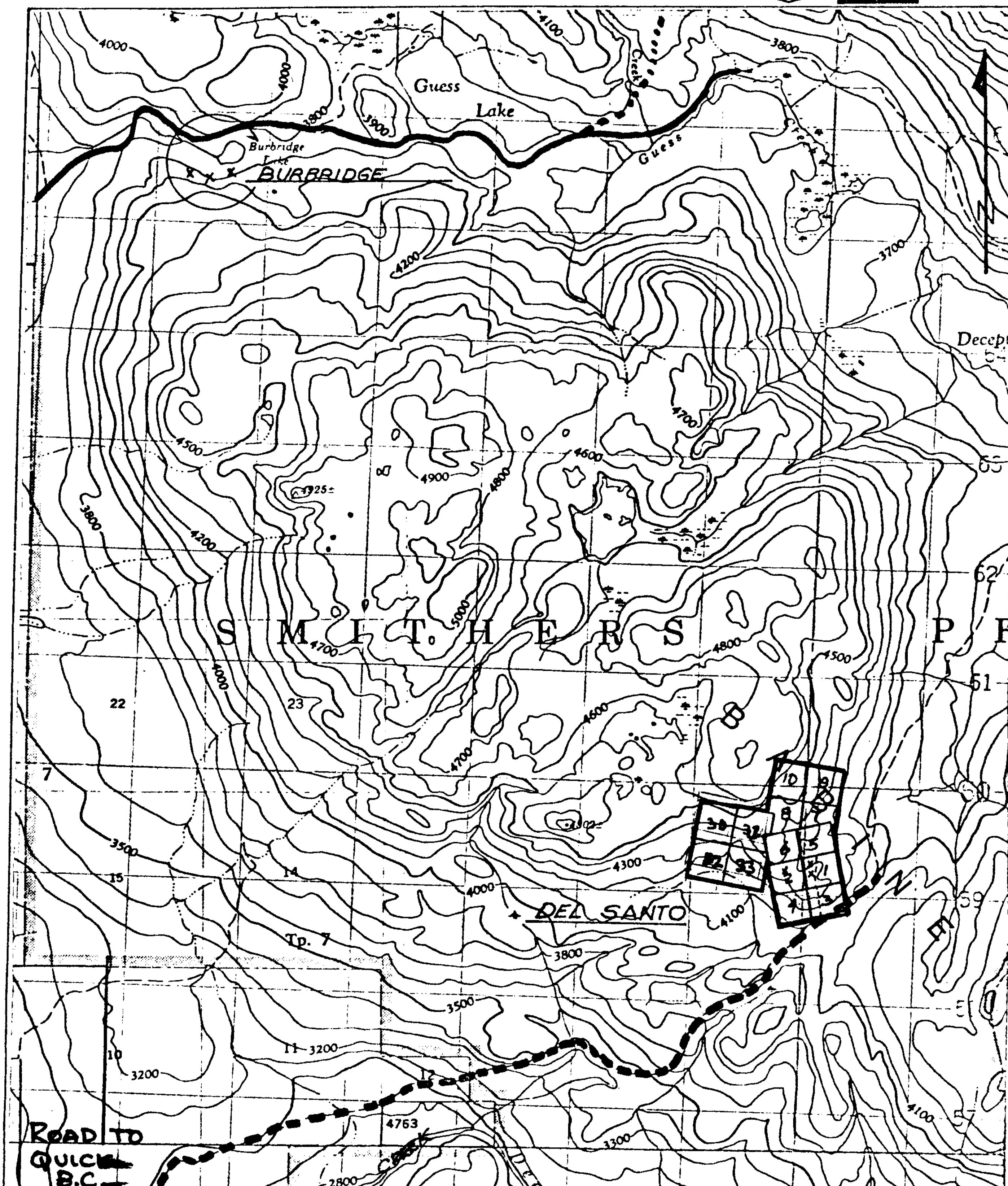


FIGURE 2. Location Map - DelSanto Property

Barry Price

the area north and west of the showings.

The claims are presently held by Petra Gem Exploration under option to purchase. A sketch of the claims is shown in figure 2.

HISTORY:

The claims are believed to cover the same area originally staked by Brewer and Brandon as the Deep Creek or Tom-Tom showing, described in the 1929 Minister of Mines Report.

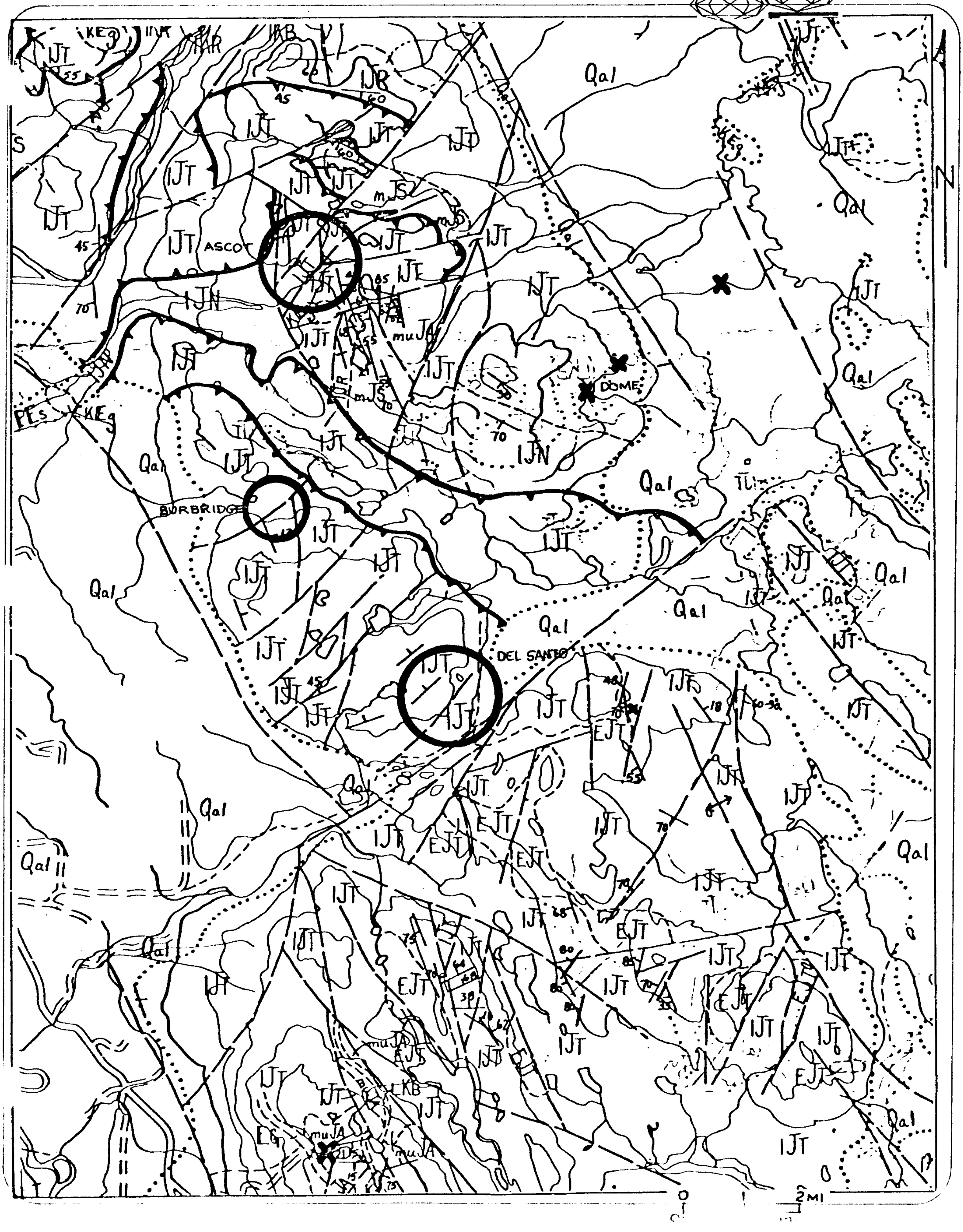
After re-staking by Chapman and Madigan the property was explored by numerous companies including Texas Gulf (1967, 1968), who did mapping and limited magnetometer and E. M. work; in 1969 Falconbridge conducted a comprehensive program of mapping, geochemistry and geophysics. Bovan Mines Ltd. drilled one short diamond drill hole in 1970 (?). Midwest Oil Ltd. examined the property and trenching was carried out by Chapman for Union Miniere in 1975.

DEL SANTO PROPERTY

CLAIM LIST

		Tag	Rec.No.	Staked	Recorded
Del Santo	1	587293	47874	Mar. 18/67	Mar. 20/67
	2	587294	47875	Mar. 18/67	Mar. 20/67
	3	793981	49493	June 1/67	June 5/67
	4	793982	49494	June 1/67	June 5/67
	5	793983	49495	June 1/67	June 5/67
	6	793984	49496	June 1/67	June 5/67
Delsaunto	7	107905M	949	Feb. 23/78	Mar. 16/78
	8	107906M	950	Feb. 23/78	Mar. 16/78
	9	107907M	951	Feb. 23/78	Mar. 16/78
	10	107908M	952	Feb. 23/78	Mar. 16/78
Delsanto	30	107909M	960	Feb. 25/78	Mar. 28/78
	31	107910M	961	Feb. 25/78	Mar. 28/78
	32	107911M	962	Feb. 25/78	Mar. 28/78
	33	107912M	963	Feb. 25/78	Mar. 28/78

FIGURE 3:
REGIONAL GEOLOGY - DEL SANTO AREA



1978 EXPLORATION:

During the summer of 1978, the writer and A and J. L'Orsa conducted detailed mapping of the showings area, S. Godwin re-picketed previously cut lines, and the writer surveyed an area near the showings with a McPhar M-700 fluxgate magnetometer.

Later in the summer, geophysical test surveys were run by Glen E. White, Geophysical Consulting and Surveys Ltd. for Norcen (Great Plains Ltd.)

Results from all investigations are incorporated in this report. Mineralogical investigations done by graduate student, Reg Faulkner at U.B.C., are completed but not available at this time. (Costs for the mineralogical study are therefore not included here).

GEOLOGY:

The Delsanto claims are underlain by Hazelton Group rocks - the lower Jurassic Telkwa Formation as defined by Tipper and Richards (GSC Bulletin 270, 1976).

Regional geology is shown in figure 3. Although regional strikes on Tipper and Richards map are shown trending north easterly, in fact on the property, sediments strike north to north-westerly with steep east and west dips.

Epidotized andesite flows and probably tuffs predominate in this section, but mineralized bands occur in black tuffs, shales and limy argillites with thin bands of true limestone.

The stratigraphy appears to be as follows:

(1) Light colored laminated volcanic sandstones
(2) Andesite and light-green dacite (massive flow?)
(3) Interbedded light felsic tuffs, red tuffs, with a black organic facies bearing sulphides associated with finely laminated manganiferous chert and grey limestone.

(4) Andesitic tuff breccias
(5) Epidotized massive andesites

STRUCTURE:

Sedimentary horizons mostly dip eastward at steep angles, but occasional westward dips suggest that tight folding or perhaps isoclinal folding is present. Foliation is parallel with bedding and minor drag folds have southerly plunging axes. Stratigraphic relationships between the limy unit - the only possible marker horizon, and a distinctive underlying andesite tuff breccia indicate that cross faulting has displaced units in a south westerly direction, following gullies along which swampy areas and streams occur.

The volcanic sandstone, thought to lie above the mineralized horizon, dips consistently westward and may indicate a small synclinal feature.

INTRUSIONS:

In the area of the property road junction, a small plug of biotite granite has intruded and hornfelsed adjacent rocks. Although virtually unaltered, the oxidized granite has crumbled in many areas to granite sand. The plug may be cut by one of the postulated cross faults. Dykes of monzonitic and dioritic composition strike northwesterly and are vertical. The diorite dykes have converted adjacent rocks to amphibolite and are very magnetic. The granite and dykes do not appear to be related to mineralization in any way.

FIGURE: 4

ASSAYS - DEL SANTO PROPERTY

ASSAYS

No.	W.	Cu %	Zn %	Ag oz/T	Au oz/T		
4810	5'	0.145	0.70	0.31	<.0006		1968 dissem
4811		0.235	0.26	0.59	"		dissem
4812	3'	2.7	0.08	5.9	"		mass.
4813	2'	0.60	0.27	1.4	"		dissem
4814	4½'	4.5	3.1	14.7	.0018		mass
4815	3'	0.15	0.69	0.21	<.0006		dissem
4816	3'	0.175	0.22	0.62	.0009		dissem.
4817	5'	0.345	0.14	0.62	"		dissem
4818	4'	0.70	0.14	0.82	"		dissem.
Y7085	4½'	7.1	2.7	15.4	.001	chip	1977
Y7086	—	0.88	0.58	2.4	.001	grab	
Y7087	2½'	1.36	0.28	3.2	.001	chip.	
Y7088	—	0.08	1.46	0.34	.001	grab.	
Y7089	3.2'	0.78	1.80	1.20	.001	chip.	
Y7090	6½'	0.77	0.30	1.58	.001	chip.	

MINERALIZED UNIT:

The distinctive assemblage of black argillaceous tuff, limy argillite, manganiferous chert and finely laminated grey limestone with overlying fine pyritic rhyolite tuffs is well exposed in trenches and stripping (figure 5). Several bands of massive sulphide mineralization occur in the unit. Mineralization consists of massive fine-grained pyrrhotite, pyrite, chalcopyrite, magnetite and minor sphalerite, galena and magnetite. To the north of the main trenches, a stripped area exposes disseminated sphalerite in black limestones and limy argillites. Southern limit of the zone in unknown.

In the best mineralized exposures mineralization is present in bands up to 6 feet wide of massive sulphide. Best mineralization grades 7% copper, 2½% zinc and 15 oz./ton silver over 4½ ft. (1.5m). Strike length of zone is at least 450 ft. (100m) with mineralized bands 3 to 6 ft. (1-2m) wide over 50 ft. (15m) in one trench.

PREVIOUS EXPLORATION:

A) Geochemistry

The only map available (in assessment report, 1970) showing geochemistry from soil samples, give values Cu + Zn "averaged to base zinc". However, Brown, 1979 mentions anomalies in copper and silver at BL/00, 4S/12W, and BL/32S, and shows copper-zinc anomalies at BL/100, L2-6S/10-12W, 2N/26W, 10N/2E and 12N/28-30W.

Attempts should be made to retrieve original data from Falconbridge; for re-interpretation. Several areas should be re-sampled to verify results, and rock-geochemistry should be done on major rock units.

B) Geophysics

A large magnetic anomaly appears to outline the granitic stock, probably from presence of magnetite in contact rocks. Anomalies strong but small in area occur from the vicinity of the stock northwestward. The pyrrhotite in the massive sulphide showings provides a strong positive anomaly. Station spacing (50 ft.) is probably too wide to adequately map the pyrrhotite rich horizons. All anomalies should be surveyed in greater detail.

E. M. (Ronka Mark IV) data, is interpreted by S. Presunka operator, to indicate a "lineament" anomaly corresponding with the magnetic anomaly.

E. M. 16 data are difficult to interpret; Presunka suggests because mineralization is shallow, but the low relief may indicate malfunctioning instruments. Presunka should be approached to check his interpretation and survey conditions.

The writer suggests that I.P. methods could outline the mineralized horizons more effectively than other methods, although deep penetrating EM should also be attempted.

PRESENT GEOPHYSICAL STUDIES:

A) Magnetic Survey (Figure 6)

A ground magnetic survey conducted by the writer on previously cut lines confirmed anomalies discovered by Falconbridge. Prominent lineal magnetic anomalies coincide with magnetic diorite dykes and hornfelsed volcanics and do not outline mineralized zones, although pronounced lows coincide with limy sediments containing the mineralized horizons.

Further magnetic surveys would not appear to aid in locating massive sulphides here, but might outline favourable sedimentary horizons.

B) Pulse E.M. Survey

A test survey with pulse E.M. (Vector EM) and horizontal loop configurations were run by Glen E. White consultants. Their brief report and profiles are attached as an appendix. Results indicate no significant conductor in the vicinity of the trenches and mineralization appears to be lensoid and shallow.

The method does not rule out the possibility of extensions of the favourable zone on other parts of the property.

CONCLUSIONS AND RECOMMENDATIONS:

Massive sulphide mineralization of volcanic exhalative origin occurs on the property, associated with limy sediments including manganiferous chert and finely laminated limestone. The mineralization is underlain by coarse andesitic tuff breccias and some thin beds of rhyolitic tuff overlie the mineralization. Thus the showings exhibit most of the characteristics of a typical volcanic exhalative deposit, such as are known in rocks of the same age elsewhere in B.C. (i.e. Seneca at Harrison Lake).

The writer considers the property to be of merit based on the above-mentioned characteristics, and two drill holes each 100 meters to 150 meters in length are recommended to test the geophysical conclusions. Recommended sites and orientations are:

1) BL/00 - L2S Az 240^{o}, Incl. 50^{o}
2) 7S/1E Az 240^{o}, Incl. 50^{o}

In addition, further prospecting should be done keeping in mind probable fault offsets of favourable zones to the northeast and southwest.

Barry Price

BARRY PRICE, M.Sc., F.G.A.C.

ITEMIZED COST STATEMENT

WAGES:	A. L'Orsa	July 18-19, 1978 $100/day	$ 200.00
	J. L'Orsa	July 18-19, 1978 $100/day	200.00
	S. Godwin	July 12,13, 1978 $ 25/day	50.00
CONSULTING FEES:			
	B. Price, Field		
		July 9-20, 7 days @ $150/day	1,050.00
	Office		
		Mar. 21-23 3 days @ $150/day	450.00
RENTALS:	McPhar M-700 Fluxgate Magnetometer		75.00
	Bema Industries	Rate $150/mo.	
TRANSPORTATION:			
	GMC Vandura 2 wks.	@ $400/mo.	200.00
	Petra Gem Explorations		
TRAVEL EXPENSES:	Airfare - Vancouver/Quesnel		44.55
MEALS & GROCERIES:			116.90
ACCOMMODATION:	Smithers		117.60
XEROX, POSTAGE, PRINTING, TYPING etc. (estimate)			75.00
MAGNETOMETER BATTERIES:			20.62
SURVEY STAKES:			37.05
CAMP COSTS:	(apportioned) 2 wks. @ $50/wk.		100.00
	(propane, tents,stoves, axes etc.)		
			$2,736.72
GEOPHYSICAL TEST SURVEY:			1,680.37
		TOTAL	$4,417.09

Glen E. White GEOPHYSICAL CONSULTING & SERVICES LTD.

9251 Beckwith Road, Richmond, British Columbia, V6X 1V7 Telephone: (604) 273-6962

September 7, 1978

Mr. G. Garrett
Great Plains Ltd.
Mineral Exploration Dept.
715 - 5th Ave. S.W.
Calgary, Alta. T2P 2X7

INVOICE

To Professional Services -

Glen E. White Geophysical Consulting & Services Ltd.

Pulse electromagnetometer surveying

Del Santo property Sept. 2, 3, 4/78

@ $400/day............................$1200.00

Vehicle lease 4x4 plus gas.................170.00

Airfreight from Smithers....................46.37

Airfare - one way..........................144.00

Data reduction and printing................120.00

Total..........$1680.37

Amount of this invoice..............................$1680.37

Glen E. White GEOPHYSICAL CONSULTING & SERVICES LTD.

9251 Beckwith Road, Richmond, British Columbia, V6X 1V7 Telephone: (604) 273-6962

September 7, 1978

Mr. Glen Garrett
Great Plains Ltd.
Mineral Exploration Dept.
715 - 5th Ave. S.W.
Calgary, Alta. T2P 2X7

Dear Mr. Garrett:

Enclosed please find two copies of the test pulse electromagnetometer survey conducted over the Del Santo property, Smithers area, B. C.

Figure 1 shows a sketch map of the area surveyed as directed by Tom Bojczyszyev. Figures 2 - 9 illustrate the vector data and Figure 10, the horizontal loop test over Line 2S with a 75 m coil separation.

The largest horizontal and vertical component responses were in the first channel which indicates low per volume bedrock conductivities. Figures 2 and 3, Line 0, show a possible shallow weak conductor at 0 ≁ 50W. This same zone appears to be energized by loop B on line 2S but not loop A, Figures 4 and 5. Figures 6 and 7 show a weak vector focusing around 1 ≁ 50E. This type of focusing may possibly be indicative of a conductive lithologic contact rather than a mineral zone. Figures 8 and 9 show only divergent vectors typical of low conductivity country rock. In all profiles channels 2 and 3 showed no attempt to focus. Figure 10 depicts the horizontal loop profile across the mineralization on line 2S. A slight conductive response was detected at 0 ≁ 65E.

In conclusion then, no significant conductor was detected by either the horizontal or vector pulse electromagnetometer modes. This would indicate that either any mineralization present is in discrete isolated lenses or no lenses of mineralization of significant size are present.

