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MEAGER CREEK GEOTHERMAL PROJECT

B. C. HYDRO AND POWER AUTHORITY

Report on
D.C. RESISTIVITY SURVEY
in the
UPPER LILLOOET VALLEY

July 1979

by

Greg A. Shore,
PREMIER GEOPHYSICS INC.,
Vancouver, B. C.

September 25, 1979

Work conducted under authority of and in co-operation
with: NEVIN SADLIER-BROWN GOODBRAND LTD., Consulting Geologists, Vancouver.

DRAFT

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1.0 Summary and Conclusions

The 1979 resistivity survey program in the upper Lillooet valley has defined a large resistivity anomaly surrounding the single-line anomalous zone discovered in 1978. In addition, four other areas of exploration interest have been identified and appear worthy of further investigation.

2.0 Introduction

In July 1979, Premier Geophysics Inc. of Vancouver, B.C. conducted a resistivity survey of a selected portion of the upper Lillooet valley, in the Meager Creek Geothermal Area 60 kilometres northwest of Pemberton, B.C.

Survey specifications and instructions to proceed were provided by Nevin Sadlier-Brown Goodbrand Ltd., of Vancouver, acting on behalf of the British Columbia Hydro and Power Authority.

2.1 Program Management

The survey program was operated to specifications set forth in an operating agreement between Nevin Sadlier-Brown Goodbrand Ltd. and Premier Geophysics Inc. Greg A. Shore, geophysical consultant to Premier Geophysics, was responsible for the scientific conduct of the field survey, in consultation with the on-site Nevin Sadlier-Brown Goodbrand geophysicist, John Reader. Overall project supervision was provided by Brian D. Fairbank, P. Eng., of Nevin Sadlier-Brown Goodbrand Ltd.

Preparatory cutting and chaining of a survey grid and the establishment of fly camps was undertaken by Nevin Sadlier-Brown Goodbrand Ltd., who also provided support functions during the survey, including the supply of survey assistants, co-ordination of air access and supply acquisition, and maintenance of radio contact with the jobsite.

Post-survey data reduction and analysis, and preparation of this report was done by Greg Shore.

2.2 Objectives

The 1979 resistivity program was designed to provide additional geophysical information about the area surrounding a 1978 resistivity anomaly (Line L, Fig. 4) and adjacent test well 78-H-1 (Fairbank et al., 1979), and to expand primary geophysical coverage of the upper Lillooet valley.

3.0 Scope of This Report

This report provides a technical description of the survey method employed in the 1979 program.

Calculated field data are presented in conventional pseudosection form together with an interpretation which represents the author's best estimate, using current analysis methods, of the true geoelectric section beneath each survey line.

The geophysical results are discussed in relation to some known geological features. While the interpretation is complete in terms of available information at the time of report compilation, the understanding of the relationship of the resistivity results to area geology will develop further as geological mapping proceeds and diamond drill test results become available.

4.0 Technical Description of the Survey

4.1 Electrode Configuration

A conventional dipole-dipole electrode array was applied, using a dipole spacing (a) of 300 metres and dipole separations (na) with n = 1 to 4. Additional deep resolution was obtained on portions of all lines by expanding the separation to n = 5 to 9. Effective depth penetration thus available was of the order of 600 to 700 metres. A description of resistivity array theory and application is contained in Appendix C of this report.

4.2 Instrumentation

The survey transmitter was a Phoenix Geophysics 3 kilowatt model IPT-1, providing a symmetrical polarity-reversing square wave output at 0.125 hertz. The receiver was a Hewlett-Packard 7155B strip chart recording microvoltmeter, recording the complete signal waveform and noise for later analysis and digitization. Signal buffering and self-potential compensation was accomplished with a Premier Geophysics PG-1A Differential Compensator. Porous pots with copper sulphate solution electrolyte and a copper core were used as potential electrodes for all measurements.

4.3 Data Processing

The field data record was hand digitized, in some cases with the aid of a mechanical method of filtering out telluric disturbances (Premier, 1979). Apparent resistivities were calculated according to the formula given in Appendix C. Data was plotted in Hallof-type pseudosections. Certain portions of the data were treated by Phoenix Geophysics Ltd. of Toronto, Ontario, using a ridge-regression method of data inversion to determine a best-fit model of layered earth resistivities (Pelton, Hallof, 1978). The data used for inversions are identified on the pseudosection plots, and the results are integrated into the interpreted sections (figures 3, 5, 7, 8). The computer printouts provided by Phoenix Geophysics are reproduced in Appendix D.

5.0 Interpretation

Five anomalous areas are discussed, with continuous reference to Figure 2, followed by a line-by-line examination of data and interpretation.

5.1 Resistivity Anomalies

5.1.1 Anomaly A

Now identified on three parallel lines, Anomaly A occupies an area in excess of 3 km^2, with boundaries open on over half of its perimeter including its entire southern (uphill) flank.

Resistive volcanic flows are identified covering a postulated fracture or fissure zone within the crystalline basement. The zone extends deeper than present survey penetration (700 metres) with indications of a continued decrease in resistivity with depth. A hot, heavily fractured water saturated environment is indicated.

5.1.2 Anomaly B

Anomaly B lies to the west of, and may be associated with, Anomaly A. The low resistivity material at depth appears to be continuous across the two areas, though the overlying resistive rock in Anomaly B is metamorphic and/or crystalline (Fairbank et al, 1979, and Fairbank, pers. comm.).

The anomalous area exceeds 1 km^2. Interpretation in this area is heavily dependent on more detailed geological mapping and possibly drilling results.

5.1.3 Anomaly C

Anomaly C is traced for 1.6 km along line Q, and appears to be a 125 metre thick horizon of water saturated, very porous material. It is overlain by 205 metres of resistive rock, possibly volcanic flows, and underlain by very resistive (4000 ohm-metres) rock, probably the quartz diorite basement. Occurring in an area of known thermal activity, such a sequence of layered resistivities represents a high priority target for further investigation. The sequence and ratios of resistivities are suggestive of possible dry steam structure.

5.1.4 Anomaly D

Anomaly D is a large zone of moderately conductive material extending from near surface to 300 or 400 metres depth. Its significance is not known from the present limited geological understanding of the area. There is some possibility that it may be connected with the northern end of anomaly A, since there is nothing in the limited sampling at the east end of line P to exclude some structural association.

5.1.5 Anomaly E

This anomaly is a marked decrease in resistivity beneath 150 metres of (outcropping) quartz diorite. It occurs in an area which may contain the contact between the quartz monzonite of the Fall Creek Stock and the quartz diorite of the Coast Crystalline Belt. The presence of a fracture or alteration zone at the edge of the quartz monzonite stock could be favourable for geothermal activity.

Anomaly E could be associated with Anomaly A, which remains open off the end of line 0 in the direction of Anomaly E.

5.2 Survey Line Interpretation

5.2.1 Line N (Figure 3)

Line N is located above the break in slope approximately 800 metres south of the 1978 anomaly on line L (see Figure 2).

Overlying resistive units 185 and 280 metres thick extend from 33W to beyond the limit of survey at 8W, a distance of 2.5 km. These are volcanic flows, identified in test well 78-H-1 as rhyodacite porphyry.

Beneath the flows is a zone of low resistivity, probably in crystalline basement, which extends to depths greater than present survey penetration of 700 metres. The resistivity appears to decrease with depth, possibly dropping to less than 150 ohm-metres.

The low resistivity derives from a highly fractured or fissured, hot, water saturated environment.

West of 33W, a moderately high resistivity unit at surface is made up of metamorphic and/or crystalline rock (Fairbank et al., 1979, and Fairbank, pers. comm.). No deep data is available from line N in this area, but a deep low observed on line M as it crosses the area confirms continuation of the resistivity anomaly to the west.

5.2.2 Line L, 1978 Survey (Figure 4)

The drilling of test well 78-H-1 100 metres east of the anomaly provided an indication of the thickness of the overlying volcanics and confirmed the presence of basement rocks (Fairbank et al., 1979). The thickness (255 metres including 47 metres of overlying sediments) fits reasonably with computer-derived estimates of the thickness of volcanics on line N. The presence of quartz monzonite basement at 262 metres confirms that the anomalous low resistivity is in basement, and lends weight to the interpretation of the line N anomaly also lying in basement rocks. Line L provides both east and west side cutoffs for the anomalous zone, suggesting the possibility of a narrow (1 km wide) structural feature possibly extending out into the valley to the north.

5.2.3 Line O (Figure 5)

Line O passes within 200 metres of line L in the vicinity of the

1978 anomaly and test well 78-H-1 (Figure 2). As would be expected, the line L anomaly data are confirmed: 1000 ohm-metres overlying 200 ohm-metres, with similar background resistivities to the west. To the east, the Lillooet River defines the limit of survey traverse, leaving the east boundary open. The extended depth information suggests that the eastern boundary may not match that of line L, though no firm interpretation can be made with the limited data and possible interference from the river itself. Again no lower limit to the low resistivity zone is seen.

The overlying resistive unit, assumed to be volcanics, is indicated at 165 metres thick. It is reasonable to suspect that the flows may be somewhat thinner here, and particularly that the depth of volcanic boulder material (suspected of making up over 100 metres of the volcanic layers at line L) would be less.