Yours truly,

Glen E. White, P. Eng.
Consulting Geophysicist

GREAT PLAINS LIMITED
DEL SANTO PROPERTY
P.E.M. SURVEY

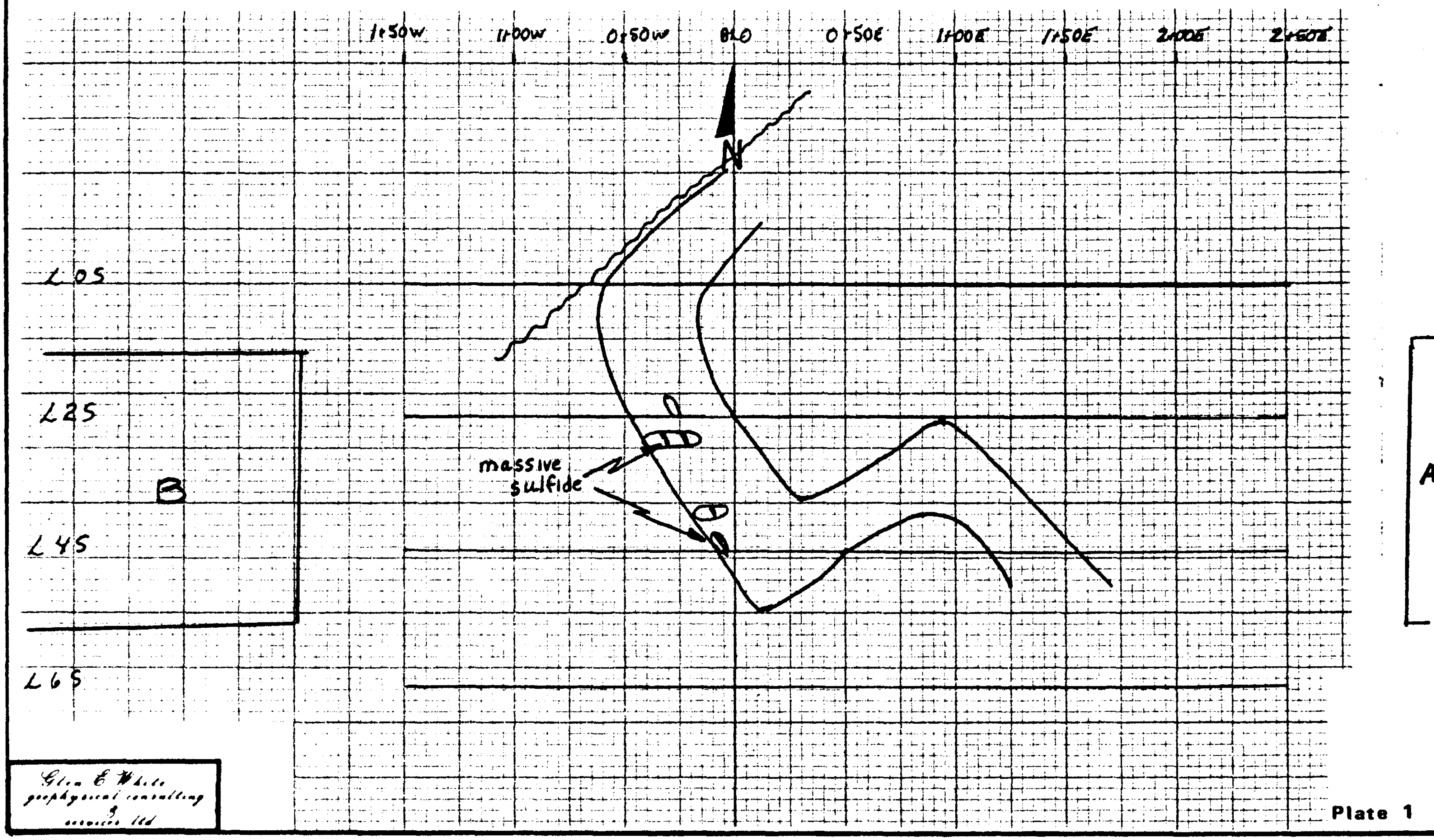


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Plate 1

GREAT PLAINS LIMITED
DEL SANTO PROPERTY
P.E.M. SURVEY

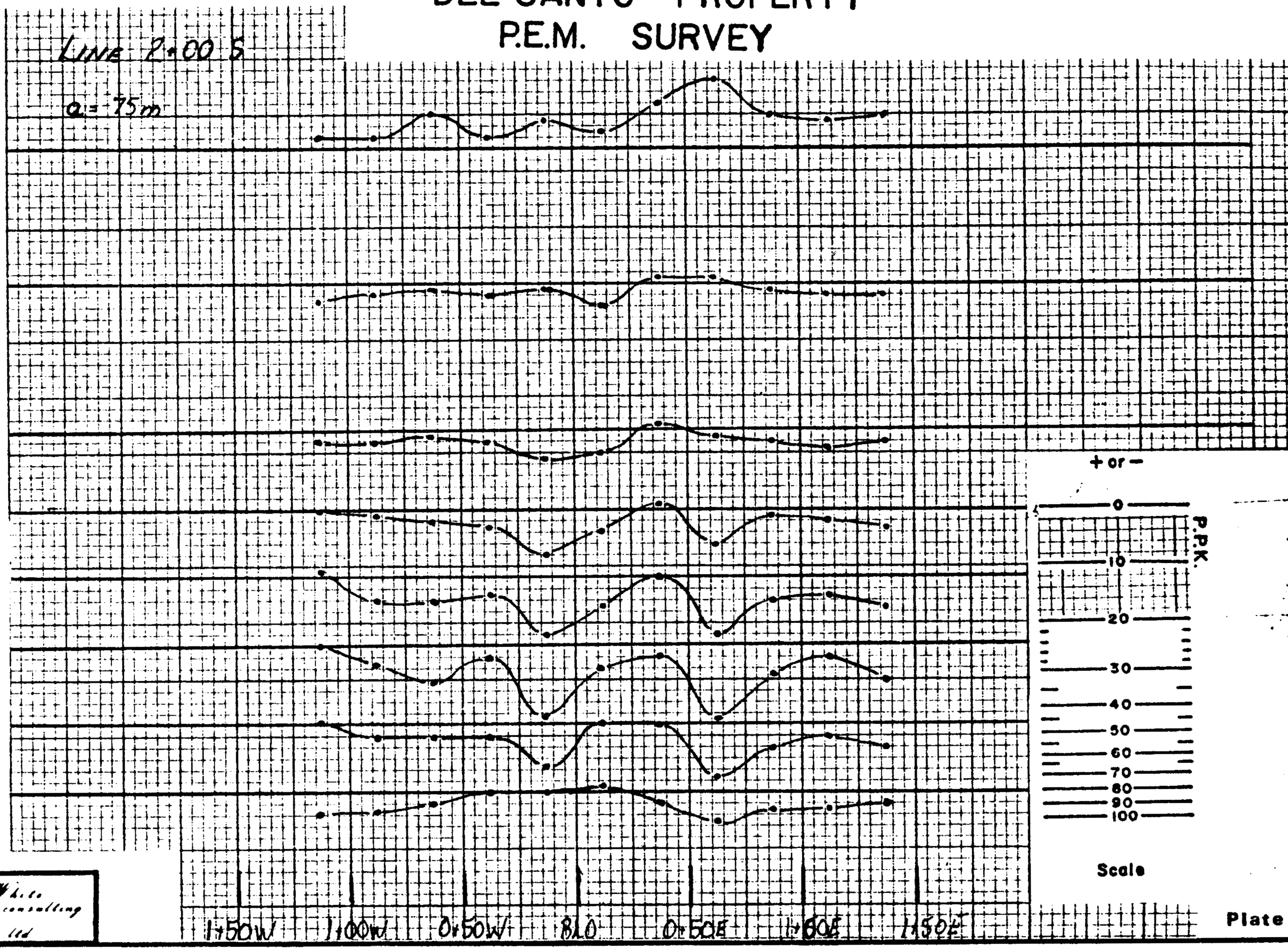

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Plate 10

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P.E.M. SURVEY

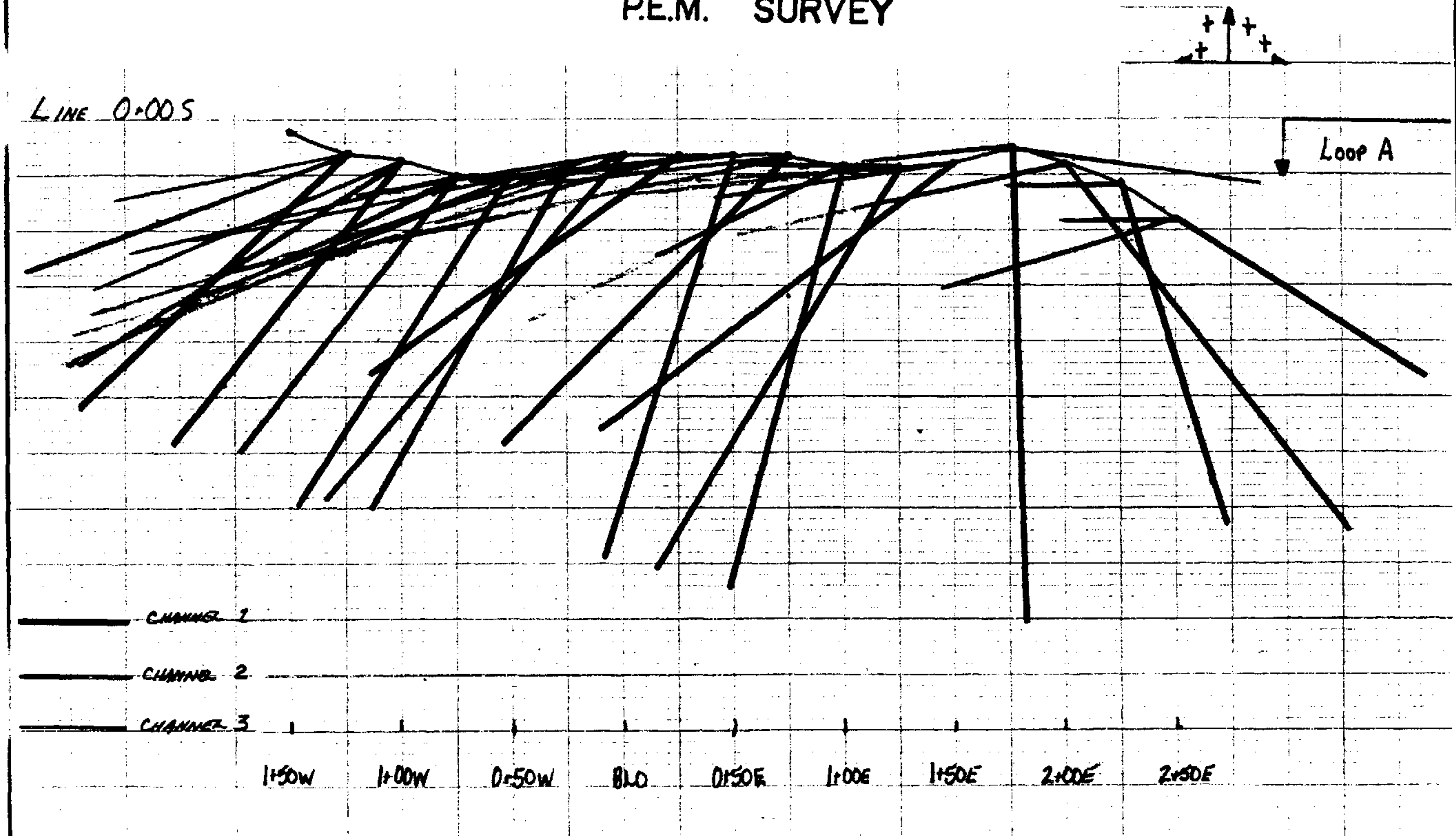

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Plate 2

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DEL SANTO PROPERTY
P.E.M. SURVEY

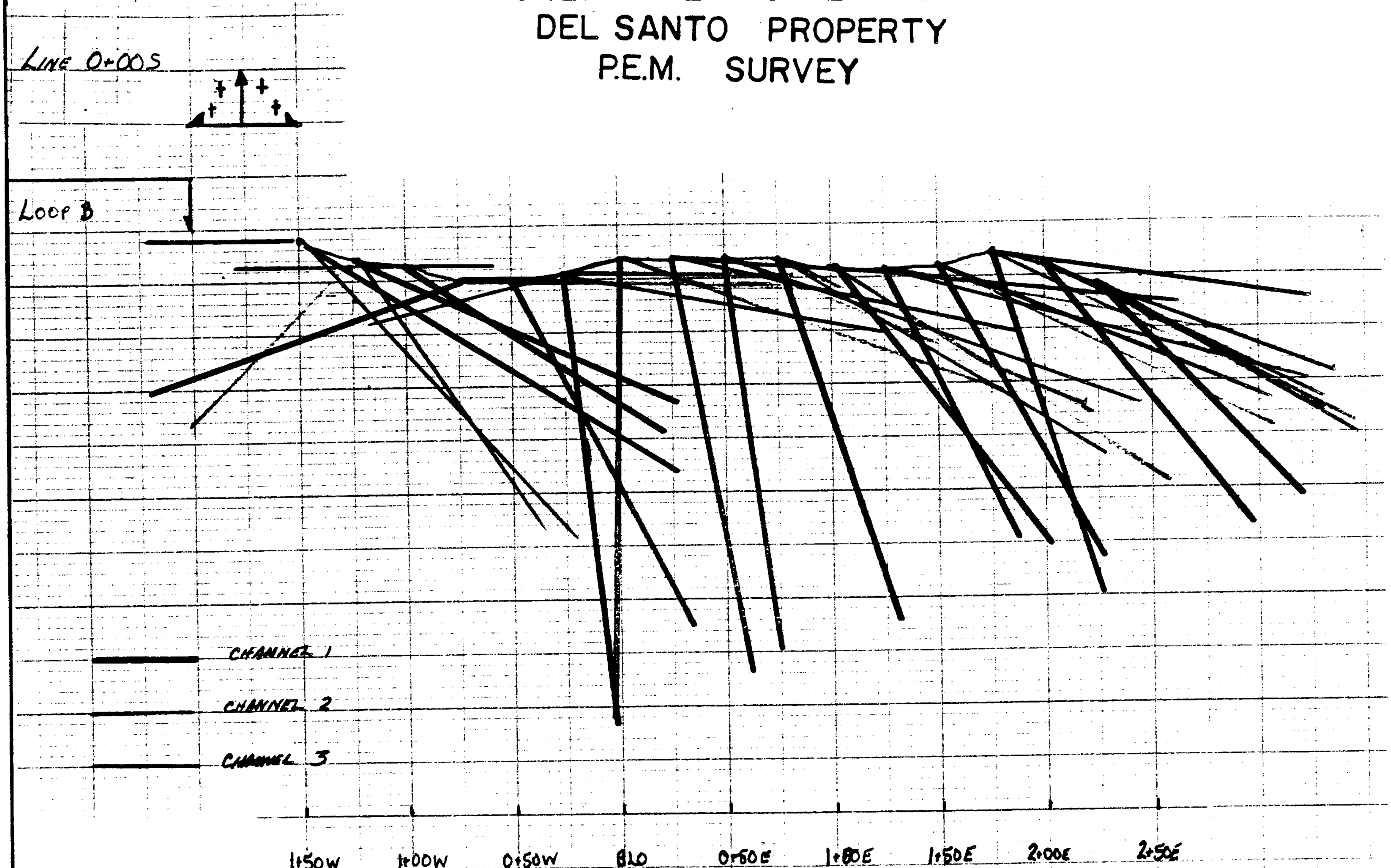

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Plate 3

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DEL SANTO PROPERTY
P.E.M. SURVEY

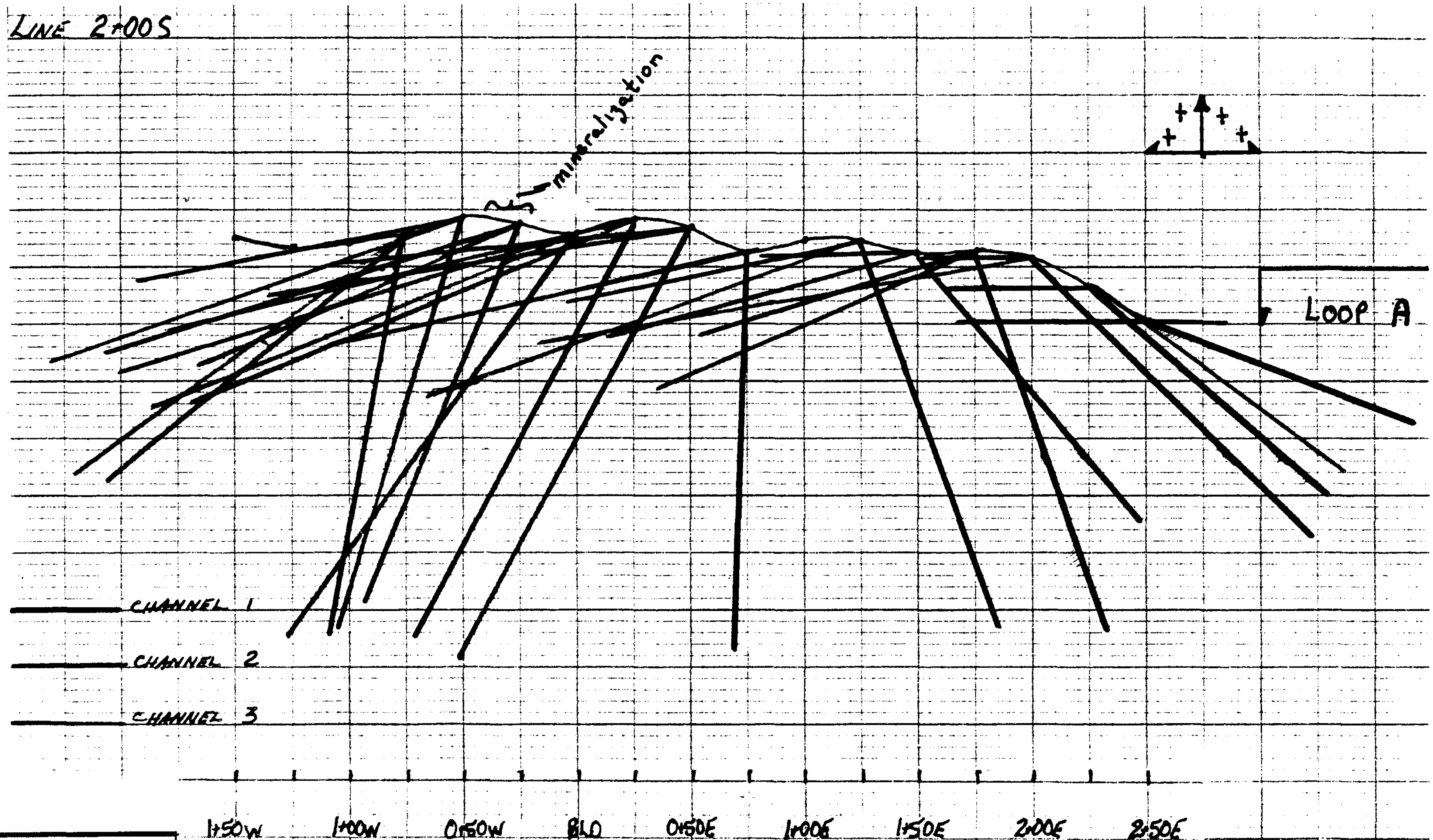

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Plate 4

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P.E.M. SURVEY

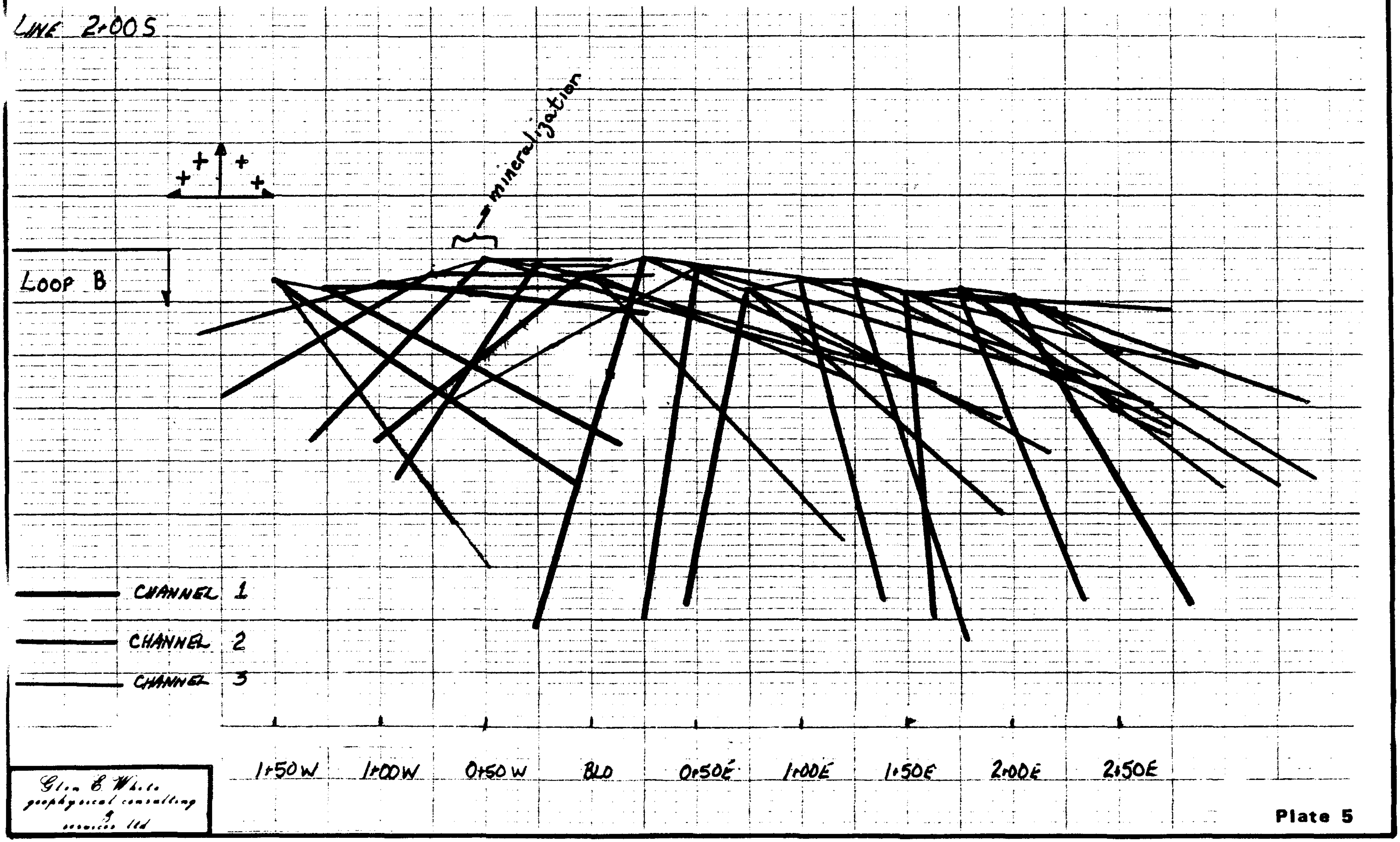

Plate 5

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DEL SANTO PROPERTY
P.E.M. SURVEY

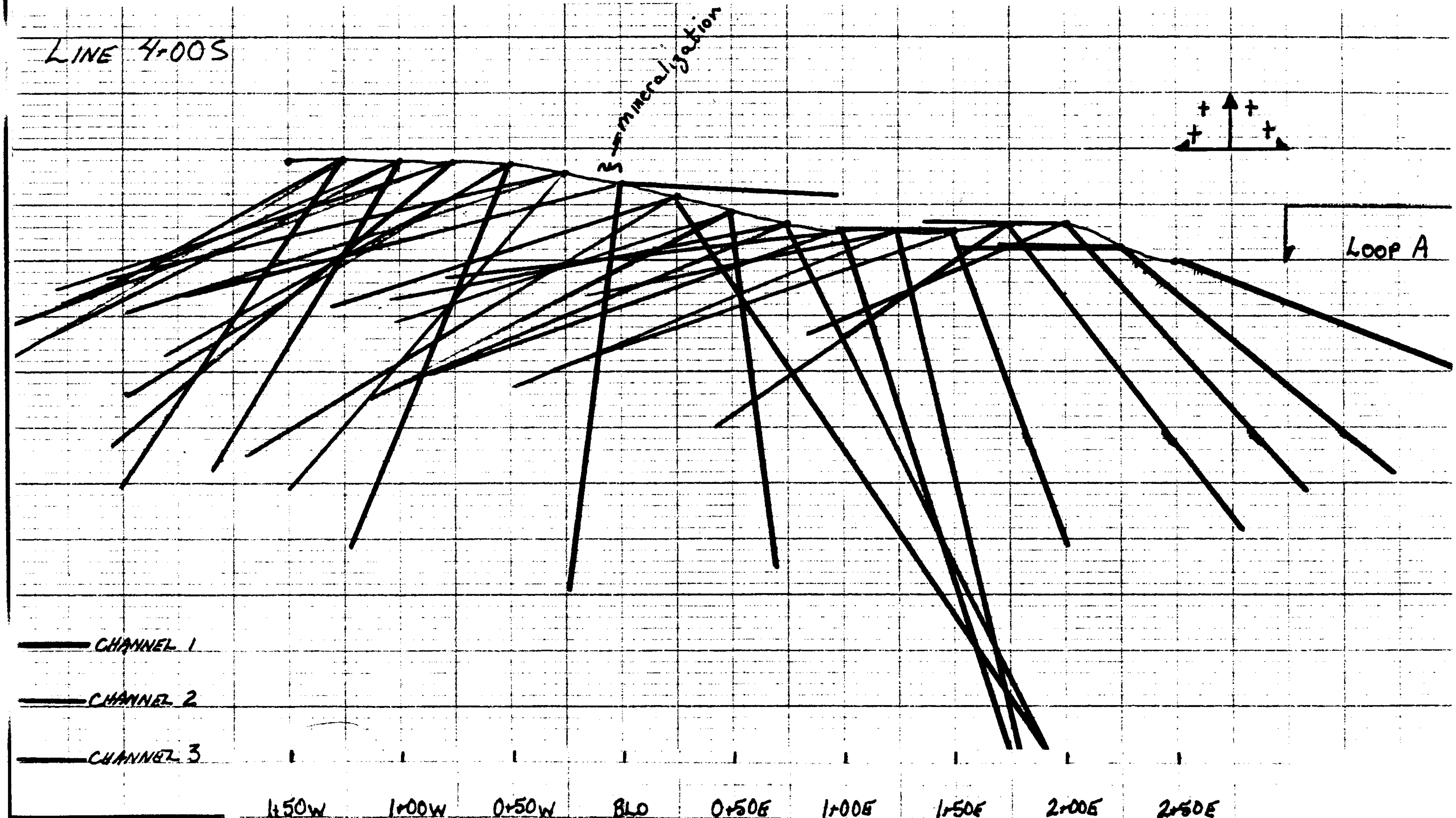

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Plate 6

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P.E.M. SURVEY

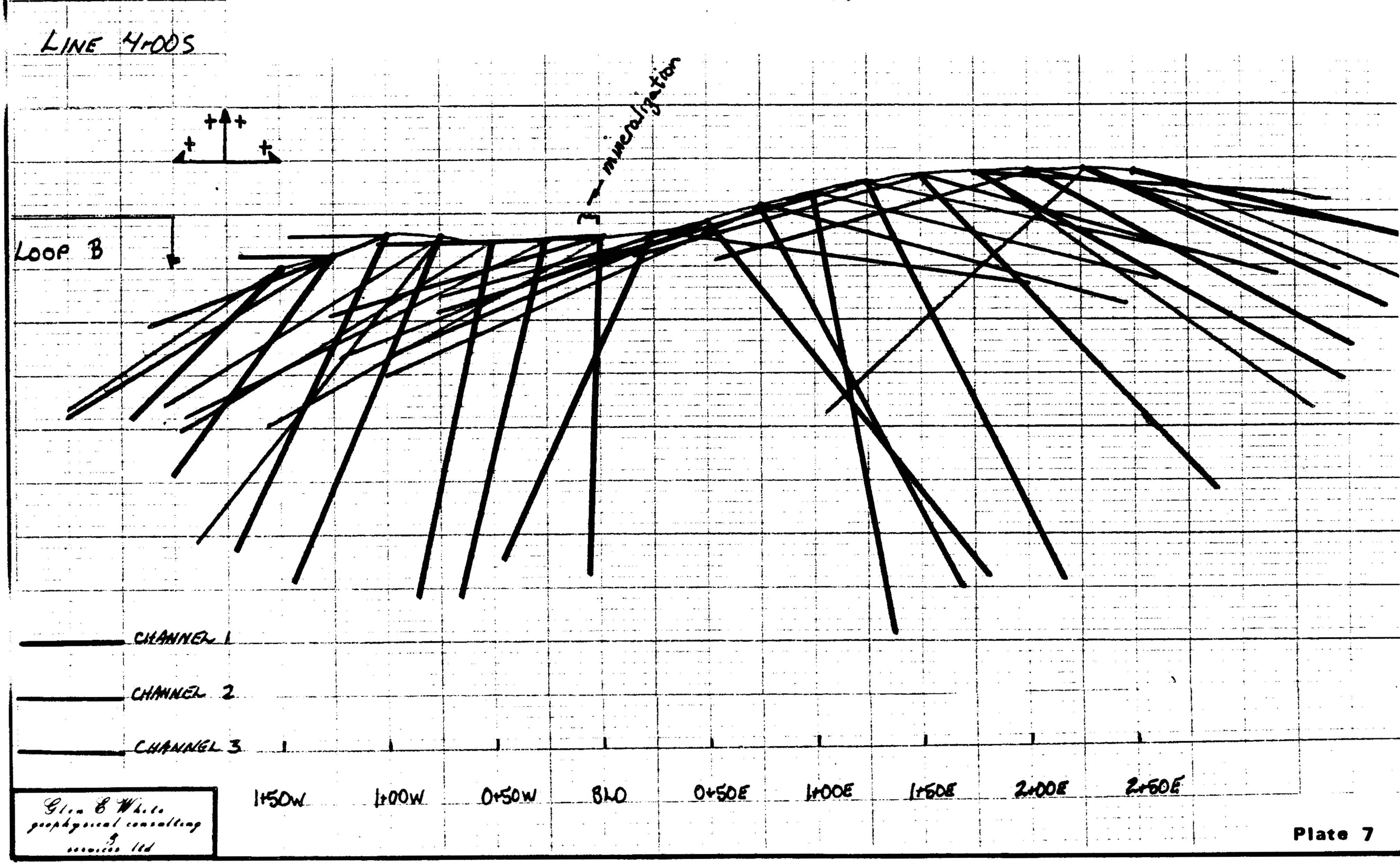

Plate 7

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P.E.M. SURVEY

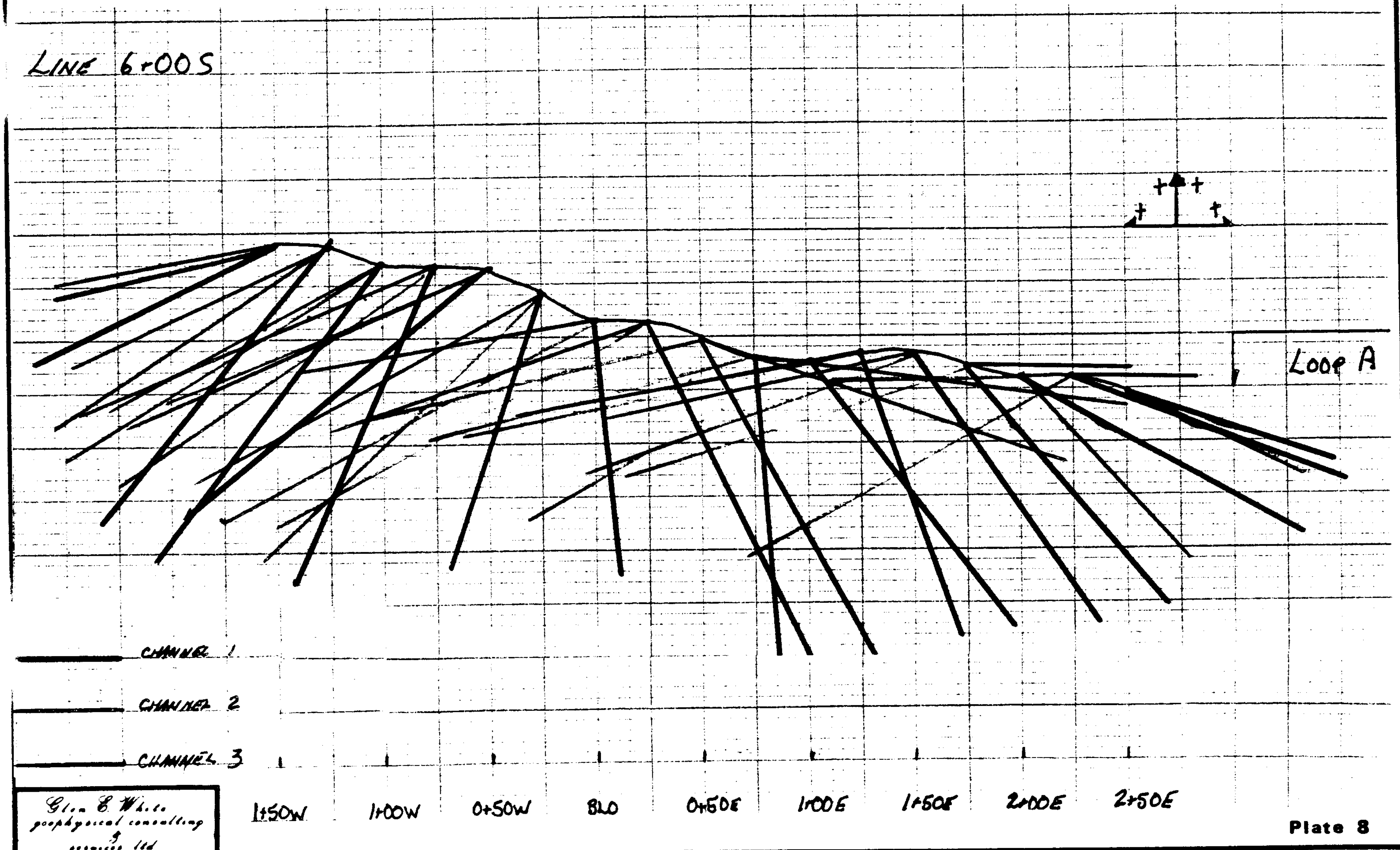
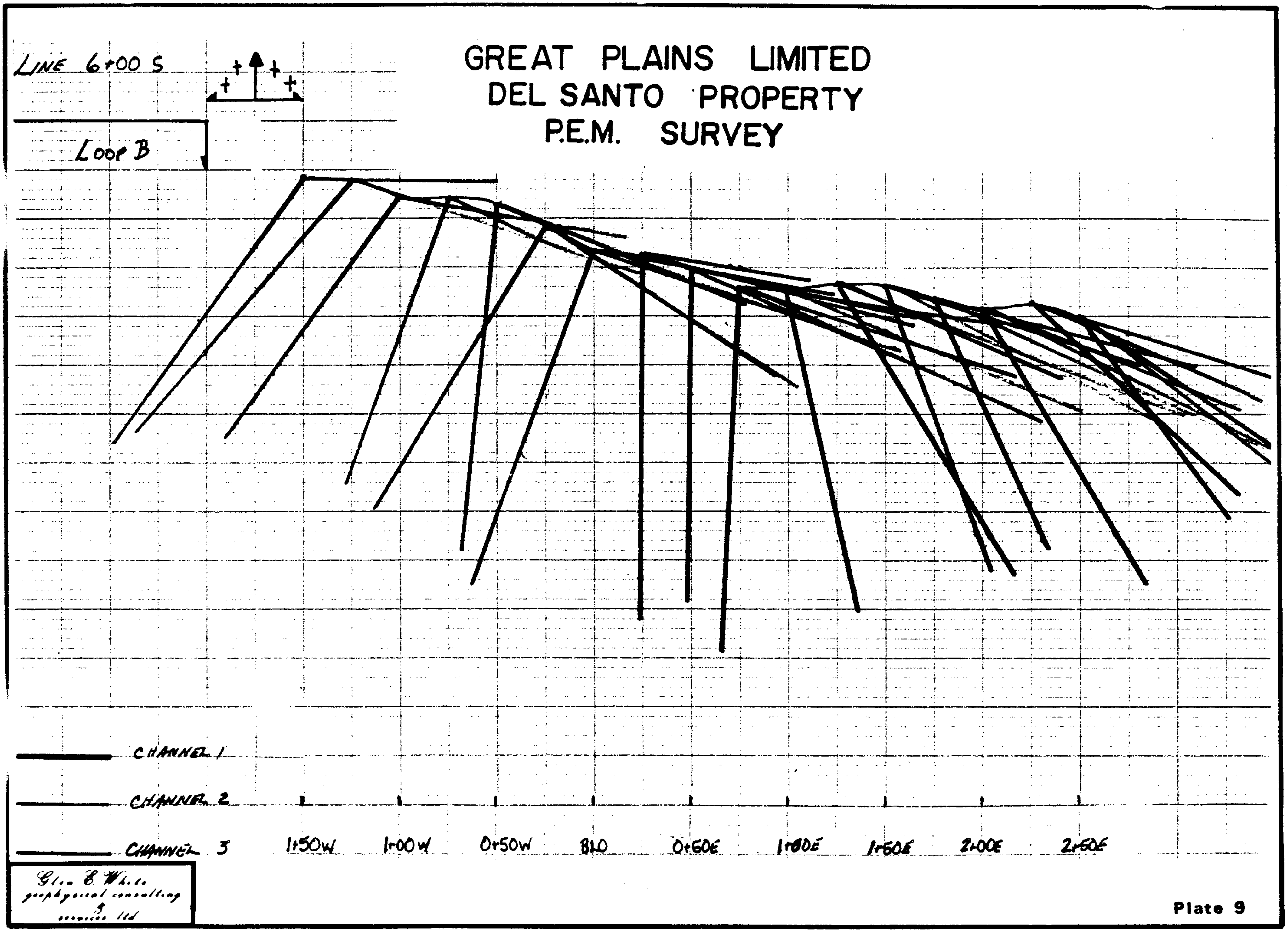


Plate 8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DEL SANTO PROPERTY
P.E.M. SURVEY
LINE 6+00 S
Loop B
CHANNEL 1
CHANNEL 2
CHANNEL 3
1+50W
1+00W
0+50W
BLO
0+50E
1+00E
1+50E
2+00E
2+50E
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Plate 9

DEEPEM METHOD

This technique employs the PEM for deep penetrating applications. Large loops (transmitting) are laid out on the ground (100 x 100M or 400' x 400'). Readings are taken at 25M or 100' intervals along adjacent traverse lines starting 25M or 100' away from the loop and extending as far as 200M or 800' from the loop. Distance can be increased to 300M or 1000' from the loop. Two versions of the set-up are illustrated in figures 1 and 2. In the overlap regions, readings from two different transmitting locations are taken at any given station. This is to ensure coupling between a ground conductor (dipping) and at least one of the transmitting locations, to obtain a secondary response.

In an area containing high surficial conductivity, it is advisable to use a modified PEM receiver with a time base twice that of the standard receiver. Figure 3 illustrates the current locations for the different channels using the two different time bases in an area of conductive overburden.

We can see that within 800' of the transmitter loop the current locations of the first 4 channels are enclosed in the area of investigation for the normal time base instrument. However, when the extended time base is employed only the first 3 channels are enclosed. This means that we should lose only the first 3 channels to overburden when searching for deep conductors in the case of the extended time base unit as opposed to the first 4 channels using the standard unit.

In plotting the geometry of the secondary field similar procedures are followed as those in the vertical loop detail. Perpendiculars are drawn from the resultant sum of horizontal and vertical component vectors for each channel. The intersection of these perpendiculars defines the apparent line current location for each channel. Profiles of horizontal components and vertical components can be made. Conductor line currents are located by crossovers in the vertical component profiles and peaks in the horizontal component profiles. Strike directions can be found by rotating the receive coil with its axis in the horizontal plane. The axis points in the strike direction when a minimum received signal is achieved.

FIELD PROCEDURE

(1) Ref. Figure 1 - The transmit loop is laid out between two adjacent traverse lines. Readings for loop 1 are carried out by the route marked out in purple. Readings are taken along the traverse lines starting from 25M or 100' from the loop and extending to a distance of 200M, or 800' from the loop. Once readings for a transmitting location are complete, the loop is moved to location 2, whose centre is 200 M or 800' from the centre of the previous location at 1 in plain view. The procedure is repeated until readings from all four transmit locations have been completed.

(2) Ref. Figure 2 - This is a special case of the above procedure. Only two transmit locations are used with distances of 400M or 1600' between the centres of the transmit locations. However, readings for each transmit location are carried out in an identical manner, except that readings outside the area between the transmit positions are not required. This whole technique is quite flexible so that the two transmit locations can be separated by any distance which gives a desired area of overlap.

(3) When taking readings at each station the readings with the receive coil levelled vertically are taken first with the P.P. set positive (for each channel). Gain and timing controls are set and recorded, although it is not necessary to normalize the P.P. to 1000. A gain of 50% is used to enhance late time channels. Readings, for each channel, with the receive coil levelled horizontally are taken next with the timing and gain settings left unchanged from the settings during the vertical readings.

(4) The head of the receive coil must face the same directions (vertically and horizontally), for any given side of the TX Loop, and records of these directions should be kept. Generally the head is kept up for vertical readings and away from the loop for horizontal readings. This way, for plotting purposes, the positive vertical component direction is upward and the positive horizontal component direction is away from the side of the TX Loop.

The P.P. polarity switch must be kept in the same position, regardless of the polarity of the P.P., when switching from vertical to horizontal readings.

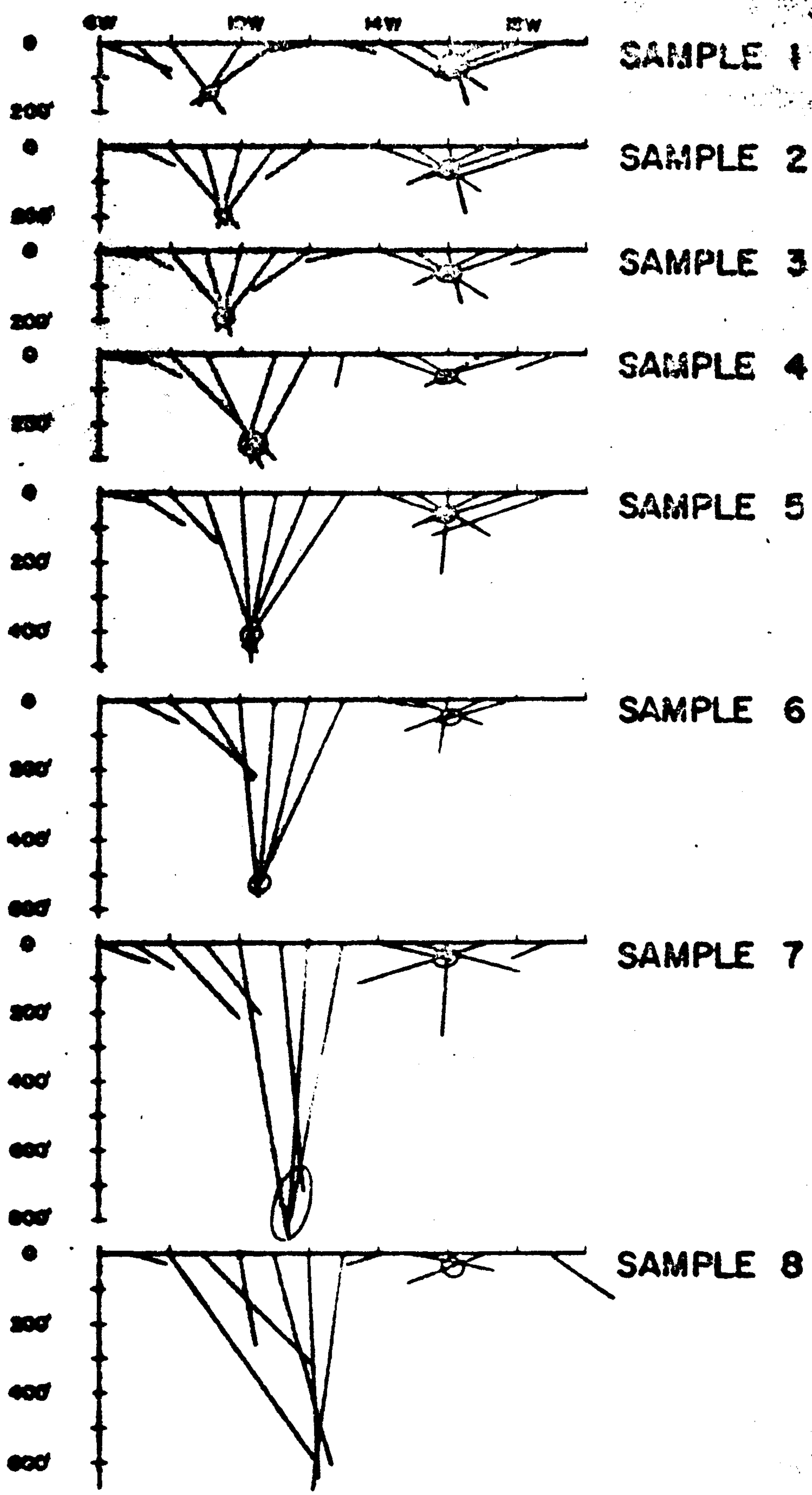
Figure 4 illustrates how coverage can be extended around a transmit location along four traverse lines instead of just two lines.

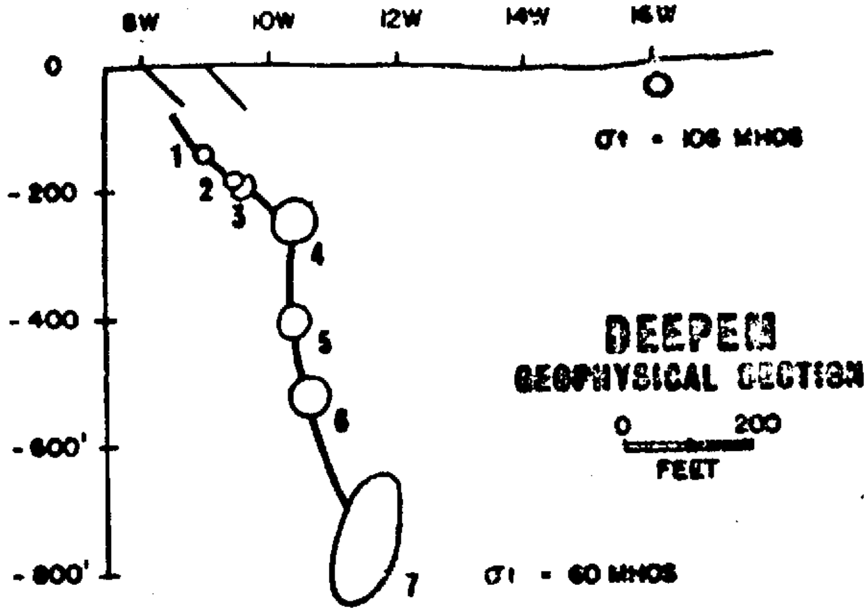
decay curve:

centre	width	gain
150 μs	100 μs	100
300 "	200 "	71.9
550 "	300 "	51.0
900 "	400 "	37.0
1.45 ms	700 "	27.0
2.4 ms	1.2 ms	19.3
4.0 ms	2.0 ms	13.9
6.4 ms	2.8 ms	10.0

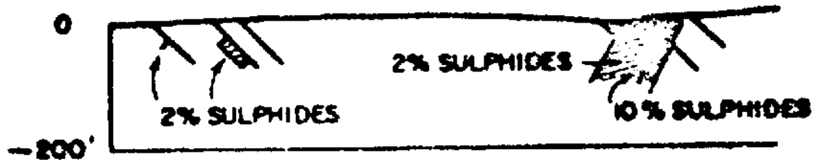
January 1978

CRONE DEEPEM SURVEY
CAVENDISH ONTARIO - LINE C
INDUCED CURRENT POSITION



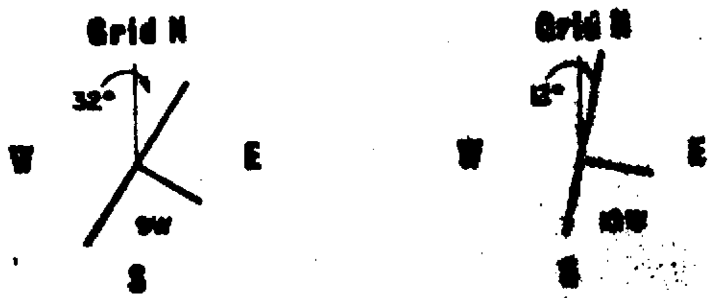


GEOLOGICAL SECTION



TRANSMIT LOOP 400'x 400' ① AT 1W TO 9W, LC TO LB
② AT 9W TO 15W, LC TO LB

STRIKE DIRECTION FROM PEM

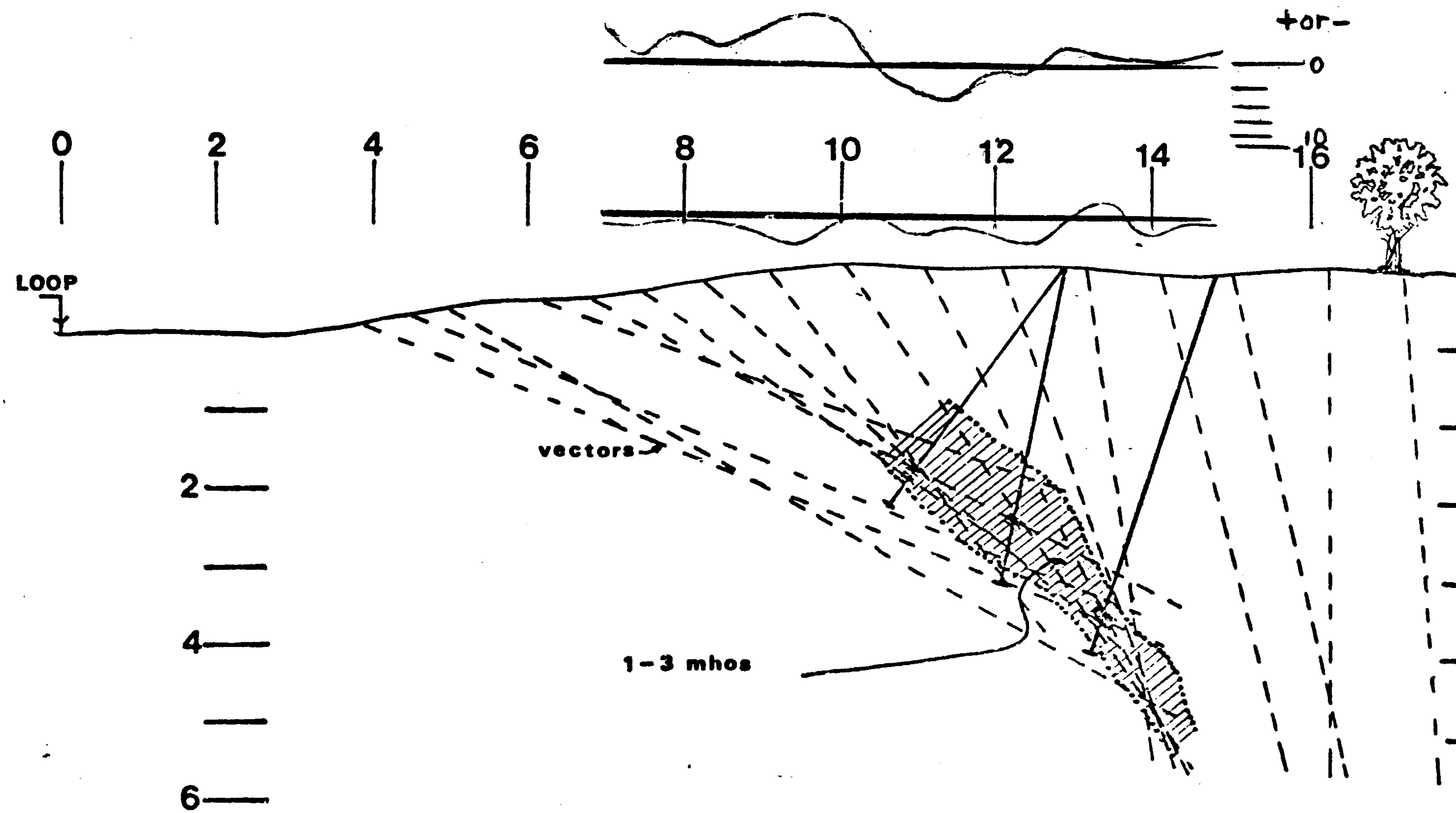


CRONE DEEPEM

(DEEP PULSE EM SURVEY)

CAVENDISH TEST SITE, ONTARIO - LINE 'C'

VECTOR EM



Glen E. White geophysical consulting & services ltd.

SCALE 1"=200'

Plate 3

the advantage of a much stronger transmit field, thus greater penetration. This is called the DEEPEM method. The transmit loop is laid to one side of the area to be detailed and survey lines are read away from the loop, starting 50 meters from one wire and out to a distance of 350 meters. Both horizontal and vertical components are measured and the induced current paths are determined as before.

An example is shown in Figure 14 from a test survey over the FLYING DOCTOR prospect, NORTH BROKEN HILL area, Australia. In this case the surficial conductivity is caused by brackish ground water. It has a conductivity of 4.2 ohm-meters to a depth of 7 meters - a conductivity thickness of 1.5 Mhos. The massive sulphide body consists almost entirely of galena and sphalerite with a calculated conductivity thickness from the PEM survey of 9 Mhos. The body is weathered to a depth of 40 meters. The first sample is dominated by the surficial conductivity and does not form an eddy current path position. The second, third and fourth samples produce eddy current path positions along the contact of the sulphide lens that faces the transmit loop. Since the sulphide lens has a low conductivity, the response of the fifth and sixth samples are weak and the eddy current paths are not accurately defined. In order to show the amplitudes of the responses measured, the vertical component is usually plotted as shown in Figure 15. The conductor is located below the cross-over position.

The presence of a conductive half space below the transmit loop results in eddy currents that flow in concentric rings around and outside the loop. The first sample eddy current flows close to the loop, with the later samples spaced further out as shown in the upper portion of Figure 16. The interval between the eddy current paths decreases as the conductivity-thickness of the half space increases. The lower portion of Figure 16, shows the current paths induced in a massive sulphide body without the presence of a surficial conductive zone. When the sulphide body occurs in a conductive half space, then both surficial and sulphide eddy currents are present as shown in the upper portion of Figure 17. In this case, a resultant current path will be detected by the receiver that is shown as a dashed line. This resultant current path for the early or high frequency samples, will be dominated by the surficial conductivity response. The later sample or low frequency resultant response, will be influenced to a greater degree by the more conductive sulphide body. The net effect is for the resultant current path to form a line that lies between the surficial and sulphide current paths. If transmit loops are employed on either side of the target area, then the approximate position of the sulphide zone can be determined as the area enclosed by the two resultant current paths, as shown in the lower portion of Figure 17.