Background levels west of the anomaly are uniformly lower than those of line L, possibly indicating deeper overlying conductive sediments which will lower apparent resistivity measurements.

5.2.4 Line P (Figure 6)

The east half of line P is strongly influenced by conductive overburden and the parallel Lillooet River. Two features only are of note, besides the general low resistivity appearance of most of the line:

a) west of 55W the line rises up out of the conductive cover and a 500 ohm-metre rock is seen, suggesting that the majority of the line may consist of 500 ohm-metre material, similar to that of western line O, masked by conductive overburden, and,

b) a more resistive unit lies beneath the east half of the line at a depth of 300 to 400 metres, a layering somewhat similar to Anomaly D on line Q, almost opposite on the other side of the river.

5.2.5 Line M (Figure 7)

The north end of line M lies in swamp near the Lillooet River, with the data originating from the last dipole (38N - 41N) clearly indicating near-surface conductive masking. Just 750 metres away from the river, the masking is not readily identifiable, though probably present in a more widespread, uniform effect over the alluvial fan. Between 26N and 36N lies moderate resistivity material, probably the 500 ohm-metre unit described on lines O and P.

From 14N to 26N a resistive unit (1300 ohm-metres) overlies conductive material of about 280 ohm-metres resistivity. This is a good fit with western line N, and provides for continuation of the line N anomaly in the resistivity sense, if not specifically in rock type. The overlying resistive rocks are metamorphic and/or crystalline; consideration of the meaning of the apparent continuation of the line N anomaly (anomaly A) westward under line M must await more detailed mapping in the area, and possibly drill results.

South from 8N are conductive rocks possibly associated with the anomaly. Conductivity is apparently due to intense alteration (and therefore high porosity and water content) and sulphide minerals, the resistivity signature further lowered by the deep-V topography prevalent in the south kilometre of this line. (The topography does not artificially enhance the anomaly from 14N to 26N however. The tendency here would be to lower both the value of the overlying resistive unit and the anomalous low, without disturbing the ratio.)

5.2.6 Line Q (Figures 8 and 9)

Line Q is a step-out line located north of the Lillooet River at the break in slope. Where the cliffs are near, or the slope of the mountain parallels closely, the direction of penetration will be centered about a line perpendicular to the average surface plane. Some additional rock volume will act to reduce the measured apparent resistivity a few percentage points, but the relatively constant nature of the slopes paralleling the line ensures that no terrain induced anomalies are recorded.

The extreme eastern end of the line, from 64W to 75W, lies on mapped quartz diorite which yields a resistivity signature of 2000 to 3000 ohm-metres. Beneath approximately 140 metres of the quartz diorite lies an area of significantly reduced resistivity, suggestive of a zone of alteration, fracturing, high temperature, or a combination of these. Somewhere near this anomaly will be located the contact between the quartz monzonite of the Fall Creek Stock (seen on the east side of Salal Creek) and the quartz diorite of the Coast Crystalline Belt (which overlies this anomaly, at least in part). The presence of a fracture zone or alteration zone at the edge of the stock could be favourable for geothermal activity. The present survey line location and stopping point may be permitting only a diluted sample of a zone lying off the end or to one side of the line.

The quartz diorite signature prevails to the west, being overlain between 80W and 98W by a conductive (100 - 180 ohm-metres) layer up to 300 metres thick. The signature continues to underlie various structures to the western limit of the line.

From 98W to 110W a conductive unit (80 - 200 ohm-metres) dominates to a depth exceeding 400 metres. Quartz diorite (?) basement is identified beneath it, with the depth to interface uncertain. The significance of this zone is unclear.