This method was first tested in a profile over the

AARJA massive sulphide body in the Sultanate of Oman. The body approximates a cylinder some 50 to 100 meters in diameter of massive sulphides that has a shallow plunge of 20° from the horizontal. The test section has a depth to the top of the sulphide zone of 150 meters. The surficial conductivity in this area is 9 ohms meters to a depth of approximately 30 or 40 meters. The resultant induced current paths are shown in Figure 18, the eddy current paths from the eastern transmit loop as dashed circles, the paths from the western loop as solid circles with the orebody occurring between.

Further tests with the DEEPEM method in Australia, indicate that the induced current path method does not outline deep (100 meters plus) massive sulphide conductors, when the surficial conductivity-thickness product is in the order of 10 Mhos.

In this case the anomalous information is available in the measured readings but the eddy current path method lacks the sensitivity to unlock the sulphide response from the strong surficial response. Computer processing of the observed data to strip off the surficial conductivity background effect is now being investigated.

<u>BOREHOLE PULSE EM</u>

Crone Geophysics developed in 1976, a Pulse Borehole EM system for the Geological Survey of Canada with depth capabilities in excess of 1000 meters. The method uses a large single turn transmit loop laid out on surface and a receiver probe sent down the borehole. The advantages of the Pulse EM

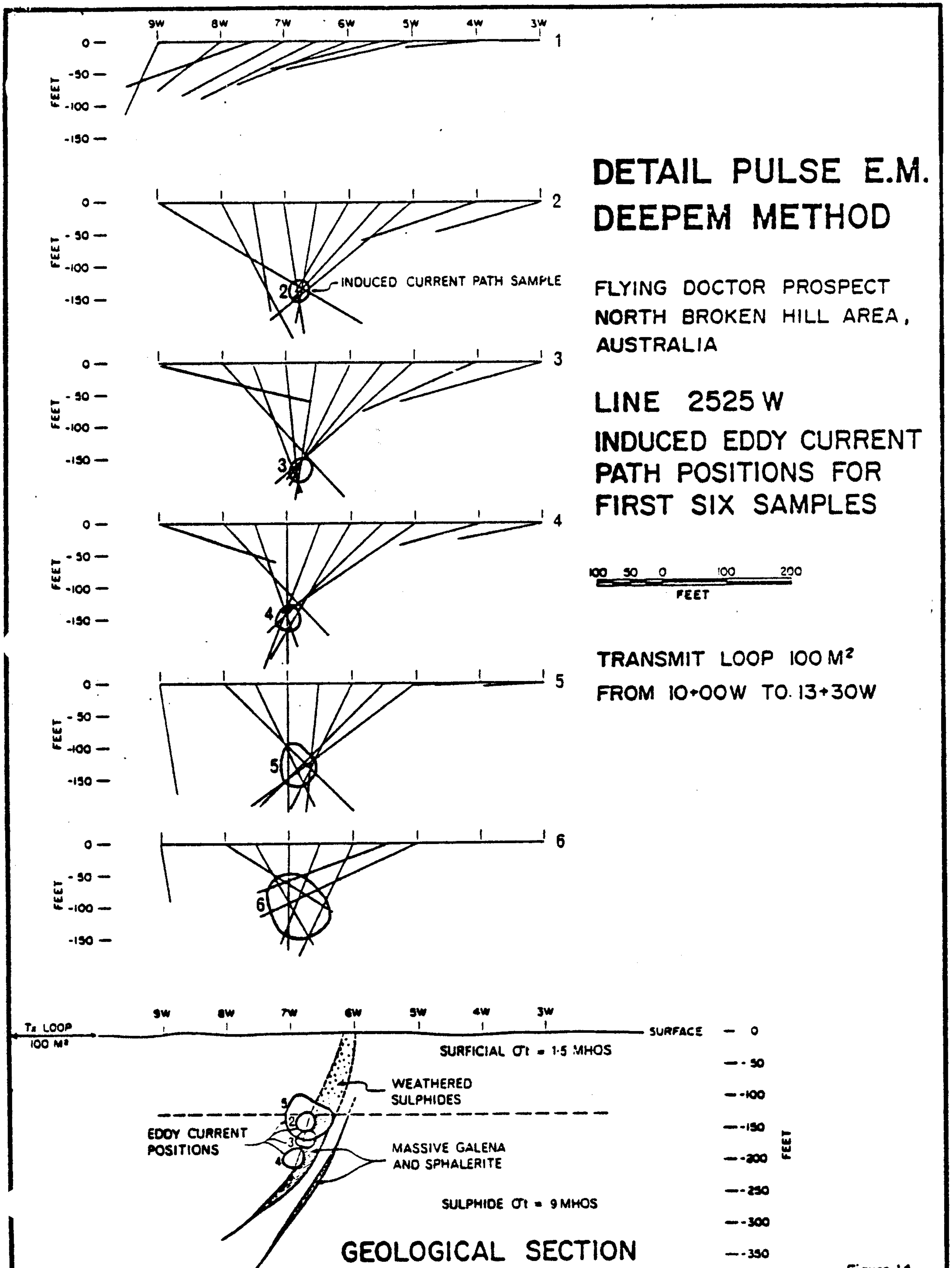

DETAIL PULSE E.M.
DEEPEM METHOD
FLYING DOCTOR PROSPECT
NORTH BROKEN HILL AREA,
AUSTRALIA
LINE 2525 W
INDUCED EDDY CURRENT
PATH POSITIONS FOR
FIRST SIX SAMPLES
100 50 0 100 200
FEET
TRANSMIT LOOP 100 M²
FROM 10+00W TO 13+30W
9W 8W 7W 6W 5W 4W 3W
0 -50 -100 -150
FEET
INDUCED CURRENT PATH SAMPLE
1 2 3 4 5 6
Tx LOOP
100 M²
SURFACE
SURFICIAL σt = 1·5 MHOS
WEATHERED
SULPHIDES
EDDY CURRENT
POSITIONS
MASSIVE GALENA
AND SPHALERITE
SULPHIDE σt = 9 MHOS
0 -50 -100 -150 -200 -250 -300 -350
GEOLOGICAL SECTION

Figure 14

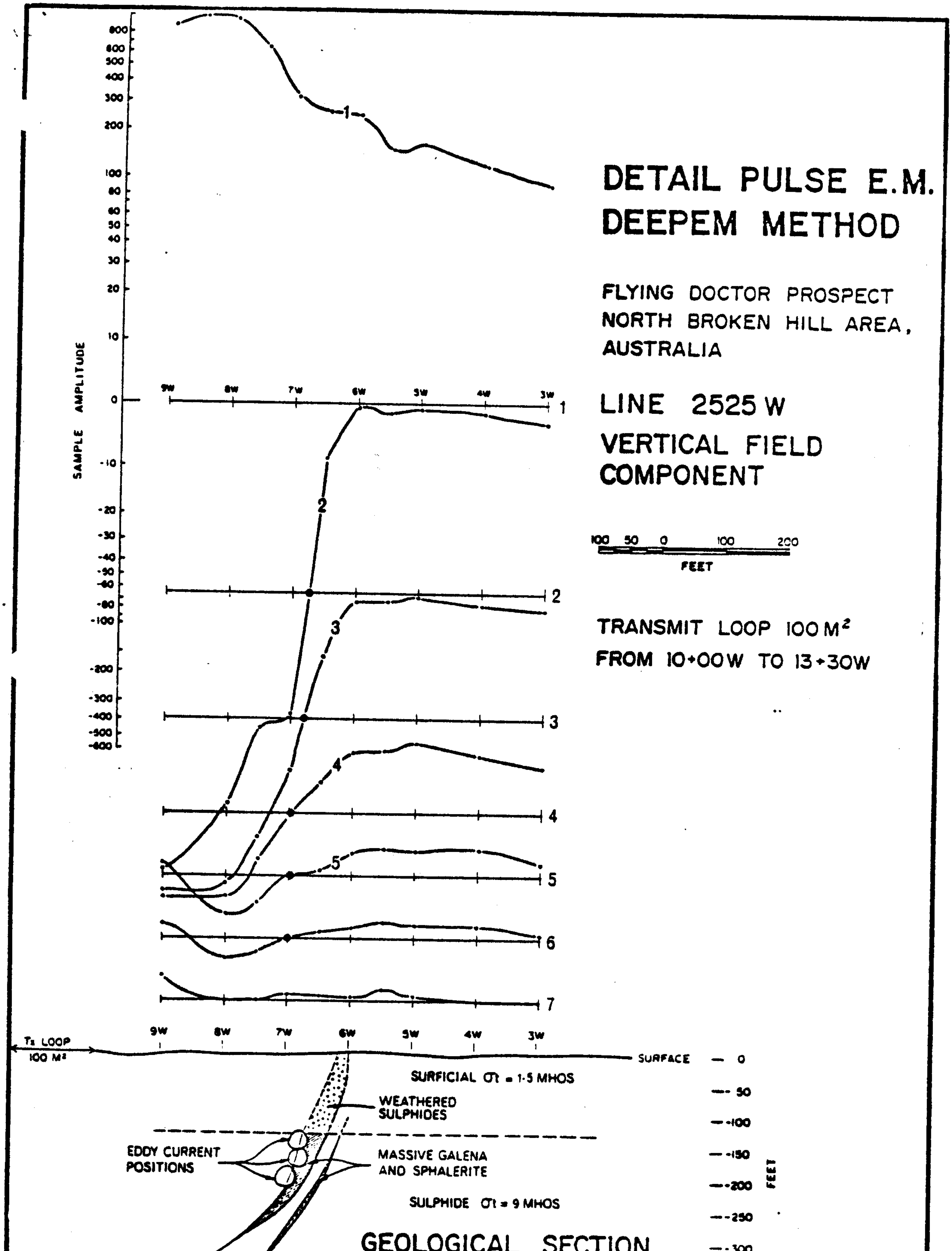
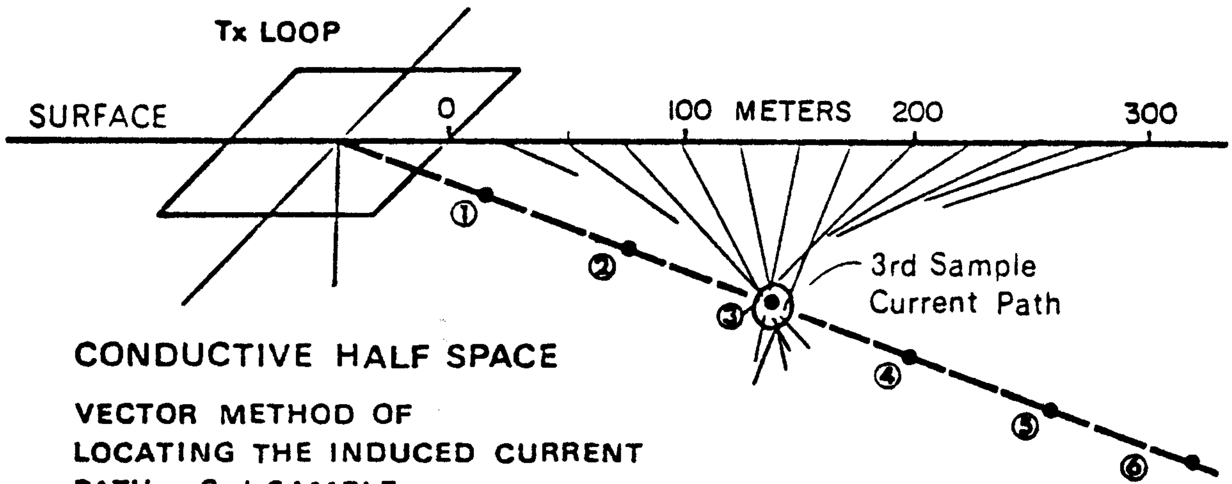
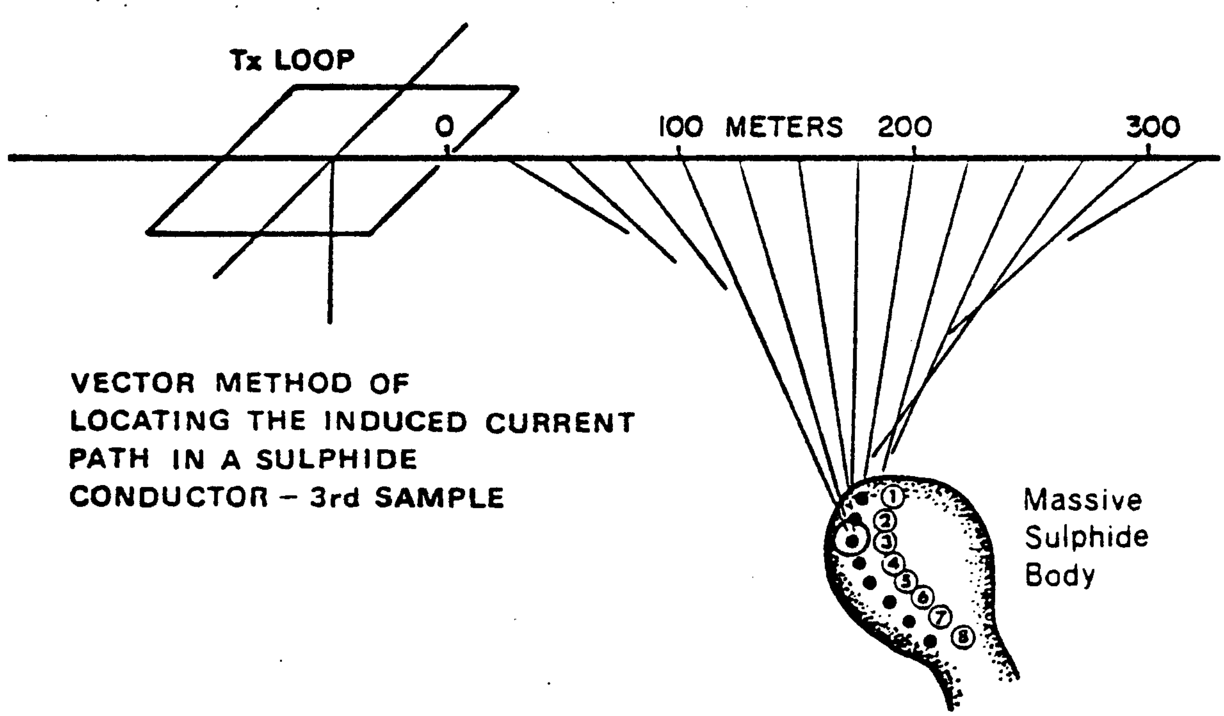

DETAIL PULSE E.M.
DEEPEM METHOD
FLYING DOCTOR PROSPECT
NORTH BROKEN HILL AREA,
AUSTRALIA
LINE 2525 W
VERTICAL FIELD
COMPONENT
100 50 0 100 200
FEET
TRANSMIT LOOP 100 M²
FROM 10+00W TO 13+30W
SAMPLE AMPLITUDE
800
600
500
400
300
200
100
80
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-80
-100
-200
-300
-400
-500
-600
9W 8W 7W 6W 5W 4W 3W
1
2
3
4
5
6
7
Tx LOOP
100 M²
SURFACE
SURFICIAL σt = 1·5 MHOS
WEATHERED
SULPHIDES
EDDY CURRENT
POSITIONS
MASSIVE GALENA
AND SPHALERITE
SULPHIDE σt = 9 MHOS
GEOLOGICAL SECTION
0
-50
-100
-150
-200
-250
-300
FEET

Figure 15

PULSE EM
DEEPEM METHOD

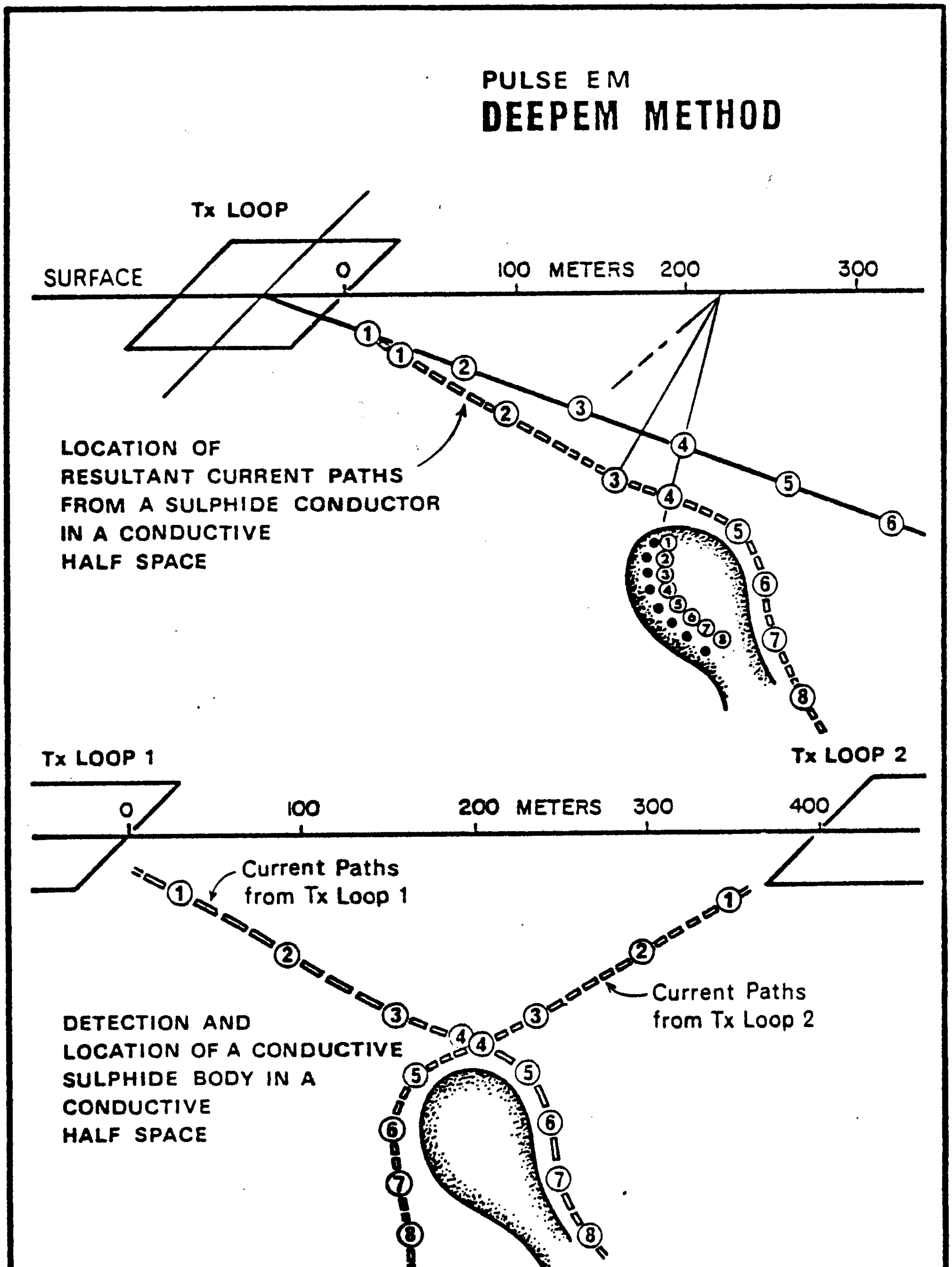


VECTOR METHOD OF LOCATING THE INDUCED CURRENT PATH – 3rd SAMPLE



VECTOR METHOD OF LOCATING THE INDUCED CURRENT PATH IN A SULPHIDE CONDUCTOR – 3rd SAMPLE

FIGURE 16



PULSE EM
DEEPEM METHOD
Tx LOOP
SURFACE
0
100 METERS 200
300
LOCATION OF
RESULTANT CURRENT PATHS
FROM A SULPHIDE CONDUCTOR
IN A CONDUCTIVE
HALF SPACE
Tx LOOP 1
Tx LOOP 2
0
100
200 METERS
300
400
Current Paths
from Tx Loop 1
Current Paths
from Tx Loop 2
DETECTION AND
LOCATION OF A CONDUCTIVE
SULPHIDE BODY IN A
CONDUCTIVE
HALF SPACE

FIGURE 17

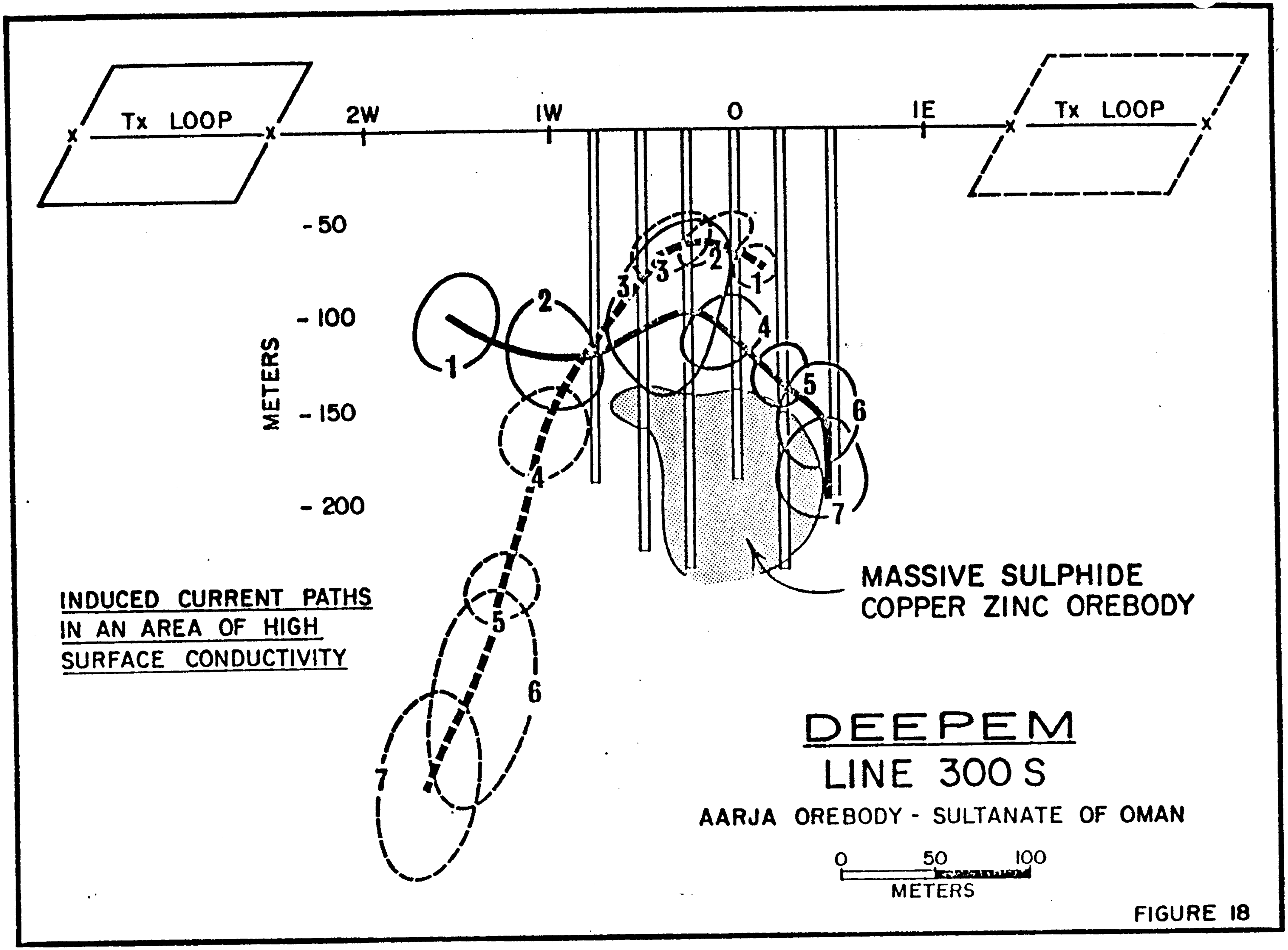

Tx LOOP
2W
IW
O
IE
Tx LOOP
METERS
- 50
- 100
- 150
- 200
INDUCED CURRENT PATHS
IN AN AREA OF HIGH
SURFACE CONDUCTIVITY
MASSIVE SULPHIDE
COPPER ZINC OREBODY
DEEPEM
LINE 300 S
AARJA OREBODY - SULTANATE OF OMAN
0 50 100
METERS

FIGURE 18

Deep Creek.

Deep creek flows into the Bulkley river about 2½ miles above Quick. Mineral properties situated at the headwaters are conveniently reached from Telkwa, from which place a car can be taken as far as Smith's ranch (unoccupied in 1928), situated on the creek, at a point about 7 miles from its mouth and 17½ miles from Telkwa. From Smith's ranch a good trail with an easy grade leads northwards as far as Dome mountain.

Deep Creek. This group is owned by T. Brewer and T. Brandon and is distant about 3½ miles from Smith's ranch, the distance from Telkwa being about 21 miles. The mineral occurrence exhibited is that of mineralized volcanic beds. Mineralization consists of pyrite, chalcopyrite, and zinc-blende, and is sparse on the whole, although there are bands up to 5½ feet in width fairly well mineralized. These bands are heavily stained with iron and the presence of a little manganese is indicated. Various open-cuts and pits indicate a mineralized width of not less than 56 feet and a length of not less than 500 feet. Mineralization appears to conform in strike and dip with the bedding-planes of the enclosing schisted andesite, which strike N. 50° W. (mag.) and dip north-east.

The elevation of the exposures is 4,140 feet and the topography is that of hilly country transitional between mountains and plateau, which unfortunately does not lend itself to the cheapest modes of development. Nevertheless, it is an occurrence which merits further investigation and is readily accessible.

A sample taken across 5.5 feet, representing the most heavily mineralized band, assayed: Gold, trace; silver, 0.6 oz. to the ton; copper, 0.2 per cent.; zinc, 1.5 per cent. A sample of selected mineral assayed: Gold, trace; silver, 4 oz. to the ton; copper, 1.5 per cent.; zinc, 2 per cent.

The mineralization may be due to some near-by granitic intrusion, and it would seem advisable to search for such, which if found might throw further light on the occurrence.

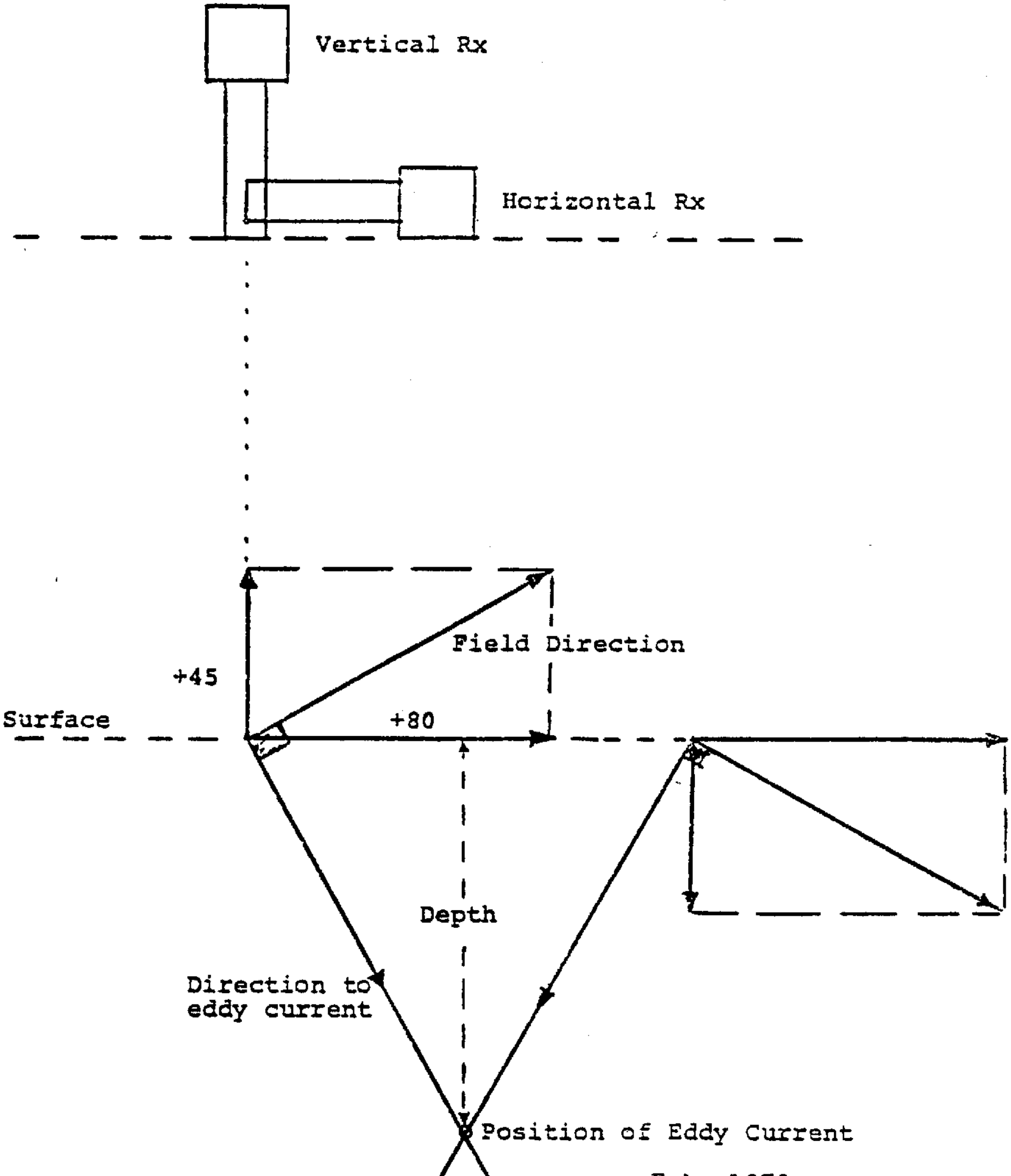
B.C.M.M. 1929. p170.

Z are read on a normal survey. The secondary field lines for samples (Channels) 1 and 2 are shown on Figures 1 and 2. The resultant field, from the X and Z component, is termed the scalar field. This field is important for finite conductors. The right angle to this resultant field is the VECTOR which for an infinite source model will point at an eddy current position. Thus, since 8 channels, equivalent to 8 frequencies, are obtained at each station. A considerable amount of information is available for interpretation of the source field and its host environment. Glen E. White Geophysical Consulting & Services Ltd. has developed computer plotting routines which plot the vector sections, horizontal components, vertical components and plan maps of the horizontal component data.

SURVEY RESULTS

Horizontal Loop Data

Figure 3 shows a low amplitude horizontal loop PEM anomaly. This example is from Northair Mines Ltd. a successfully producing gold mine near Squamish, B.C. The zone shown is the "Discovery" zone with some 4% P_b minor pyrite and chalcopyrite with precious metal values. The PEM in channels 1 - 3 detects a mineralized fault zone beneath the road. Channels 4 - 8



Feb. 1979 Fig. 1

by setting to 1000 a sample taken of the maximum shut-off voltage amplitude measured at the receiver. Thus, the pulse method is free of the geometrical restriction between the transmit and receive coil positions. This means that accurate surveys can be obtained in rugged and heavily timbered terrain.

SURVEY TECHNIQUES

Horizontal Loop Survey

The PEM system can be used as a regular horizontal loop electromagnetometer system with coil separations up to 150 m depending upon the primary transmit coil size. The normal coil is a multi-turn loop of wire 6 m in diameter laid out in a rough circle on the ground. Daily production varies from 50 - 120 readings depending upon terrain. Penetration is equivalent to the Max-Min system at ≁ 50% of the coil separation. Production by conventional systems such as the Max-Min system in flat terrain is greater than the PEM. However, where secant chaining is required or more than 3 frequencies are taken, the PEM becomes the more cost-effective instrument. This is particularly apparent in the Cordilleran where many mineral zones are poor conductors and their responses equal that caused by topography with conventional systems. Thus, since the PEM reads only the secondary field response, it is relatively free of these geometrical restrictions. The availability of the eight channels allows for more precise interpretation of surficial conductors or changes in lithology.

Vector Electromagnetic Surveying

The vector pulse electromagnetometer system is a new survey technique which is giving deep penetration in the order of 200 - 300 m and is able to resolve complex finite source and infinite source conductor fields. This system is very cost-effective and has been successful in detecting narrow finite source conductors such as plunging lenses of massive sulphide mineralization and infinite source conductors such as those beneath the Athabasca sandstone in Saskatchewan. The vector pulse electromagnetometer system uses a transmit loop of 100 - 150 m / side which gives a powerful dipole magnetic moment. Thus, since only the secondary field is read, the receiver can be moved at intervals away from the transmit loop. An area of 600 x 800 m can be covered / side from one loop setup. At each station, X, Y and Z components can be obtained. Only the horizontal X and vertical

VECTOR PULSE ELECTROMAGNETOMETER SURVEYING

Glen E. White, B.Sc., P. ENG.
Consulting Geophysicist
February 1979

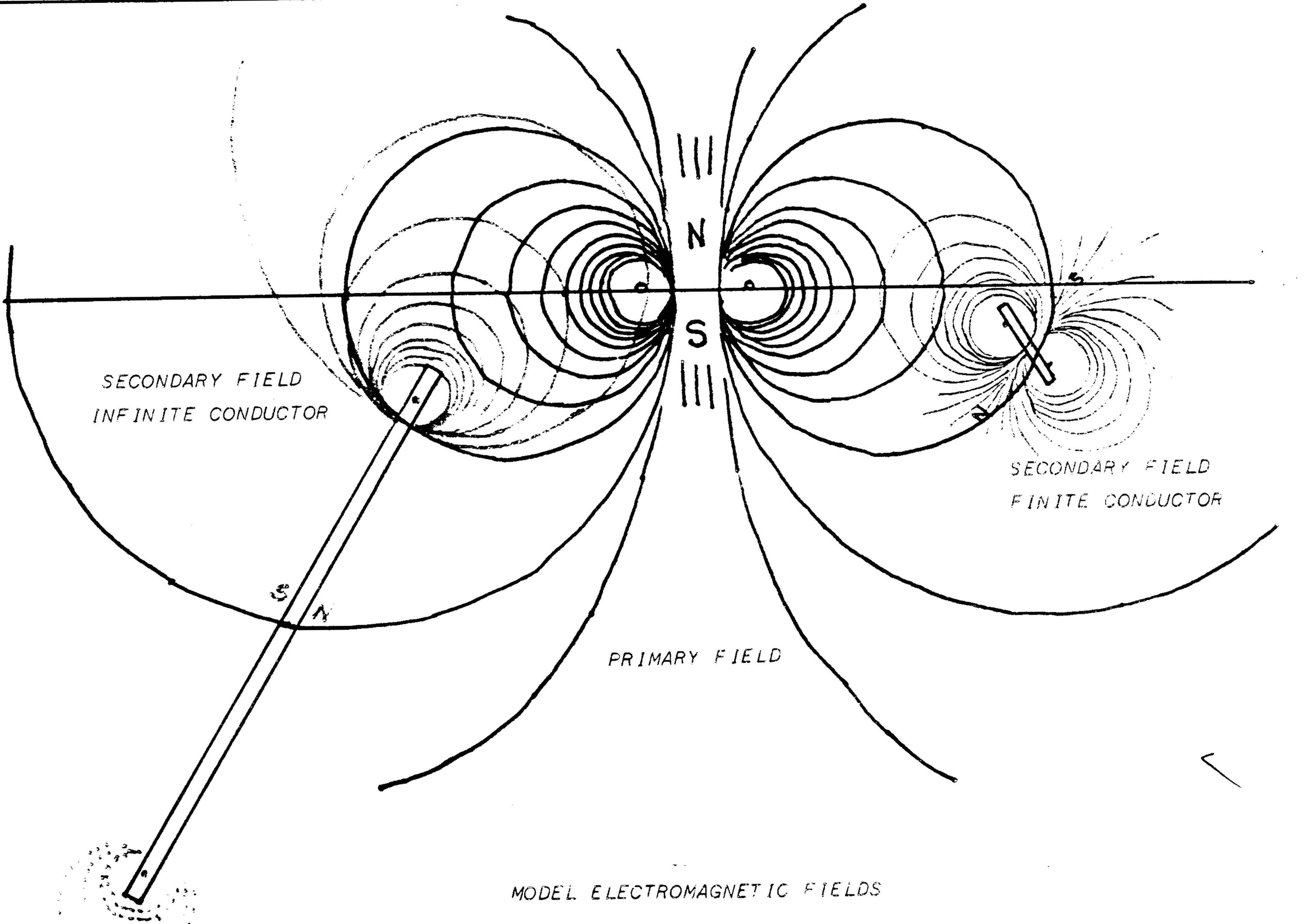
INTRODUCTION

The purpose of this short paper is to give a general description of the vector pulse electromagnetometer method and its application and cost effectiveness to mineral exploration.

INSTRUMENTATION

The VEM technique utilizes the Crone pulse electromagnetometer system and is comparable to the DEEPEM method described by Duncan Crone.

The pulse electromagnetometer system is a time domain electromagnetometer system which measures the secondary field directly rather than a resultant field reading. The primary current wave form through the transmitter loop is 10.8 ms on, 10.8 ms off with a 1.4 ms ramp shut-off. The current wave form pattern is transmitted to the receiver by radio (or cable if required in horizontal loop surveys) where eight delay time-windows or channels, of the secondary field are sampled after the current shut-off at 0.15, 0.30, 0.55, 0.90, 1.45, 2.40, 4.00 and 6.40 milliseconds to the center of the sample. This gives an approximate frequency equivalent range of 2000 cps to 20 cps. The sample amplitude is normalized



MODEL ELECTROMAGNETIC FIELDS

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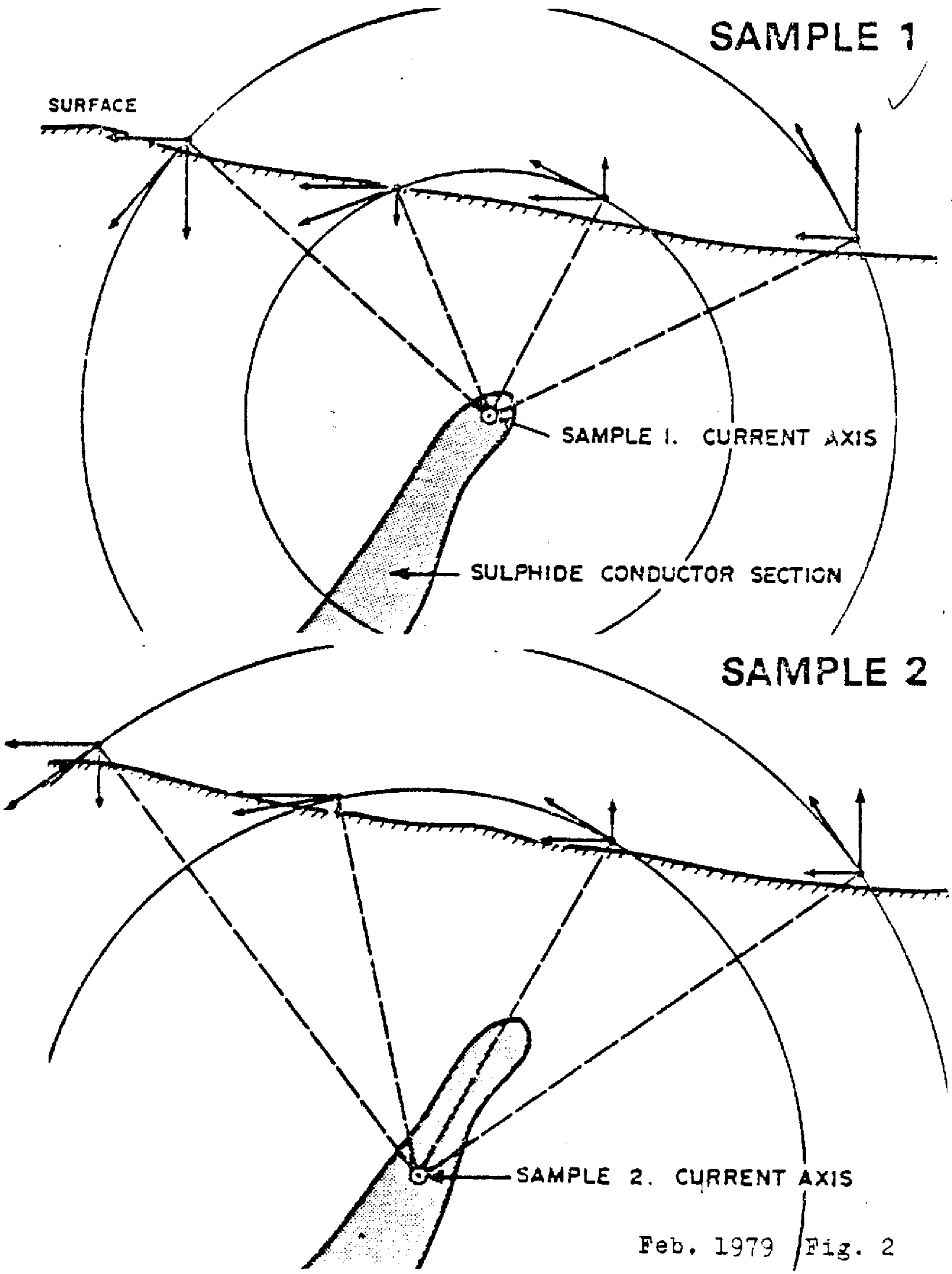


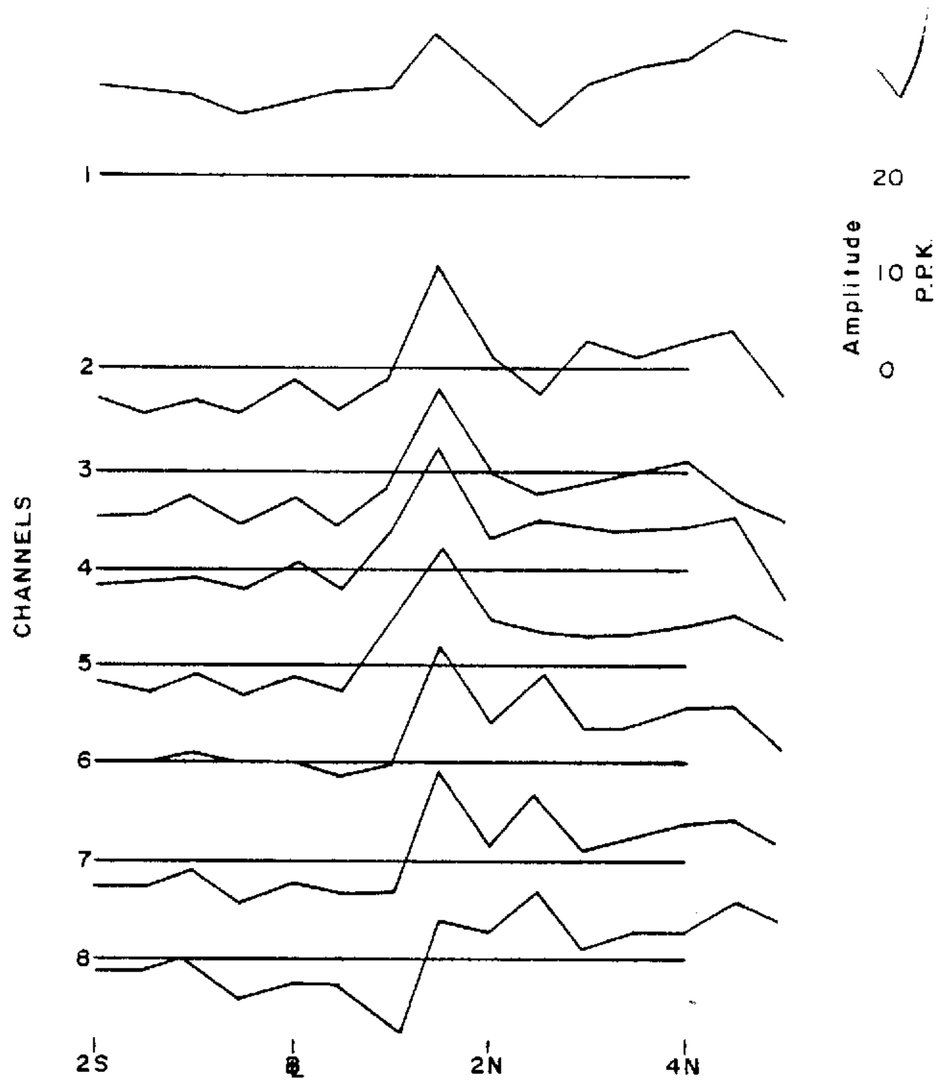
Location of the Current Path in the Conductor

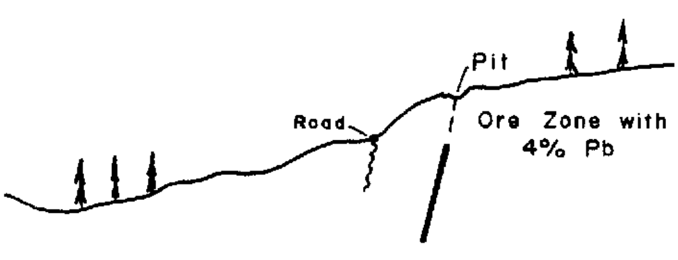
NORTHAIR MINES LTD.

PULSE ELECTROMAGNETOMETER TEST

COIL . SPACING 200 FEET

VERT. & HORZ. SCALE : 1" = 200'





Feb. 1979 Fig. 3

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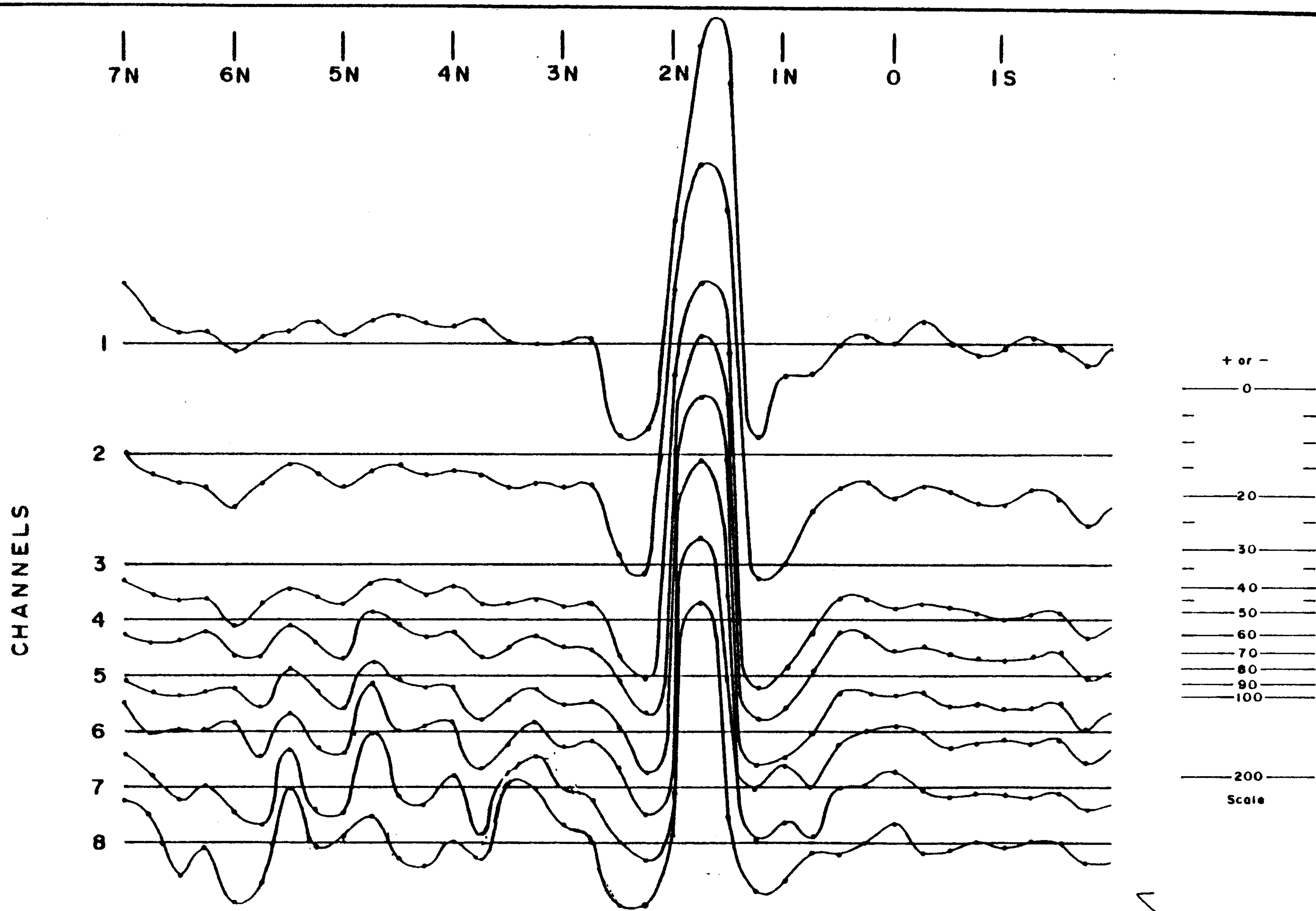

NARROW MASSIVE SULPHIDE CONDUCTOR

— HORIZONTAL LOOP P.E.M. —

SEPARATION 50M

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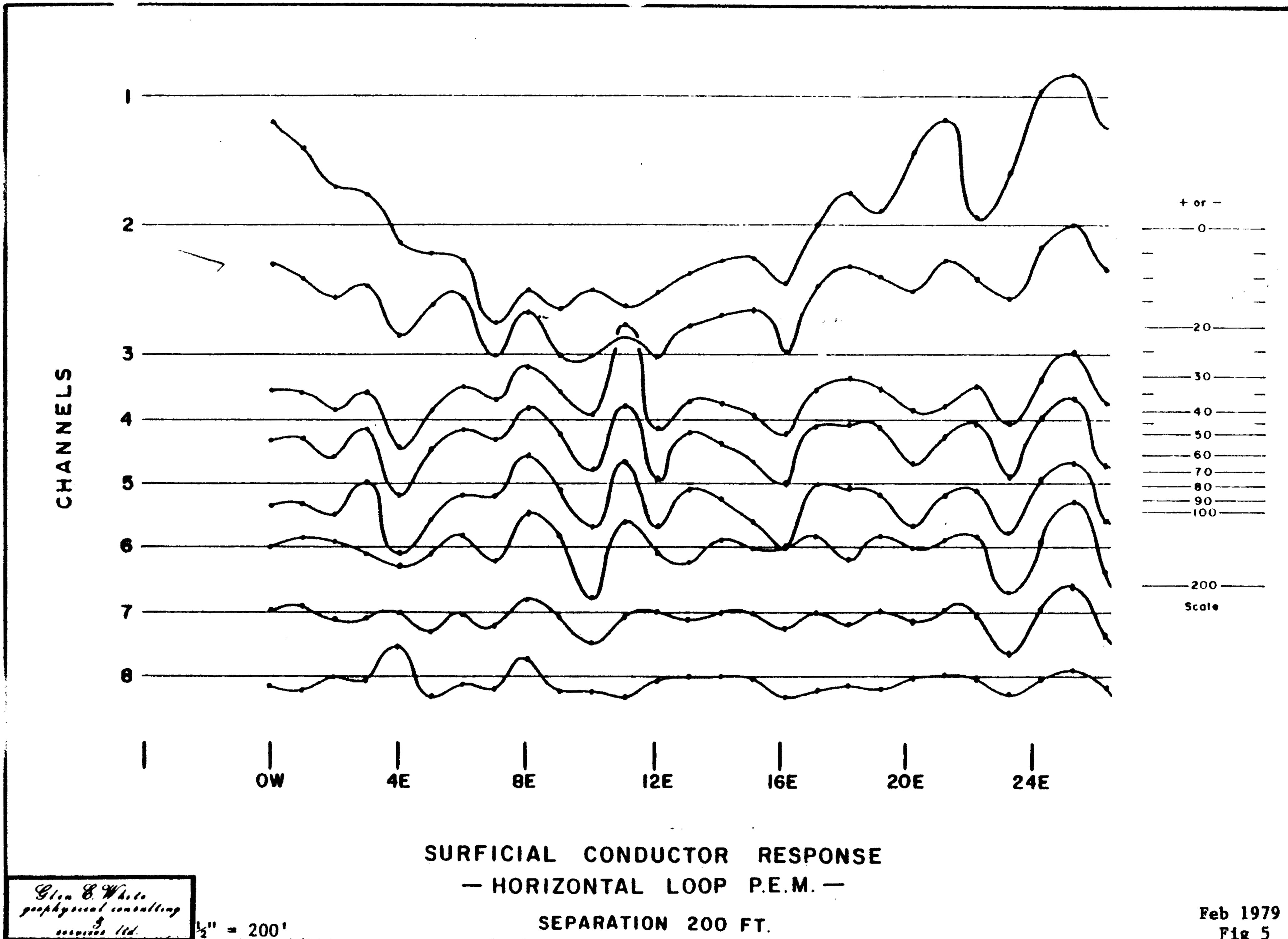
1cm = 50m

Feb. 1979

Fig. 4



SURFICIAL CONDUCTOR RESPONSE

— HORIZONTAL LOOP P.E.M. —

SEPARATION 200 FT.