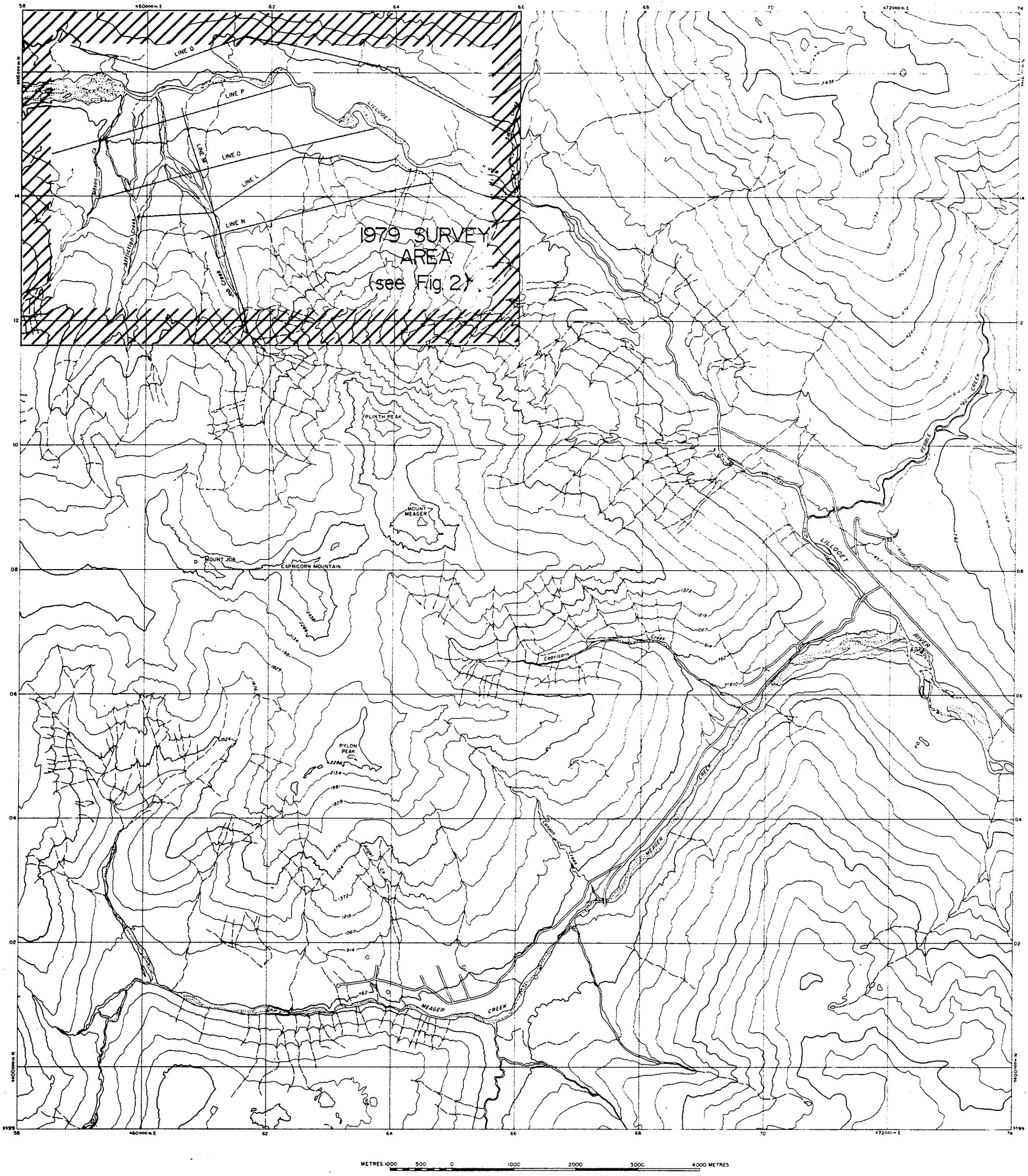
From 110W to 126W a 205 metre thick resistive unit overlies a 125 metre thick horizon estimated at 40 ohm-metres resistivity. A resistive unit (quartz diorite?) underlies the conductive horizon and extends below 500 metres. The extreme ratios of resistivities (1600:40:4000) is suggestive of a dry steam or vapor-dominated geothermal system, with resistive, sealed cap overlying a condensate layer (40 ohm-metres), in turn overlying a hot, dry basement rock. A cold water regime can similarly be presented to explain the data: volcanic flow rocks sealing an extremely conductive, saturated layer of clays and alluvium lying over cold, intact quartz diorite.

Respectfully Submitted,

PREMIER GEOPHYSICS INC.

Greg A. Shore

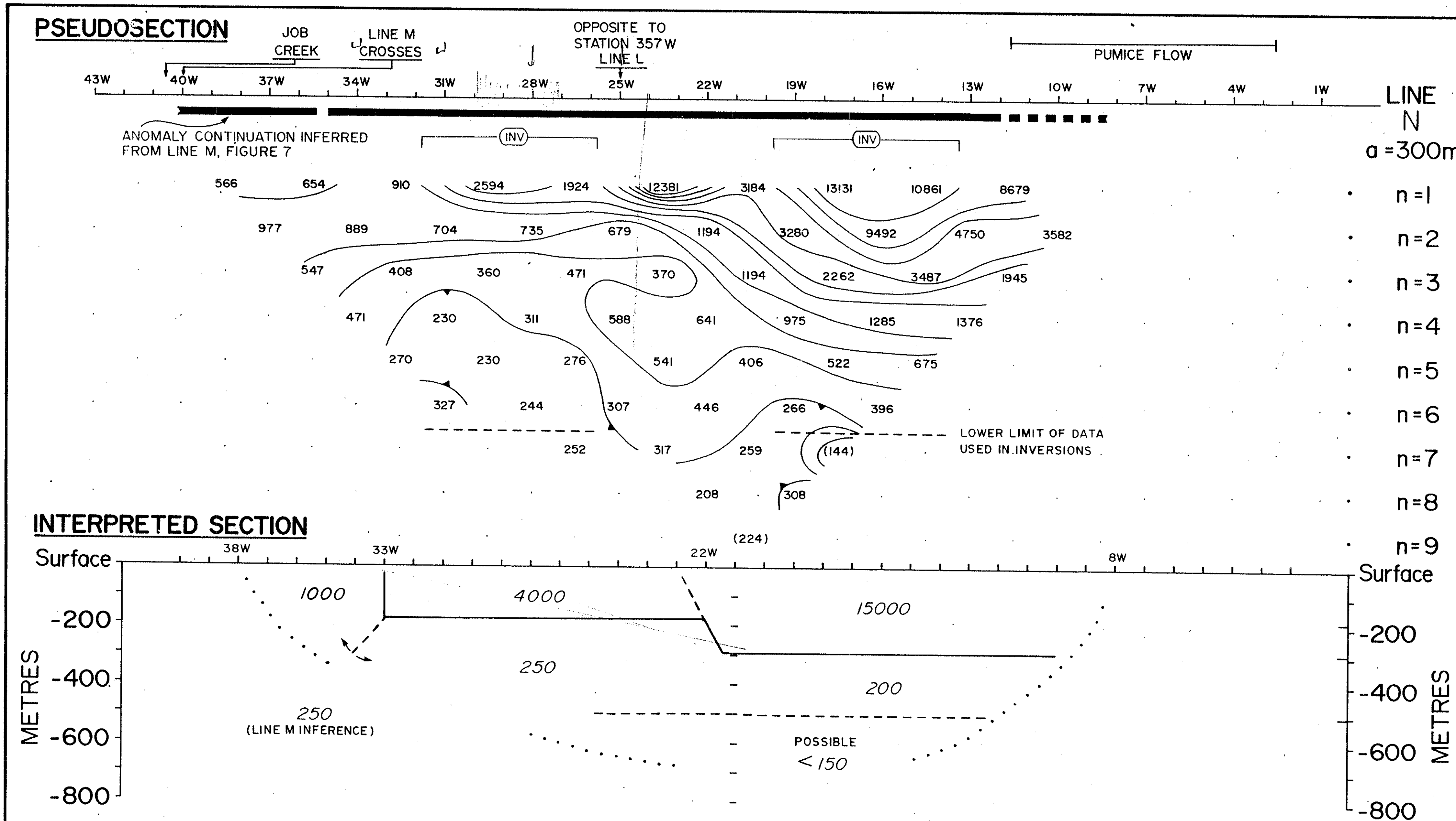
September 25, 1979



B.C. HYDRO & POWER AUTHORITY
NEVIN SADLIER-BROWN GOODBRAND LTD. CONSULTING GEOLOGISTS
MEAGER CREEK GEOTHERMAL PROJECT

LOCATION OF
D.C. RESISTIVITY SURVEY AREA
UPPER LILLOOET VALLEY
JULY 1979
SURVEY BY PREMIER GEOPHYSICS INC. VANCOUVER B.C.

Figure 1



INTERPRETED SECTION

500 INTERPRETED TRUE RESISTIVITY IN OHM-METRES
RESISTIVITY CONTACT
PROBABLE RESISTIVITY CONTACT OR TRANSITION ZONE
LIMIT OF INTERPRETATION

PSEUDOSECTION PLOTTING

C_1-C_2 CURRENT DIPOLE
P_1-P_2 POTENTIAL DIPOLE
a DIPOLE LENGTH
DEFINITE ANOMALY
POSSIBLE ANOMALY
296 APPARENT RESISTIVITY IN OHM-METRES
(INV) SECTION OF DATA TREATED BY INVERSION
CONTOUR INTERVAL IS MODIFIED LOG 1, 1.5, 2, 3, 5, 7, 10