Feb 1979
Fig 5

which are equivalent to decreasing frequencies, detect the ore zone at a depth of some 100 feet.

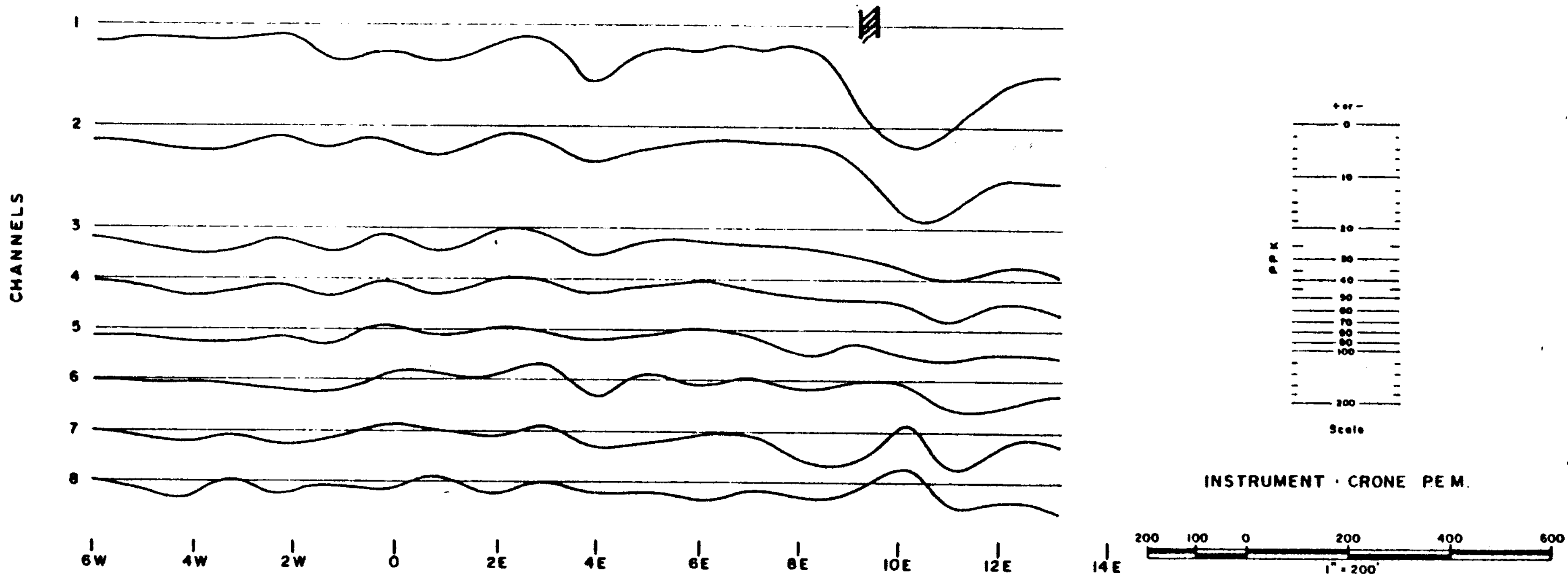
Figure 4 illustrates the response of the PEM system to a narrow near surface zone of conductive massive pyrite-pyrrhotite mineralization.

Figure 5 shows a surficial anomaly which is reflected in the highest frequencies, channels 1 and 2. This anomaly is caused by clays of some 10 - 50 ohm-meters overlying a small basin of graphite-bearing lacustrine sediments.

Vector EM Data Infinte Sources

Figure 6 is presented with the kind permission of Robert and Amigo Mines and shows a classic vector section of an infinite line source conductor with focusing of channels 1 - 5 at a depth of 400 feet.

Figure 7 shows the horizontal loop profile with a separation of 200 feet across the same line. Elsewhere on this particular property, the horizontal loop survey gives responses similar to Figure 4. However, the anomaly on line 4S may have been overlooked if only the horizontal loop method had been undertaken. The advantage of the VEM technique is that at any given station it has a detection ability



N.T.S. 82 E/2

ROBERT & AMIGO MINES

GREENWOOD MINING DIVISION – B.C.

PULSE ELECTROMAGNETOMETER
SEPARATION 200 FT.
LINE 4+00 S

To Accompany Geoph...
Date ....
By GLEN E WHITE P.S. .... GEOPHYSICIST

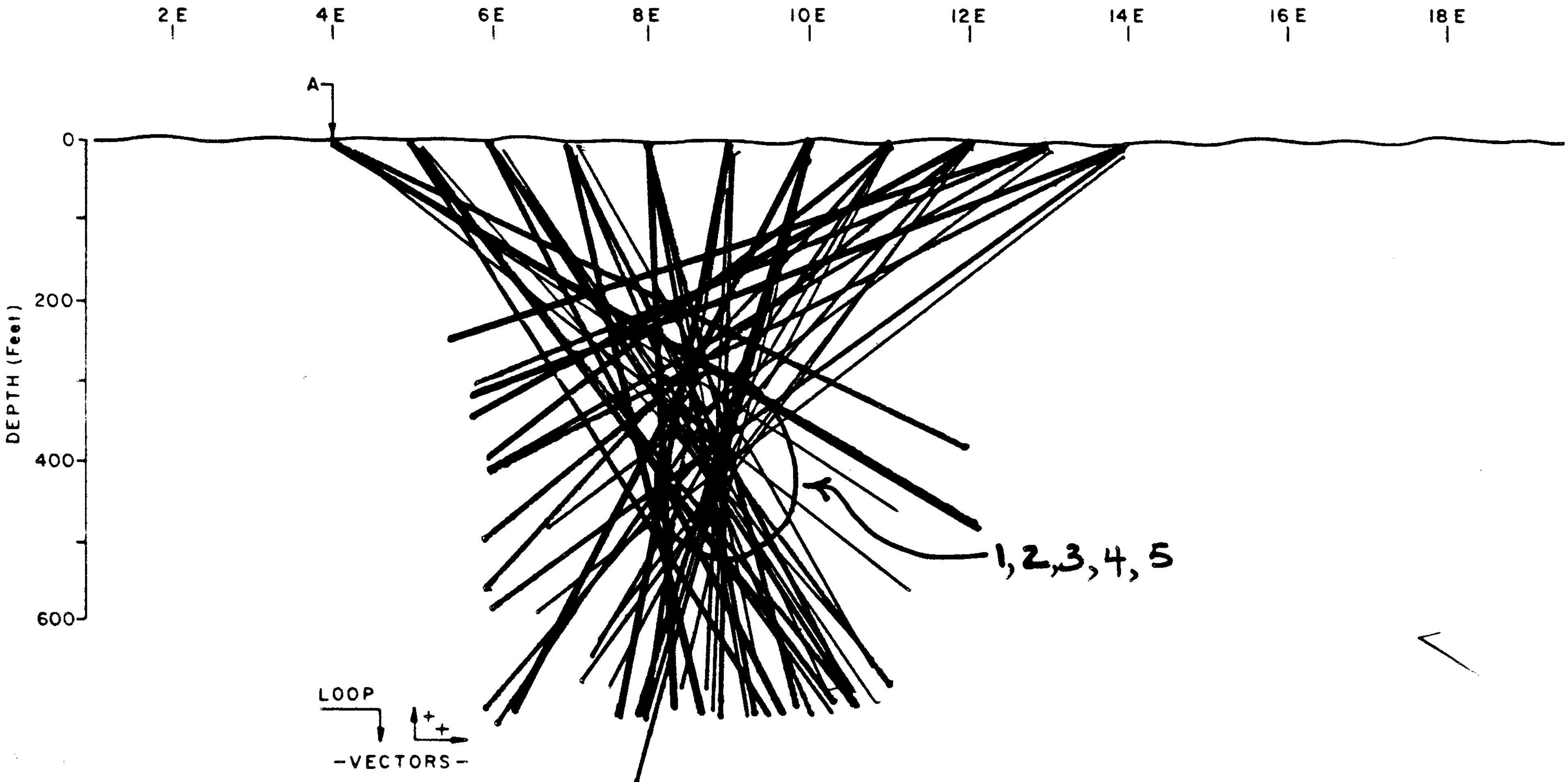
PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — GLEN E. WHITE

Glen E. White geophysical consulting & services ltd.

INTERPRETED BY: G.E.W.
DRAWN BY: T.M.
CHECKED BY:
DATE: MAY, 1970
FIG No: 10

Glen E. White geophysical consulting & services ltd.

Fig 7



-VECTORS-

CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
CHANNEL 5
CHANNEL 6
CHANNEL 7
CHANNEL 8

ROBERT & AMIGO MINES
PULSE ELECTROMAGNETOMETER
-VECTOR SECTION-
LINE 4+00 S
-INSTRUMENT: CRONE P.E.M.-

Scale 1" = 200'

Fig 6

MAY, 1978
FIG. 34

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of some 300 m depending upon the conductivity thickness product of the source. Experience has shown that because of the large magnetic moment of the transmit loop, poor anomalies can be detected to a depth of some 100 - 200 m beyond the conductivity thickness product range of both the PEM and Max-Min systems.

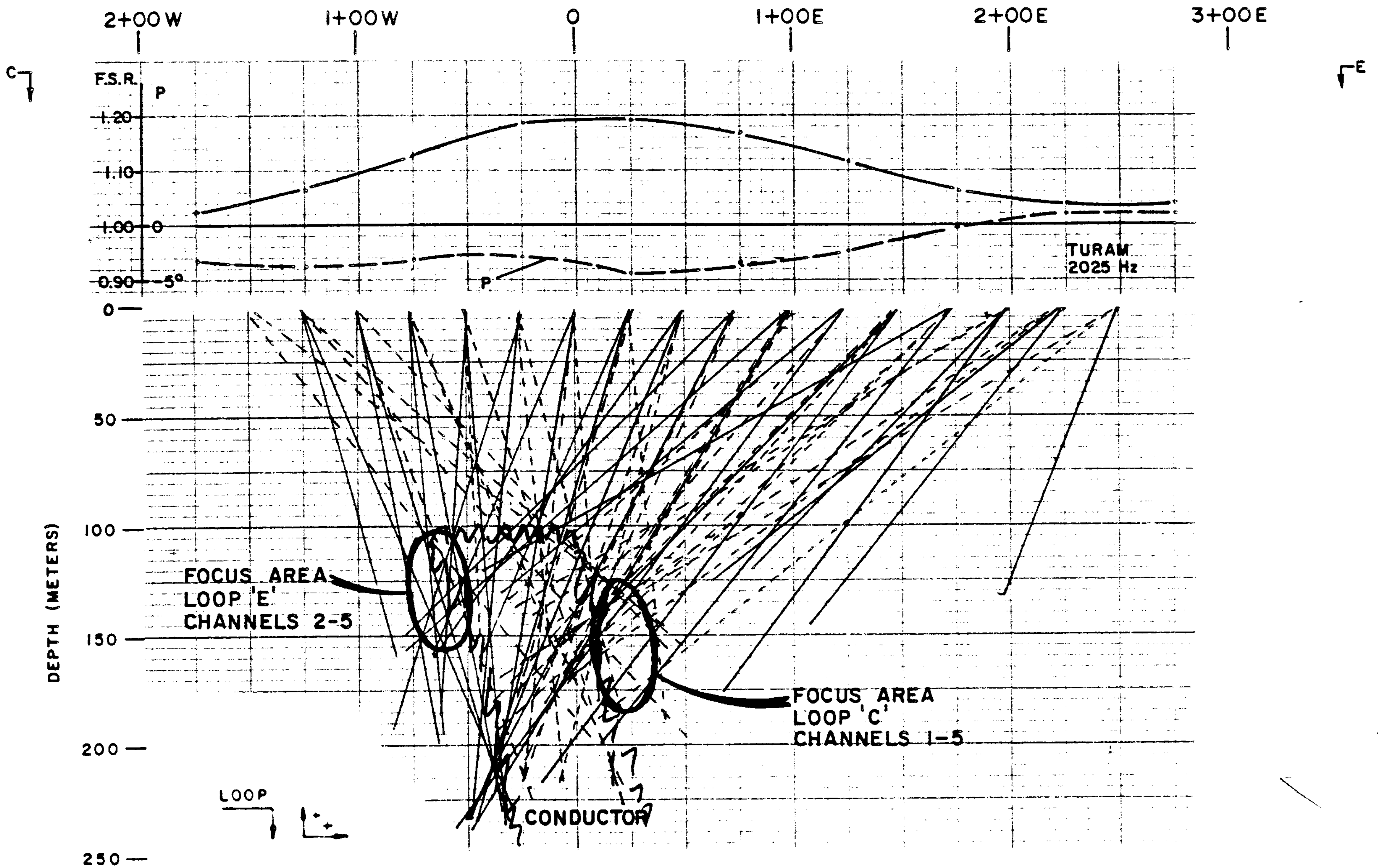
Figure 8 is published by the kind permission of Mr. Don Buchholz, P. Eng, Manager of Mining, Asamera Oil Corporation, who with his experience in time domain EM in Australia was willing to test our technique in Saskatchewan. This Figure is a composite of two loop setups and shows only the channels 1 and 2 data. A turam profile taken with an Androtex unit is shown for comparison. The vector data clearly defines both flanks of the conductor and gives a depth to top of some 100 m.

Vector EM Data Finite Sources

Figures 9, 10 and 11 are illustrated with the kind permission of Nels Vollo of Craigmont Mines Ltd. and cover a line across a massive sulphide prospect near Kamloops, B. C. Figure 9 shows channels 1 and 2 plots of the secondary electromagnetic field data which indicates that the mineral zone is responding as a dipole magnet or as a finite electromagnetic source. The vectors on the dashed lines show a very shallow focus and can not be used in this model. The actual horizontal and vertical component plots are shown on Figures 10 and 11 where a conductor of good conductivity thickness product is easily interpreted.

Figure 12 illustrates an example where a conventional horizontal loop survey has insufficient magnetic moment to energize a plunging lense of poorly conductive sulphide mineralization. The center of this lense contains 10 feet of 3.5% copper. The vector technique on the other hand, with its large magnetic moment, energizes the complete crossectional area of the lense, and a weak secondary field is generated as is indicated by the channel 1 horizontal component data.

Figures 13 and 14 depict a more complex situation in an area of an old mine, where finite lenses of massive sulphide mineralization are located in a volcanic/sedimentary complex where there is a mixture of syngentic and fracture filling pyrite and irregular topography. They are used by kind permission but not of disclosure. Figure 13 shows a chargeability profile obtained with a 60 m Wenner array which gave two weakly anomalous peaks, one in an area of a resistivity low and the other in an area of high resistivity.



CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4

CHANNEL 5
CHANNEL 6
CHANNEL 7
CHANNEL 8

ASAMERA OIL COMPANY LTD.

PULSE ELECTROMAGNETOMETER
— VECTOR SECTION —

1 cm = 25 m

— INSTRUMENT CRONE PEM —

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Fig. 8

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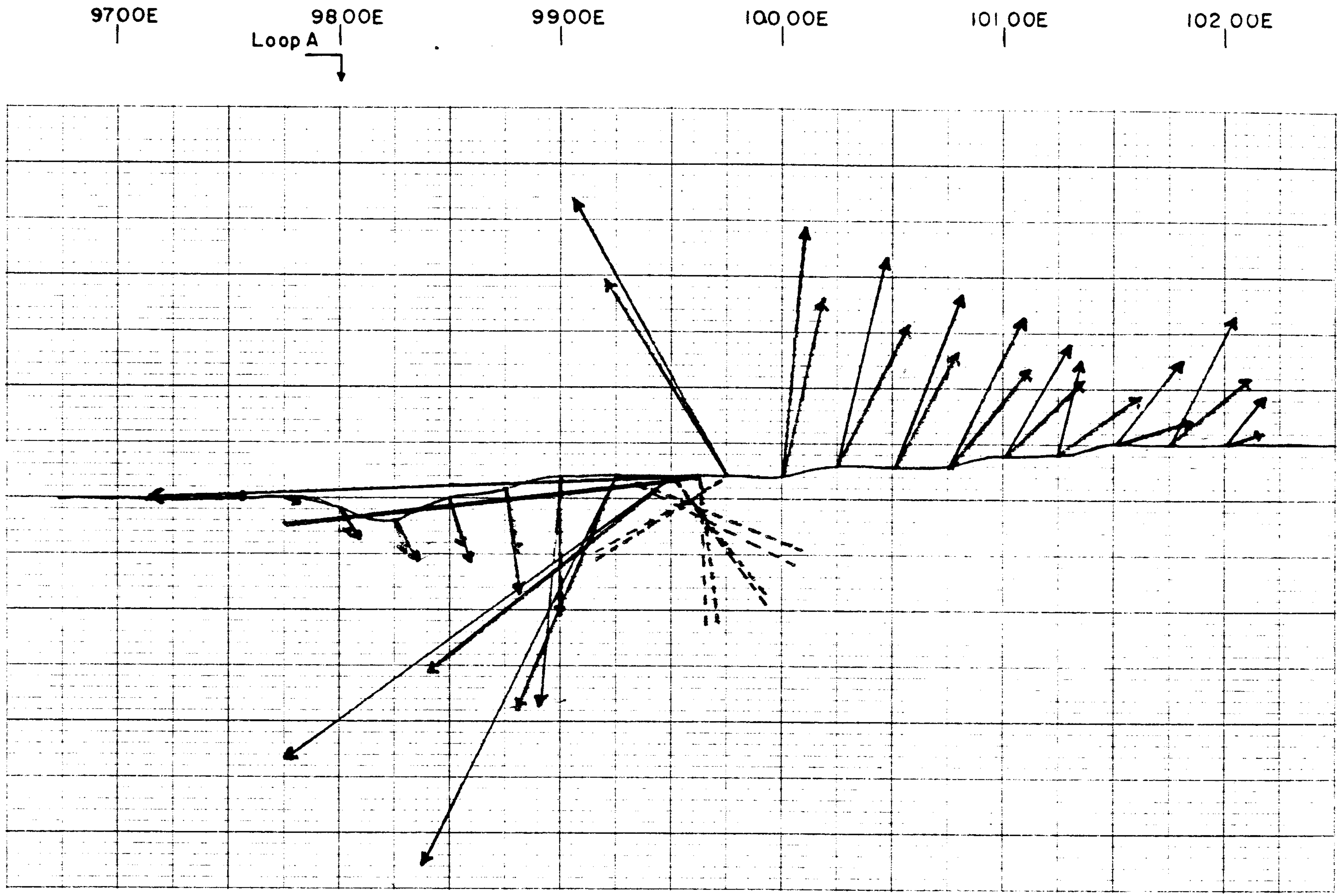


CHANNEL 1
CHANNEL 2

CRAIGMONT MINES LTD
CHU CHUA MOUNTAIN PROJECT
PULSE ELECTROMAGNETOMETER
RESULTANT SECONDARY FIELD
LINE 10000N

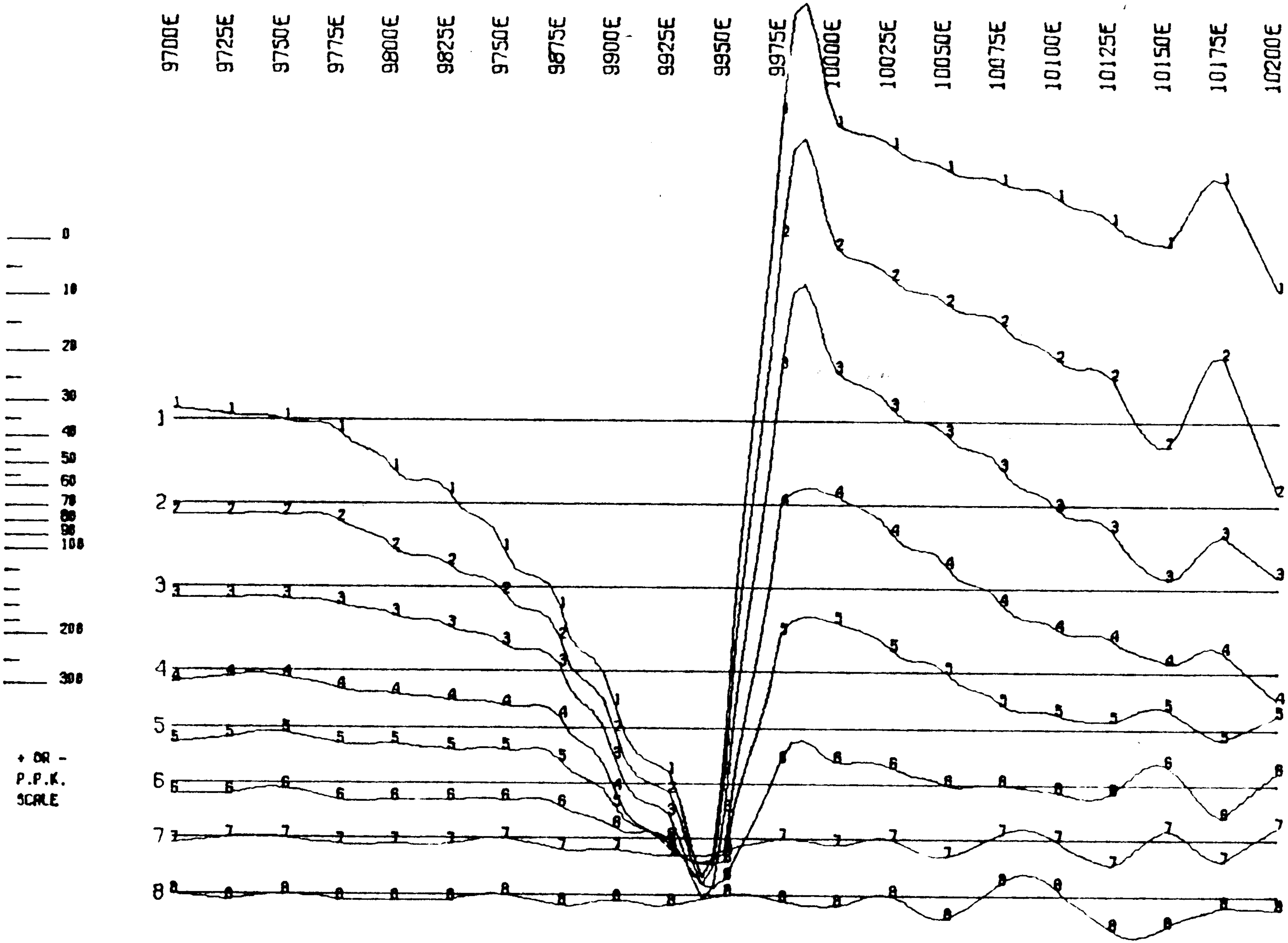
Fig 9

Scale 1cm = 20 p.p.k.