DIPOLE - DIPOLE ARRAY
C_1 a C_2 na P_1 a P_2
90°
PLOTTED POSITION

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NEVIN SADLIER-BROWN GOODBRAND LTD., CONSULTING GEOLOGISTS

MEAGER CREEK GEOTHERMAL PROJECT

D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

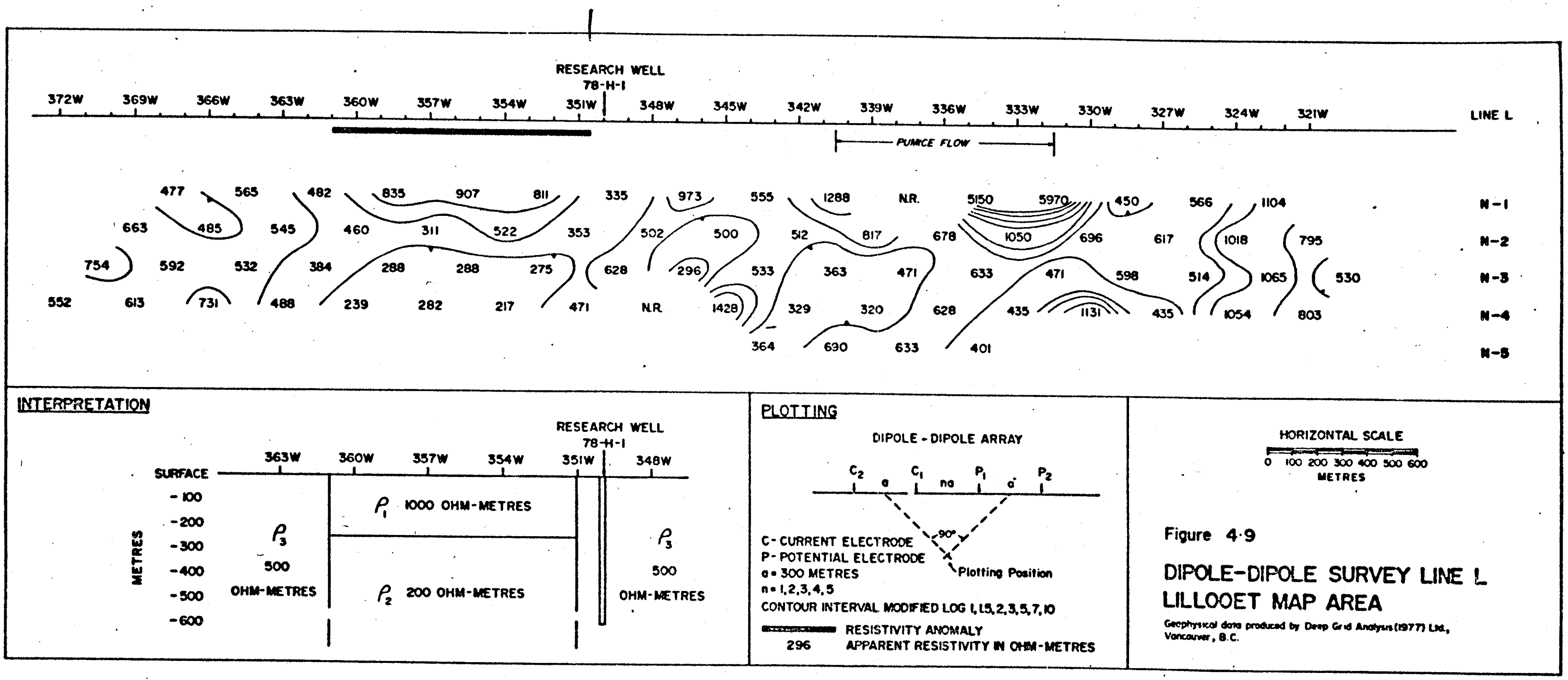
JULY 1979

SURVEY BY PREMIER GEOPHYSICS INC., VANCOUVER, B.C.

HORIZONTAL SCALE
0 100 200 300 400 500 600
METRES

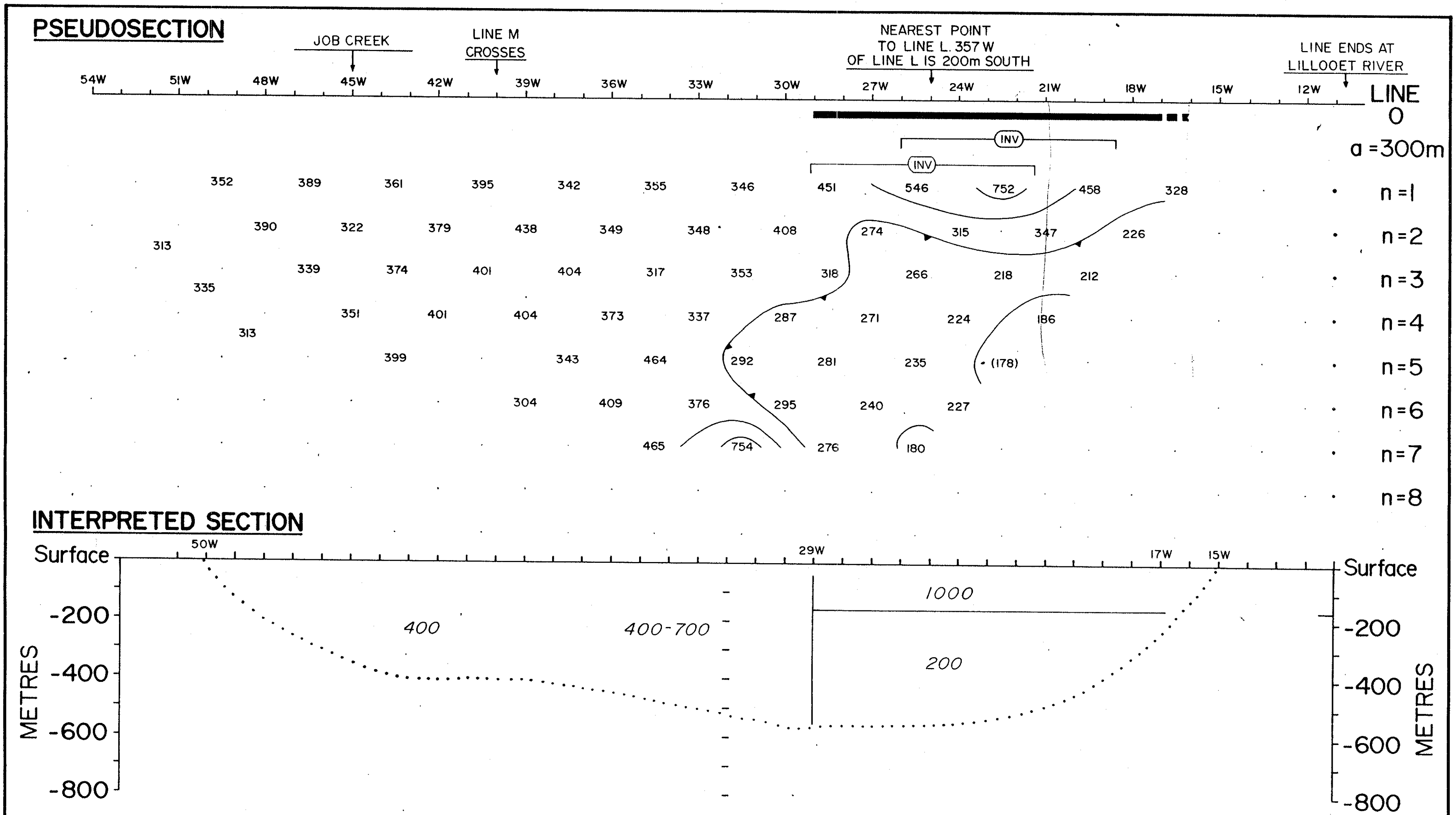
LINE N

Figure 3



REPRODUCTION OF FIGURE 4.9 FROM "REPORT ON 1978 FIELD WORK, MEAGER CREEK GEOTHERMAL AREA, UPPER LILLOOET RIVER, BRITISH COLUMBIA." (FAIRBANK ET AL., 1979)

Figure 4



INTERPRETED SECTION

500 INTERPRETED TRUE RESIST-IVITY IN OHM-METRES

RESISTIVITY CONTACT

PROBABLE RESISTIVITY CONTACT OR TRANSITION ZONE

LIMIT OF INTERPRETATION

PSEUDOSECTION PLOTTING

C_1-C_2 CURRENT DIPOLE

P_1-P_2 POTENTIAL DIPOLE

a DIPOLE LENGTH

DEFINITE ANOMALY

POSSIBLE ANOMALY

296 APPARENT RESISTIVITY IN OHM-METRES

(INV) SECTION OF DATA TREATED BY INVERSION

CONTOUR INTERVAL IS MODIFIED LOG 1,1.5,2,3,5,7,10

DIPOLE - DIPOLE ARRAY

C_1 a C_2 na P_1 a P_2

90°

PLOTTED POSITION

B.C. HYDRO AND POWER AUTHORITY

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MEAGER CREEK GEOTHERMAL PROJECT

D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

JULY 1979

SURVEY BY PREMIER GEOPHYSICS INC., VANCOUVER, B.C.