1 cm : 25 Metres

— INSTRUMENT CRONE PEM —

NOV 1978
FIG 18



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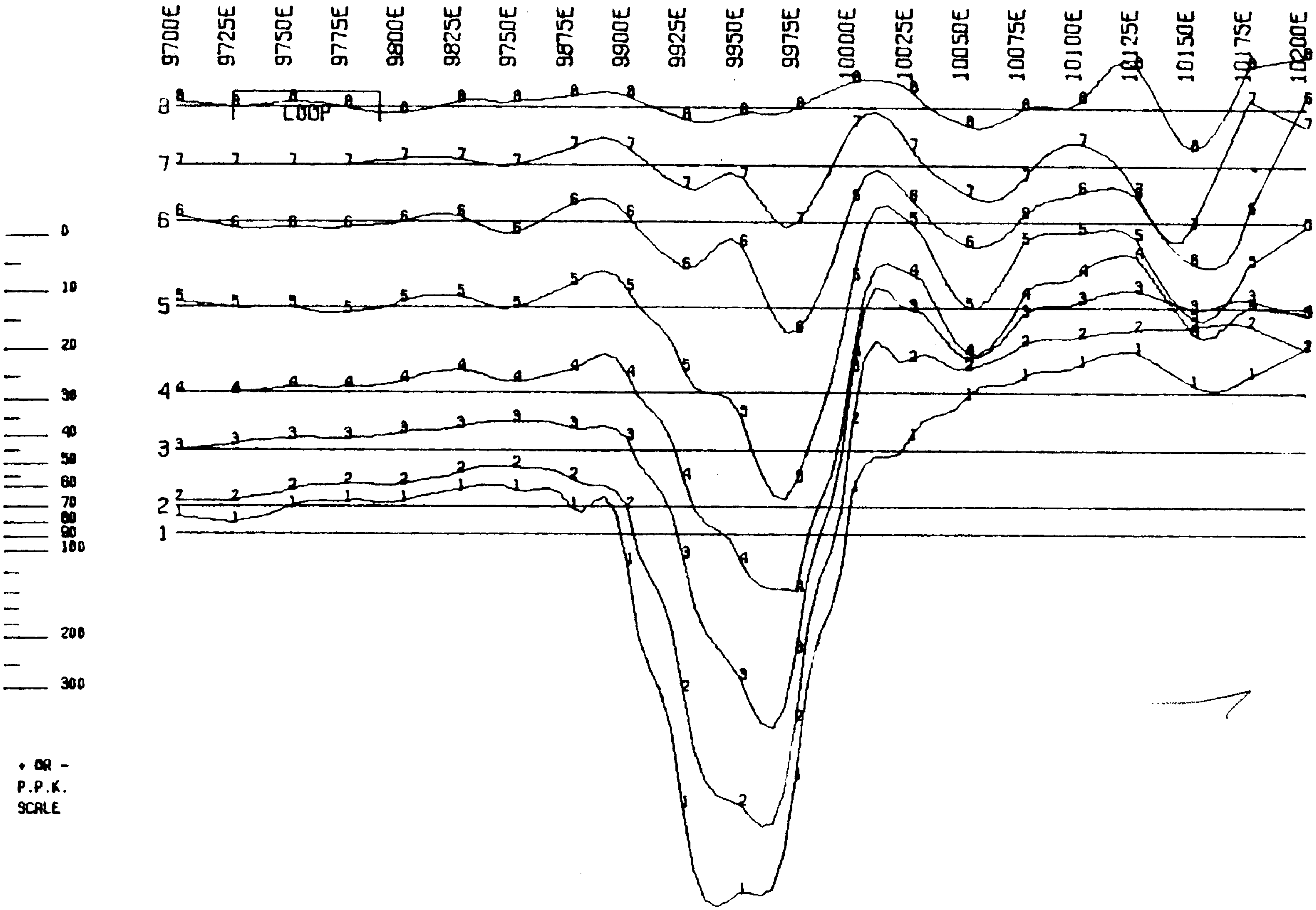
& SERVICES LTD.

CRAIGMONT MINES LTD.
CHU CHUA MOUNTAIN PROJECT
LINE 10000 N LOOP A

1 CM = 25 METERS
PULSE ELECTROMAGNETOMETER
VERTICAL COMPONENT

Fig 11



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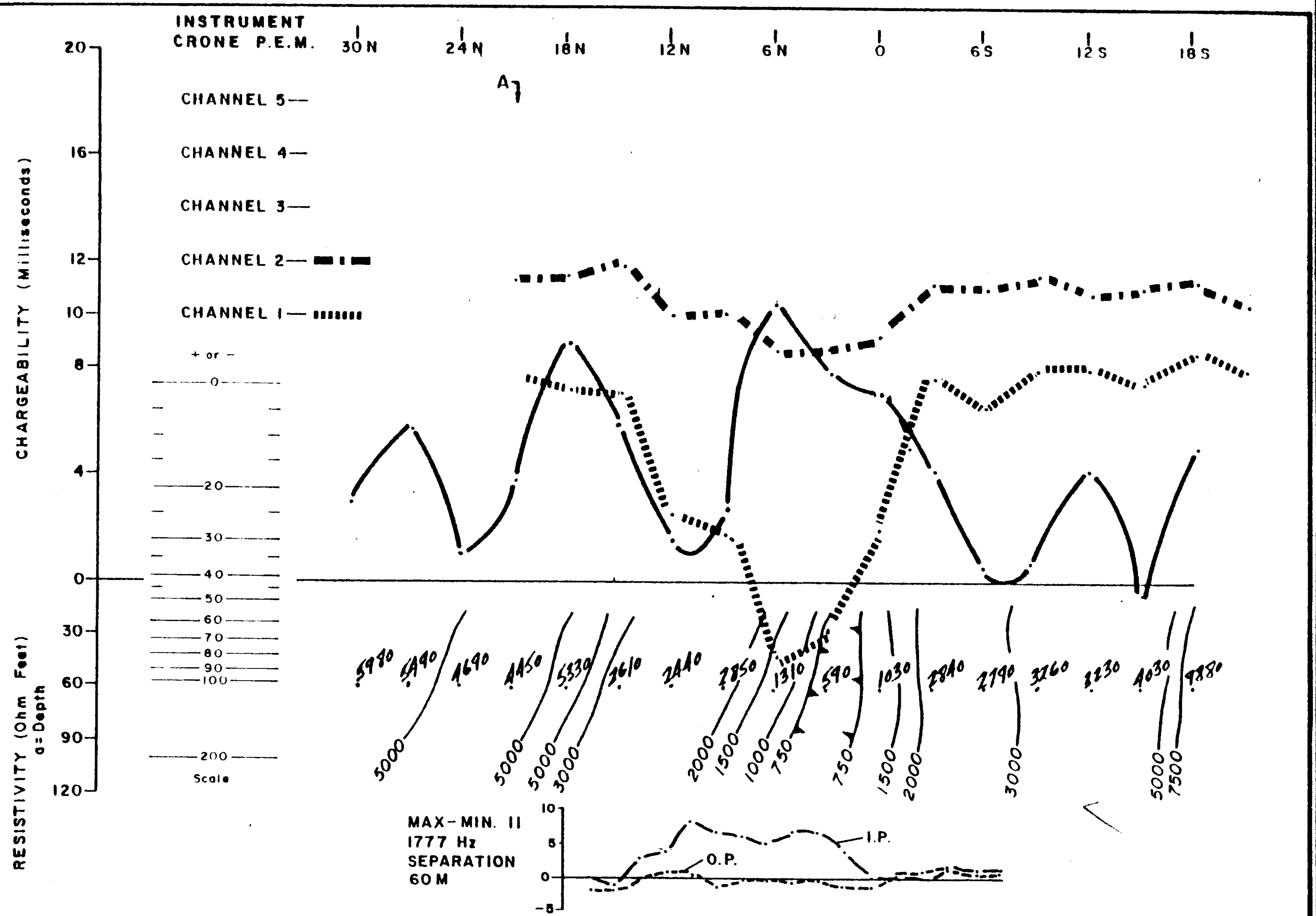
& SERVICES LTD.

CRAIGMONT MINES LTD.
CHU CHUA MOUNTAIN PROJECT
LINE 10000 N LOOP A

1 CM = 25 METERS
PULSE ELECTROMAGNETOMETER
HORIZONTAL COMPONENT

Fig 10



INDUCED POLARIZATION PROFILES &
VECTOR PULSE ELECTROMAGNETOMETER
HORIZONTAL COMPONENT

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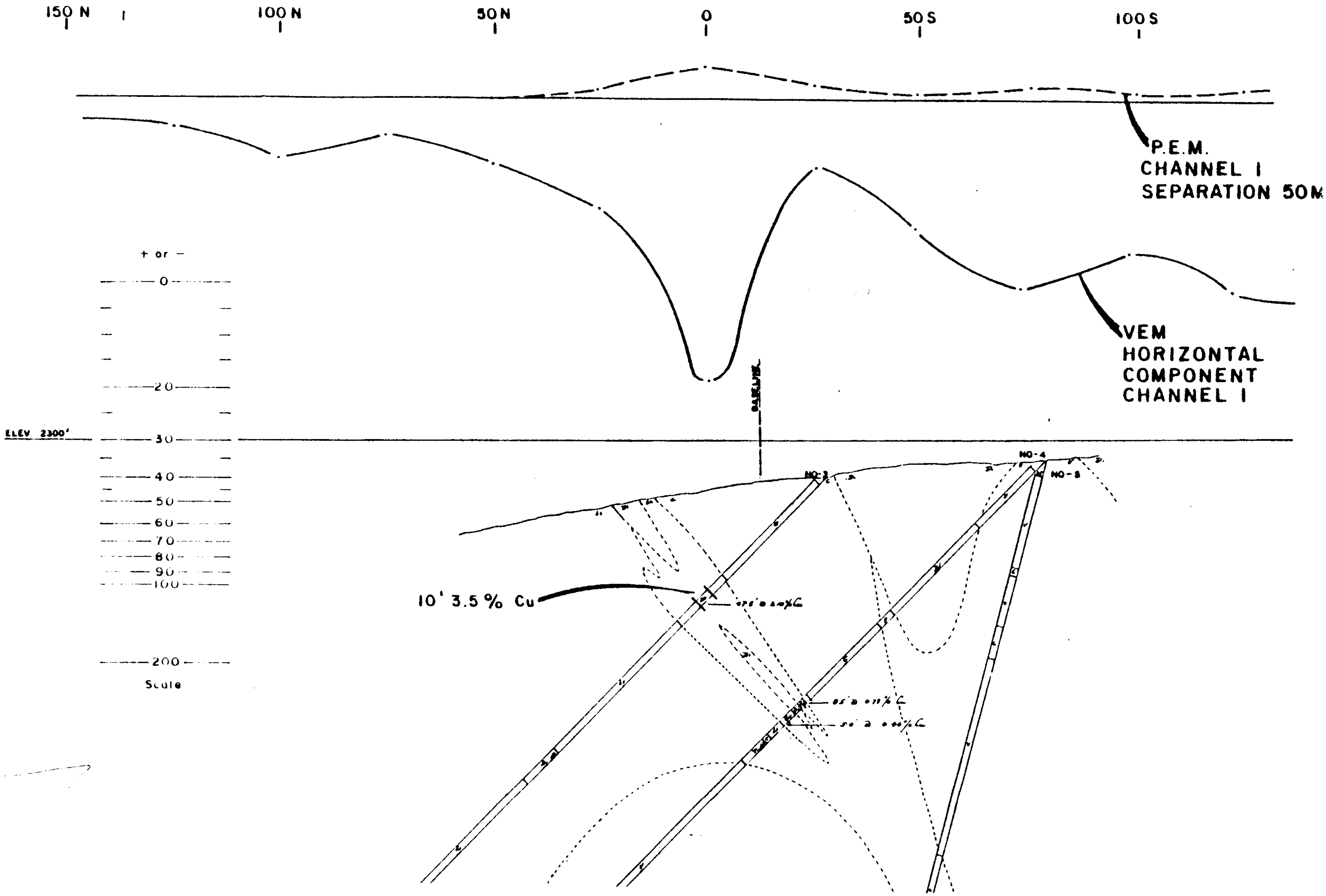
1cm = 30m

Feb. 1979
Fig. 13



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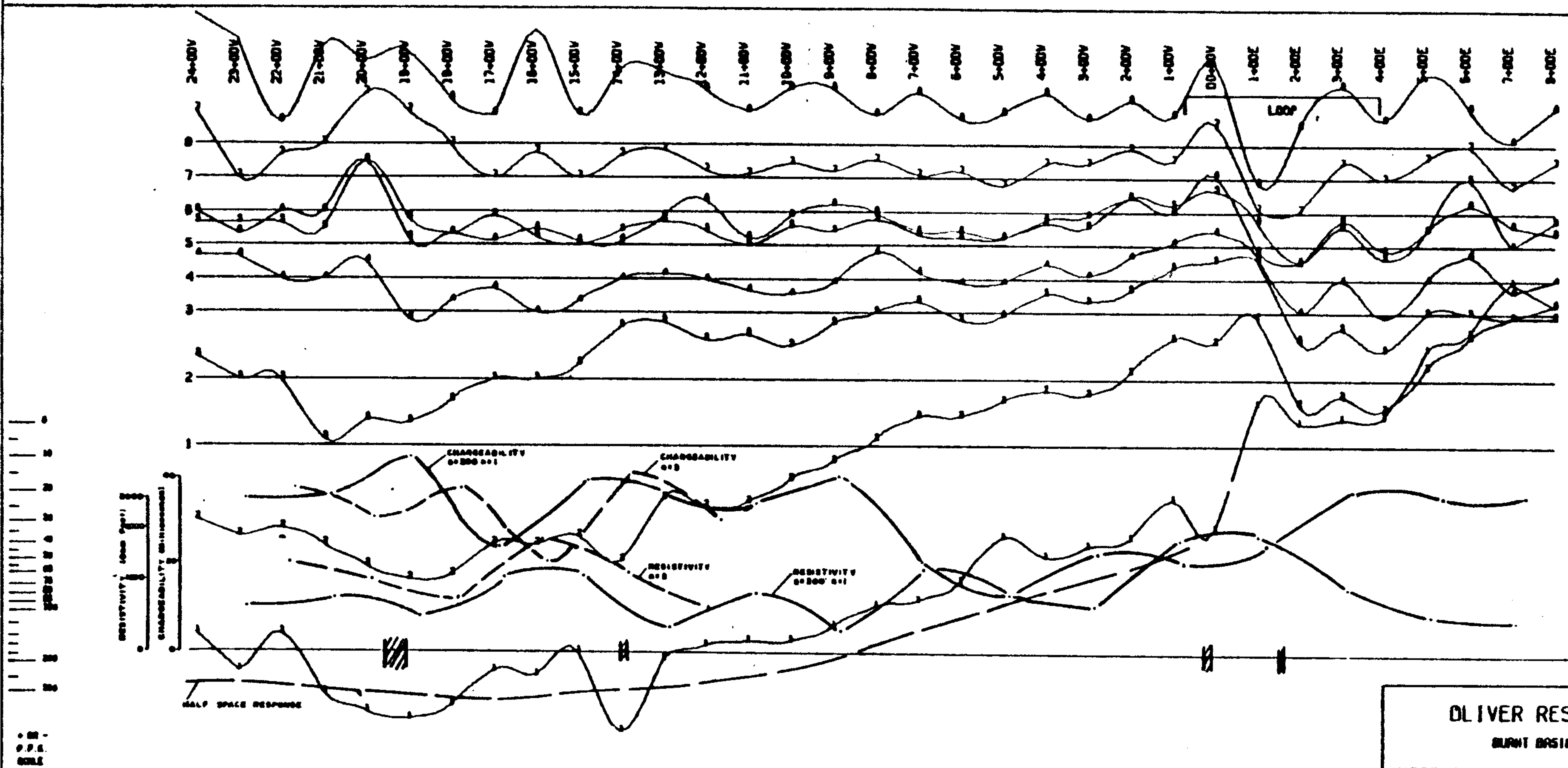
1" = 100'

WESTMOUNT RESOURCES LTD.

– KAR CLAIMS –

Feb. 1979

Fig. 12



STATION SPACING IS 100 FEET

NUMBER IN THE LINE = CHANNEL NUMBER INSTRUMENT: CRONE P.E.M.

OLIVER RESOURCES LTD

BURNT BASIN PROPERTY

VECTOR PULSE ELECTROMAGNETOMETER
HORIZONTAL COMPONENT
LINE 24+00N LOOP B

GLEN E. WHITE
GEOPHYSICAL CONSULTING
& SERVICES LTD.

N.T.S. 82-E/1

FIG. NO:

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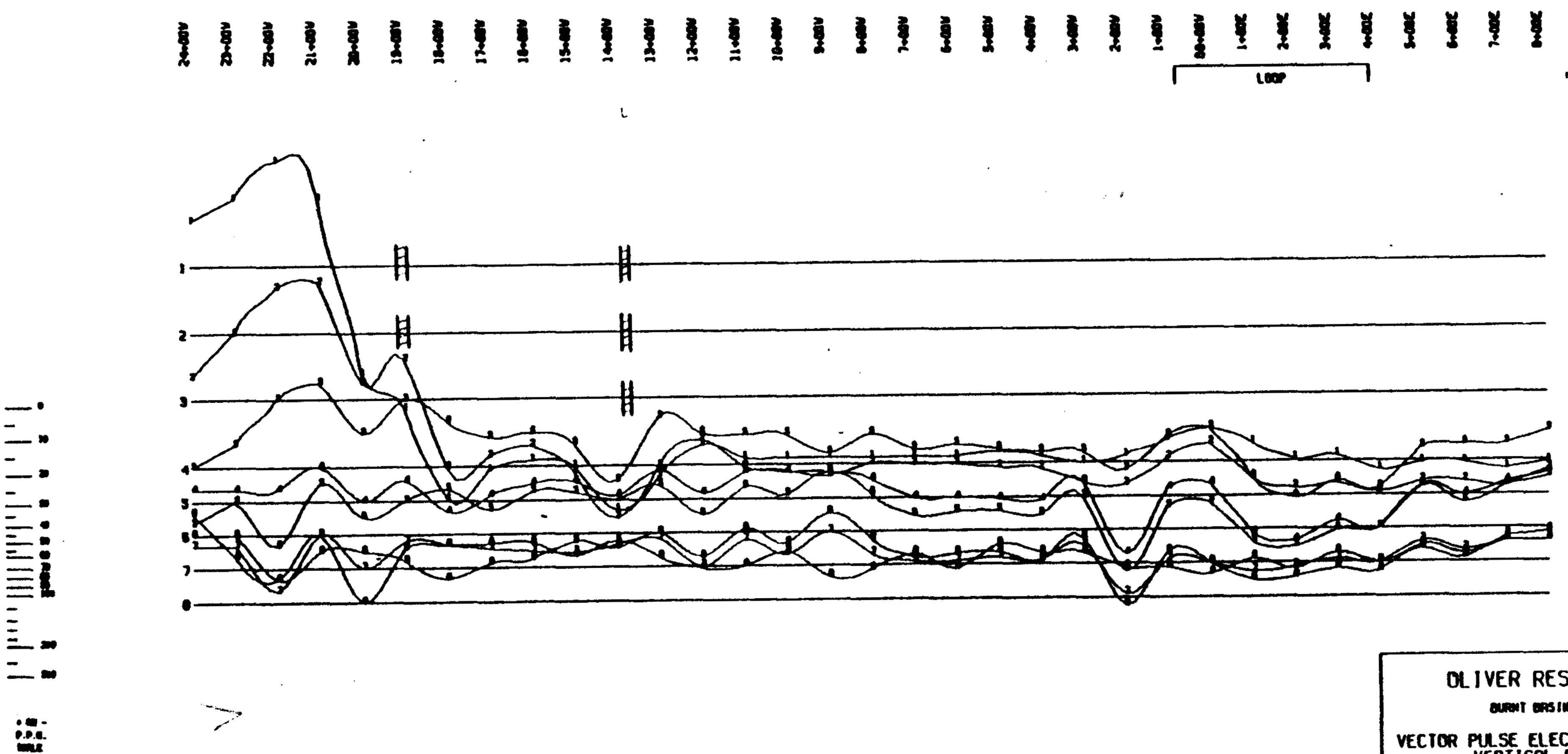
Fig 16



STATION SPACING IS 100 FEET

NUMBER IN THE LINE = CHANNEL NUMBER   INSTRUMENT: CRONE P.E.M.

OLIVER RESOURCES LTD

BURNT BASIN PROPERTY

VECTOR PULSE ELECTROMAGNETOMETER
VERTICAL COMPONENT
LINE 24+00N LOOP B

GLEN E. WHITE
GEOPHYSICAL CONSULTING
& SERVICES LTD.

N.T.S. 82-E/3

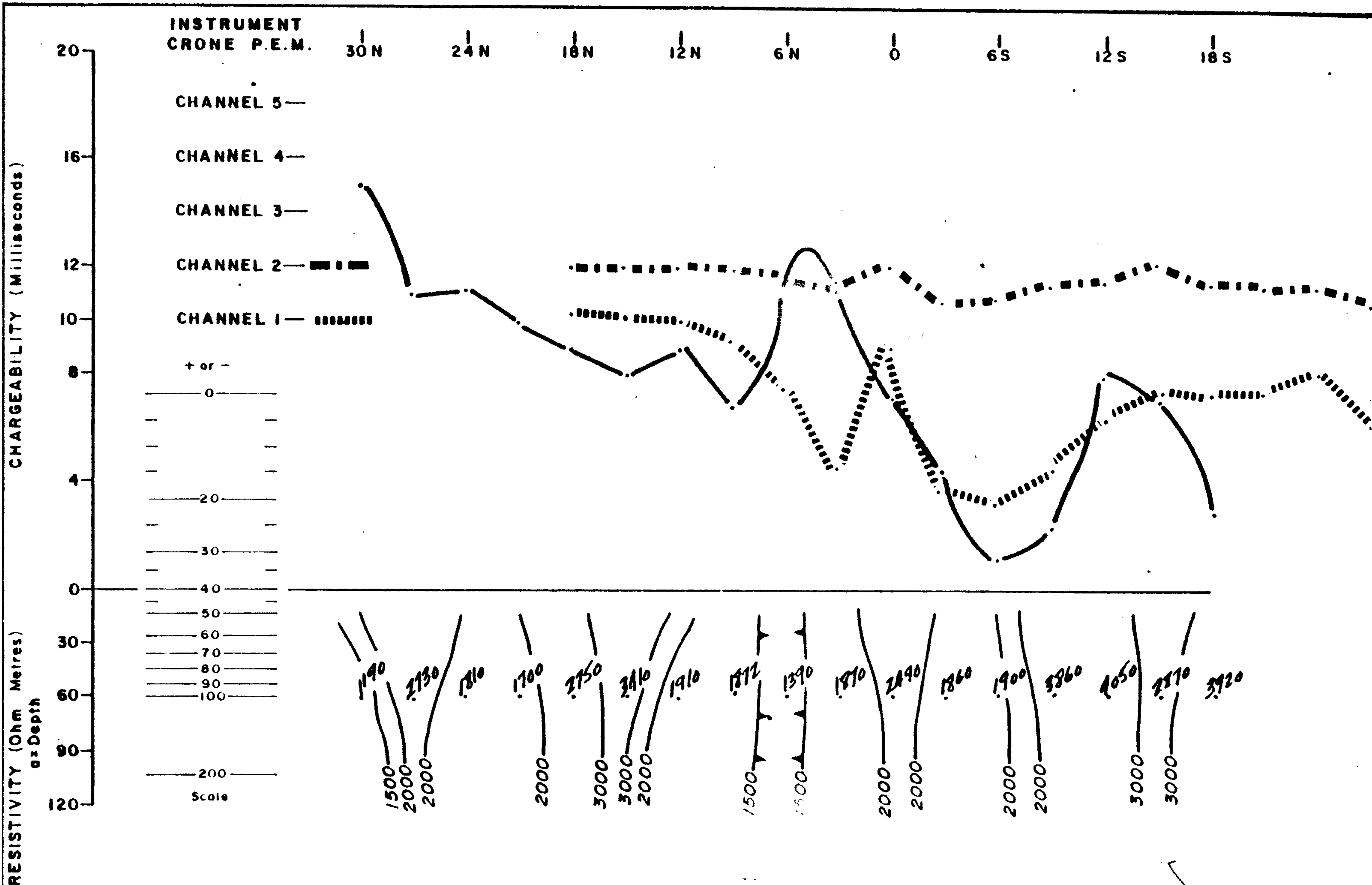
Glen E. White
geophysical consulting
&
services ltd.

Fig 17

The horizontal component vector data gives a definite channel 1 and 2 anomaly over the resistivity low. This zone is associated with a known ore zone at a depth of some 150 feet. The Max-Min conventional electromagnetic technique showed only topographic separation noise. Further to the east, Figure 14, the chargeability curve indicates a resistivity low associated anomaly at 6N. Here the vector horizontal component also indicates a conductor. This anomaly is caused by a narrow near surface zone containing some 10 feet of 3% copper. The large basin effect with the horizontal component at 6S reflects a known mineral zone at a depth of some 350 feet. There is no chargeability response over this zone and the resistivity values are moderately high. Increasing the separation does not help as the cross-sectional volume of the interesting zone decreases with respect to the volume of irregular pyrite zones being sampled.

Figures 15, 16 and 17 are published by the kind permission of Mr. L. Mayers, President Oliver Resources Ltd. The Burnt Basin property is a massive sulphide lead-zinc prospect with some chalcopyrite, in a complex of limey argillites which have been intruded by the Nelson Intrusives. This property contains both infinite and finite electromagnetic sources in a weakly conductive environment. Figure 15 shows a computer plot of a 2 channel vector focus at a depth of some 350 feet. Figure 16 illustrates the chargeability, apparent resistivity and horizontal component vector data. The chargeability readings show a broad high zone which reaches a value of some 46 ms. The high chargeability is caused by poorly connected graphite and pyrite disseminated throughout the argillite. [illegible]vity high to the east correlates with the N[illegible] rocks. The horizontal component data [illegible]cates the vector focus which is an infinite source response as well as delineating several other finite source conductors. Figure 17 completes this summation by illustrating the excellent crossovers obtained from the vertical component data.

The advantage of the vector EM technique is, that the scalar field, vector field, horizontal and vertical components can be utilized to evaluate a conductive source. The components are not always definitive, neither is the vector plot, particularly in cases of complex half-space responses and mixed infinite-finite conductor source models. Thus the ability to examine directly the secondary field and the galvanic-induction response of a conductive half-space environment makes the vector technique

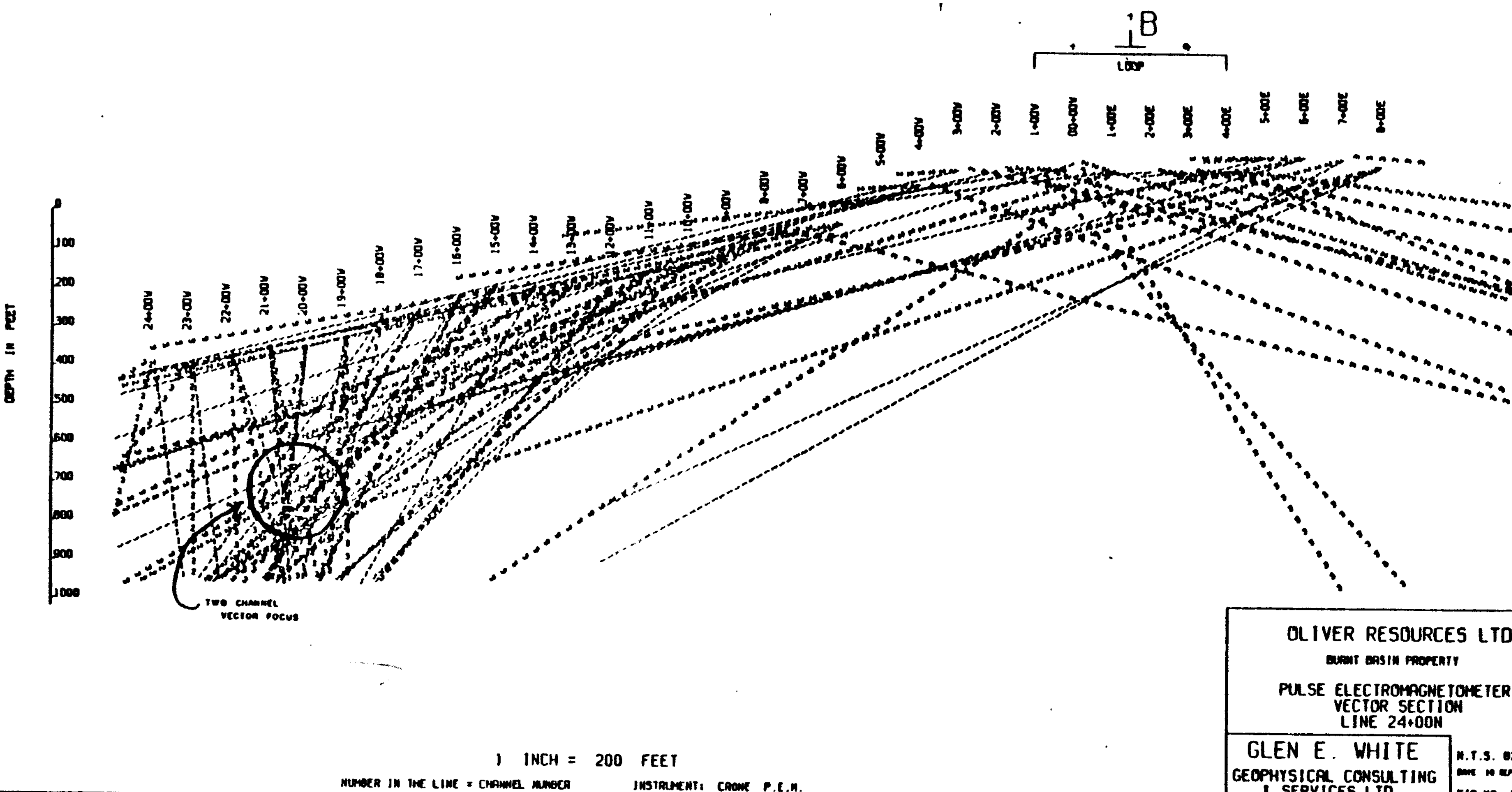


INDUCED POLARIZATION PROFILES
&
VECTOR PULSE ELECTROMAGNETOMETER
HORIZONTAL COMPONENT

Glen E. White geophysical consulting & services ltd.

1cm = 30m

Feb. 1979
Fig. 14



OLIVER RESOURCES LTD

BURNT BASIN PROPERTY

PULSE ELECTROMAGNETOMETER
VECTOR SECTION
LINE 24+00N

GLEN E. WHITE
GEOPHYSICAL CONSULTING
& SERVICES LTD.

N.T.S. 82-E/1
DATE 10 SEPTEMBER 1970
FIG.NO: 17

Glen E. White geophysical consulting & services ltd.

Fig 15

a powerful, cost effective geophysical tool which has increased the depth penetration for poor conductivity width targets to a depth of some 100 - 200 m and for good conductors, some 200 - 300 m.

Respectfully,

Glen E. White, B.Sc, P. Eng.
Consulting Geophysicist

QUALIFICATIONS

NAME: Barry James Price

BORN: Smithers, B.C., August 19, 1944

EDUCATION:

(A) High School: Smithers, B.C. Graduated 1961

(B) University: B.Sc. Honors Geology 1965, Thesis topic:

(U.B.C.) "Tertiary Sediments at Driftwood Creek, Smithers Map Area, B.C."

M.Sc., Geology, 1972, Thesis topic:

"Minor Elements in Pyrite and Exploration Applications of Minor Element Studies".

EMPLOYMENT RECORD:

1964, (summer) GEOLOGICAL SURVEY OF CANADA
Junior assistant, mapping party in Rocky Mtns., supervised by Dr. G. B. Leech.

1965 - 1968 CHEVRON STANDARD LTD., Alberta
Senior assistant, regional mapping party in Mackenzie and Richardson Mtns. Subsurface geological studies, carbonate reef research, wellsite supervision and production department studies.

1968, (summer) MANEX MINING LTD., Smithers, B.C.
Geological mapping and diamond-drill supervision.

1969, (summer) MANEX MINING LTD., Smithers, B.C.
Property mapping and evaluation, geophysical and geochemical studies, supervision of diamond drilling, geological mapping for Jade Queen Mines Ltd.

1970, (summer) ARCHER, CATHRO AND ASSOC.,
Party chief, regional study of sedimentary copper potential of Mackenzie Mtns. Reconnaissance mapping and geochemical interpretation.

1971, (summer)	J. R. WOODCOCK CONSULTANTS LTD. Project geologist in charge of exploration of massive sulphide prospects, including geological mapping, geochemistry, geophysics and diamond drilling. Concurrently supervised regional exploration program.
1972 - 1976	MANEX MINING LTD., Vancouver, B.C. Geologist in charge of field projects. Consulting geological work for New World Jade Ltd., and Delphi Resources Ltd.
1976 - 1979	PETRA GEM EXPLORATION OF CANADA LTD. Vice-President and exploration manager. Property acquisition and development. Consulting geological work. Director Delphi Resources Ltd., Territorial Gold Placers Ltd.

PROFESSIONAL MEMBERSHIPS:

- Canadian Institute Mining and Metallurgy
- Fellow, Geological Association of Canada
- B.C. Yukon Chamber of Mines

FIGURE: 5

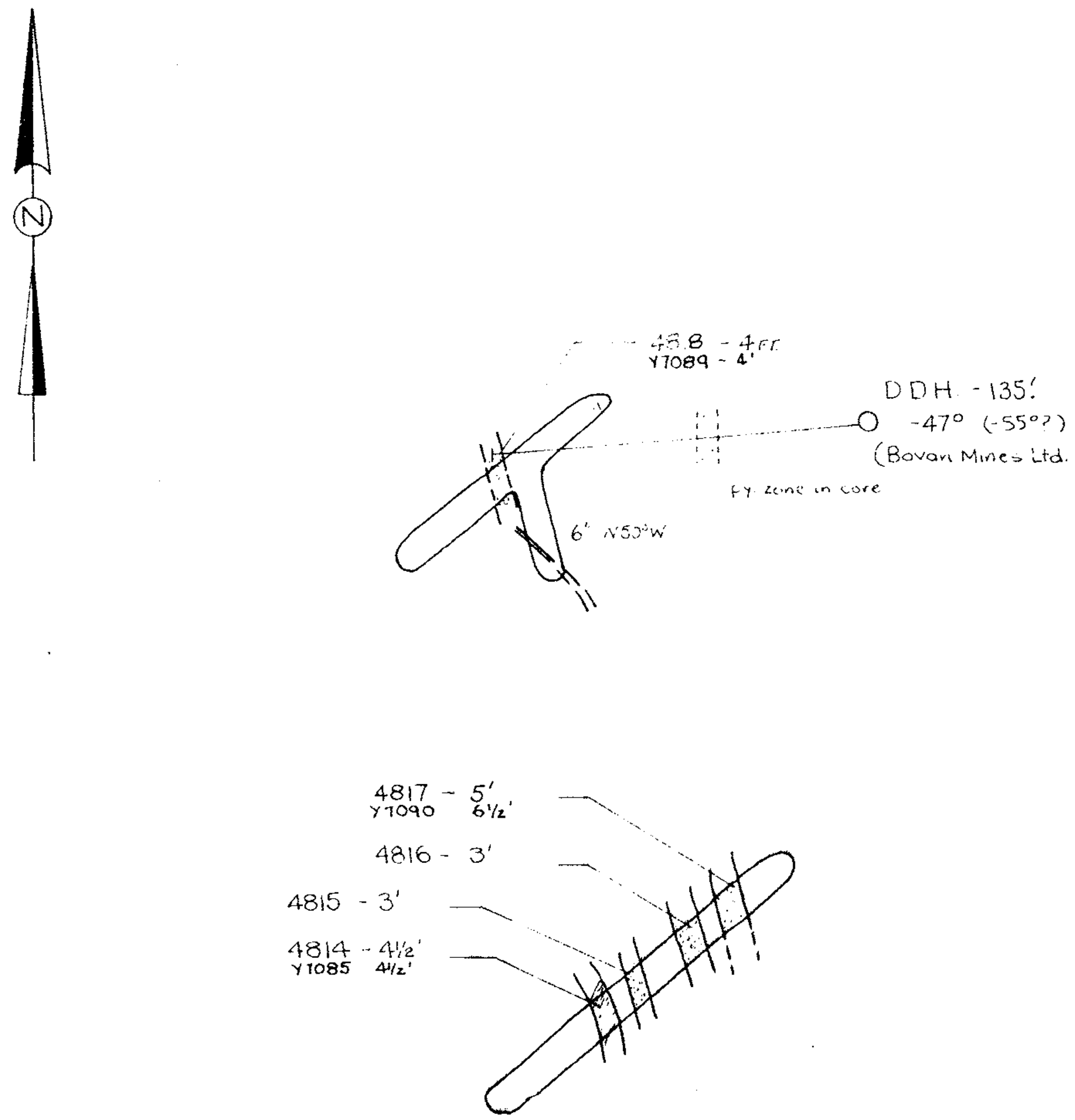
PETRA GEM EXPLORATION LTD.

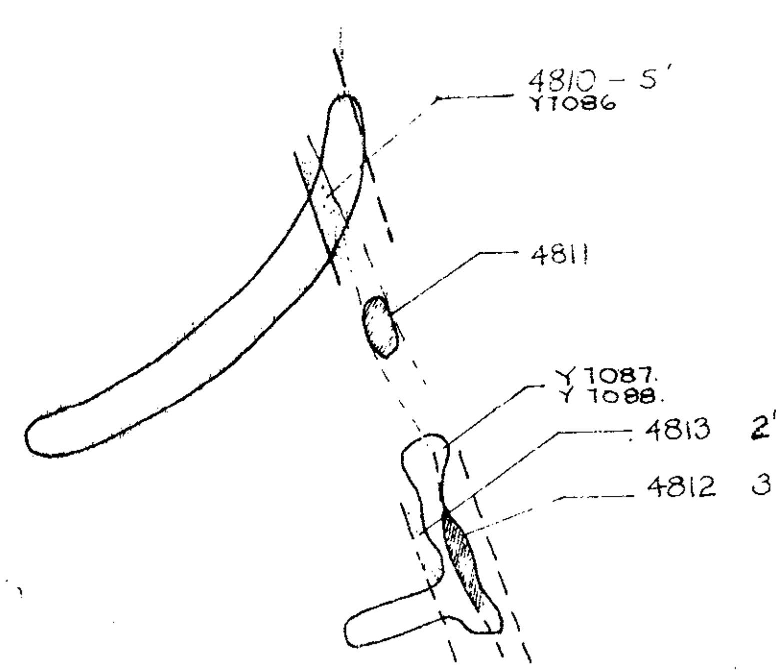
DEL SANTO PROSPECT CU-ZN-AG
DEEP CREEK, TELKWA, B.C.
OMINECA, M.D.

SKETCH OF TRENCHES, ASSAY PLAN.

Traced from sketch by D. Jonson, Midwest Oil Corp.
1977 Assays added. B. Price.

B. PRICE, M.Sc. 200-3540 W. 41 Ave. Vancouver, B.C.





ASSAYS

No.	W.	Cu %	Zn %	Ag oz/T	Au oz/T		
							1968.
4810	5'	0.145	0.70	0.31	<.0006		dissem
4811		0.235	0.26	0.59	"		dissem
4812	3'	2.7	0.08	5.9	"		mass.
4813	2'	0.60	0.27	1.4	"		dissem
4814	4½'	4.5	3.1	14.7	.0018		mass
4815	3'	0.15	0.69	0.21	<.0006		dissem
4816	3'	0.175	0.22	0.62	.0009		dissem.
4817	5'	0.345	0.14	0.62	"		dissem.
4818	4'	0.70	0.14	0.82	"		dissem.
Y7085	4½'	7.1	2.7	15.4	.001	chip	1977
Y7086	—	0.88	0.58	2.4	.001	grab	
Y7087	2½'	1.36	0.28	3.2	.001	chip.	
Y7088	—	0.08	1.46	0.34	.001	grab.	
Y7089	3.2'	0.78	1.80	1.20	.001	chip.	
Y7090	6½'	0.77	0.30	1.58	.001	chip.	

7286

SCALE:
0 30 50'
0 10m

Barry Price. Dec. 3 1977.

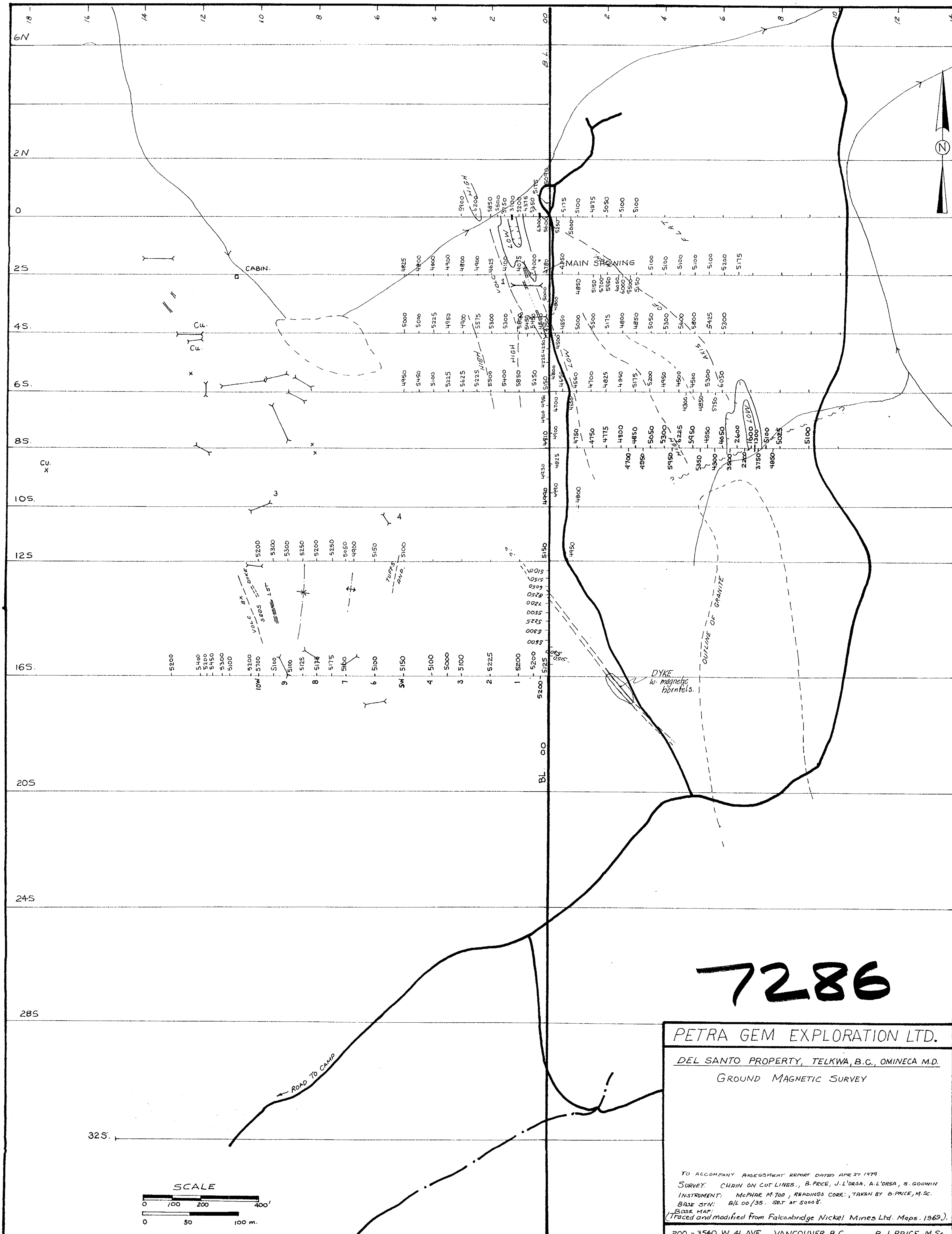
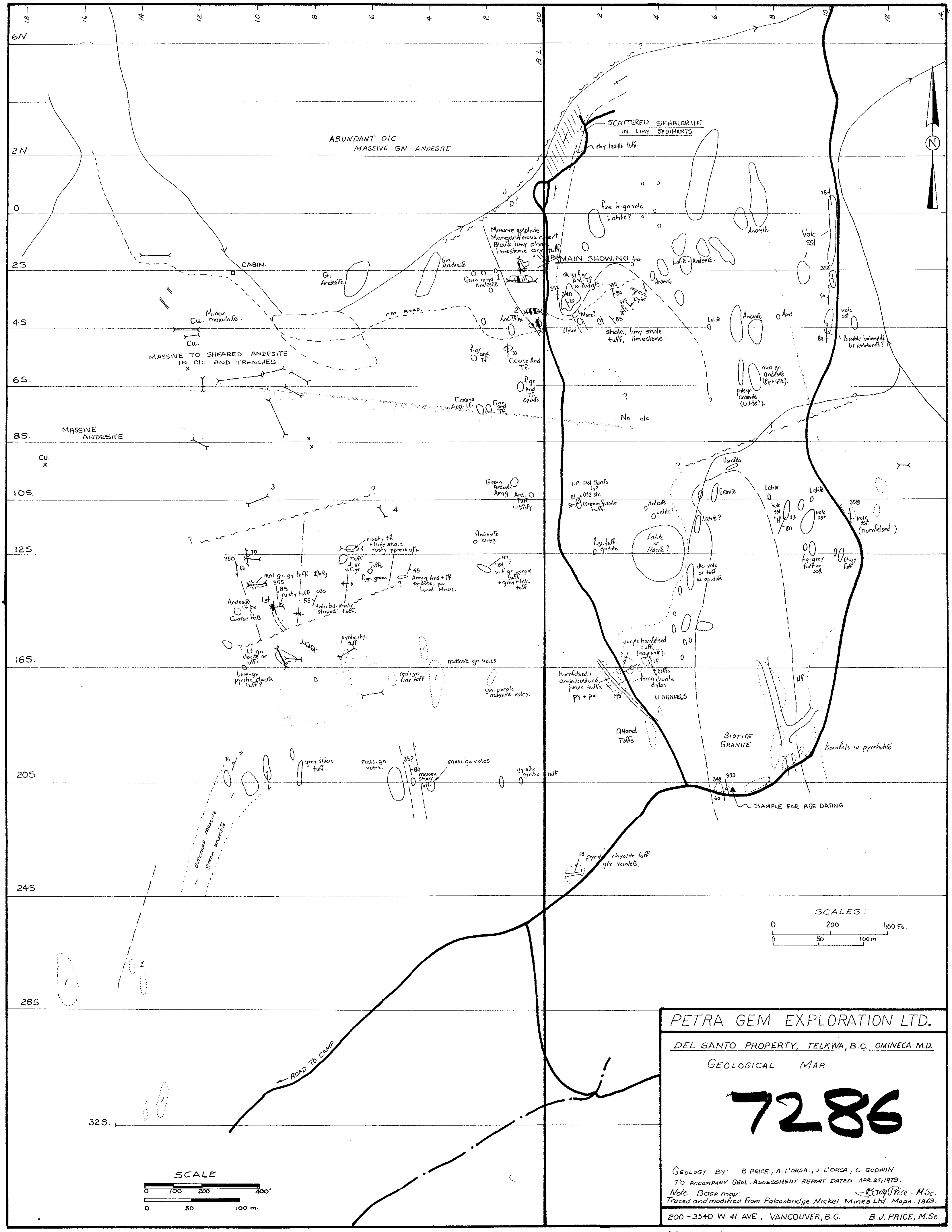

7286
PETRA GEM EXPLORATION LTD.
DEL SANTO PROPERTY, TELKWA, B.C., OMINECA M.D.
GROUND MAGNETIC SURVEY
TO ACCOMPANY ASSESSMENT REPORT DATED APR 27 1979.
SURVEY: CHAIN ON CUT LINES., B. PRICE, J. L'ORSA, A. L'ORSA, S. GODWIN
INSTRUMENT: McPHAR M-700, READINGS CORR:, TAKEN BY B. PRICE, M.Sc.
BASE STN: B/L 00/35. SET AT 5000 γ.
BASE MAP: (Traced and modified from Falconbridge Nickel Mines Ltd. Maps. 1969).
200 - 3540 W. 41. AVE., VANCOUVER, B.C.
B.J. PRICE, M.Sc.
SCALE
0 100 200 400'
0 50 100 m.
MAIN SHOWING
CABIN
ROAD TO CAMP
DYKE w. magnetic hornfels.
OUTLINE OF GRANITE
B.L. 00

FIGURE: 6



ABUNDANT O/C
MASSIVE GN. ANDESITE
SCATTERED SPHALERITE
IN LIMY SEDIMENTS
rhy lapilli tuff.
MAIN SHOWING
Massive sulphide
Manganiferous chert
Black limy shale
limestone and tuff
CABIN
Minor
Cu. malachite
MASSIVE TO SHEARED ANDESITE
IN O/C AND TRENCHES
MASSIVE
ANDESITE
CAT ROAD
Shale, limy shale
tuff, limestone.
No o/c.
Lahite or Dacite?
BIOTITE
GRANITE
HORNFELS
hornfels w. pyrrhotite
SAMPLE FOR AGE DATING
Altered
Tuffs.
Fresh dioritic
dyke
massive gn volcs
gn-purple
massive volcs.
outcrops massive
green andesite
pyritic rhyolite tuff.
qtz veinlets.
ROAD TO CAMP
SCALES:
0 200 400 Ft.
0 50 100m
SCALE
0 100 200 400'
0 50 100 m.
B.L.
6N
2N
0
2S
4S
6S
8S
10S
12S
16S
20S
24S
28S
32S
PETRA GEM EXPLORATION LTD.
DEL SANTO PROPERTY, TELKWA, B.C., OMINECA M.D.
GEOLOGICAL MAP
7286
GEOLOGY BY: B. PRICE, A. L'ORSA, J. L'ORSA, C. GODWIN
TO ACCOMPANY GEOL. ASSESSMENT REPORT DATED APR. 27, 1979.
Note: Base map:
Traced and modified from Falconbridge Nickel Mines Ltd. Maps. 1969.
Barry Price M.Sc.
200 - 3540 W. 41. AVE., VANCOUVER, B.C.
B.J. PRICE, M.Sc.

FIGURE: 7