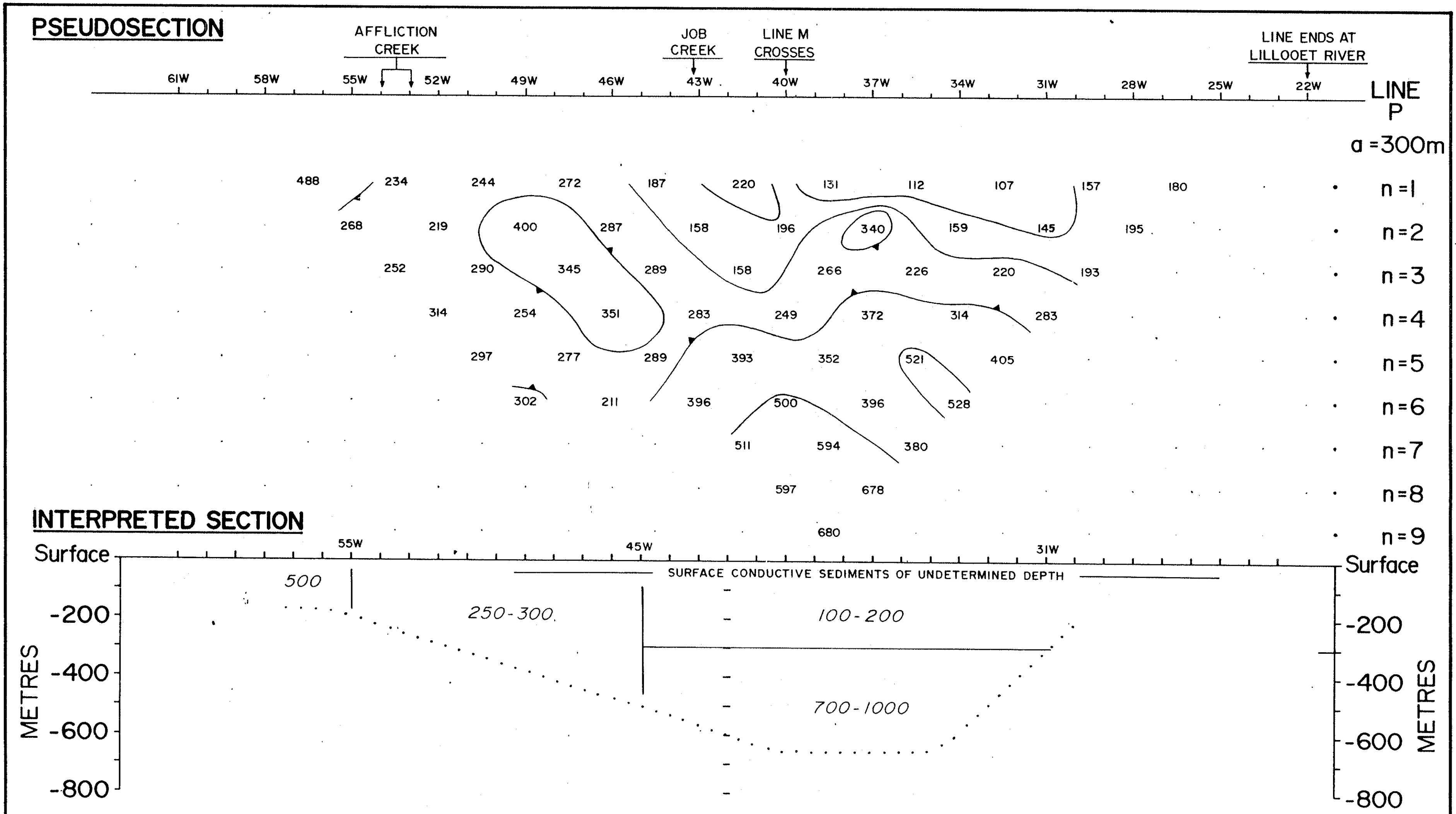
HORIZONTAL SCALE

0 100 200 300 400 500 600

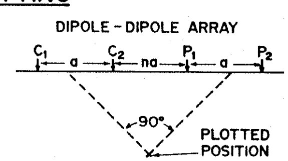
METRES

LINE 0

Figure 5



INTERPRETED SECTION	PSEUDOSECTION PLOTTING
500 INTERPRETED TRUE RESIST-IVITY IN OHM-METRES	C_1-C_2 CURRENT DIPOLE
RESISTIVITY CONTACT	P_1-P_2 POTENTIAL DIPOLE
PROBABLE RESISTIVITY CONTACT OR TRANSITION ZONE	a DIPOLE LENGTH
LIMIT OF INTERPRETATION	▬▬ DEFINITE ANOMALY
	■■■ POSSIBLE ANOMALY
	296 APPARENT RESISTIVITY IN OHM-METRES
	(INV) SECTION OF DATA TREATED BY INVERSION
	CONTOUR INTERVAL IS MODIFIED LOG 1, 1.5, 2, 3, 5, 7, 10



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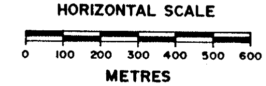
D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

JULY 1979

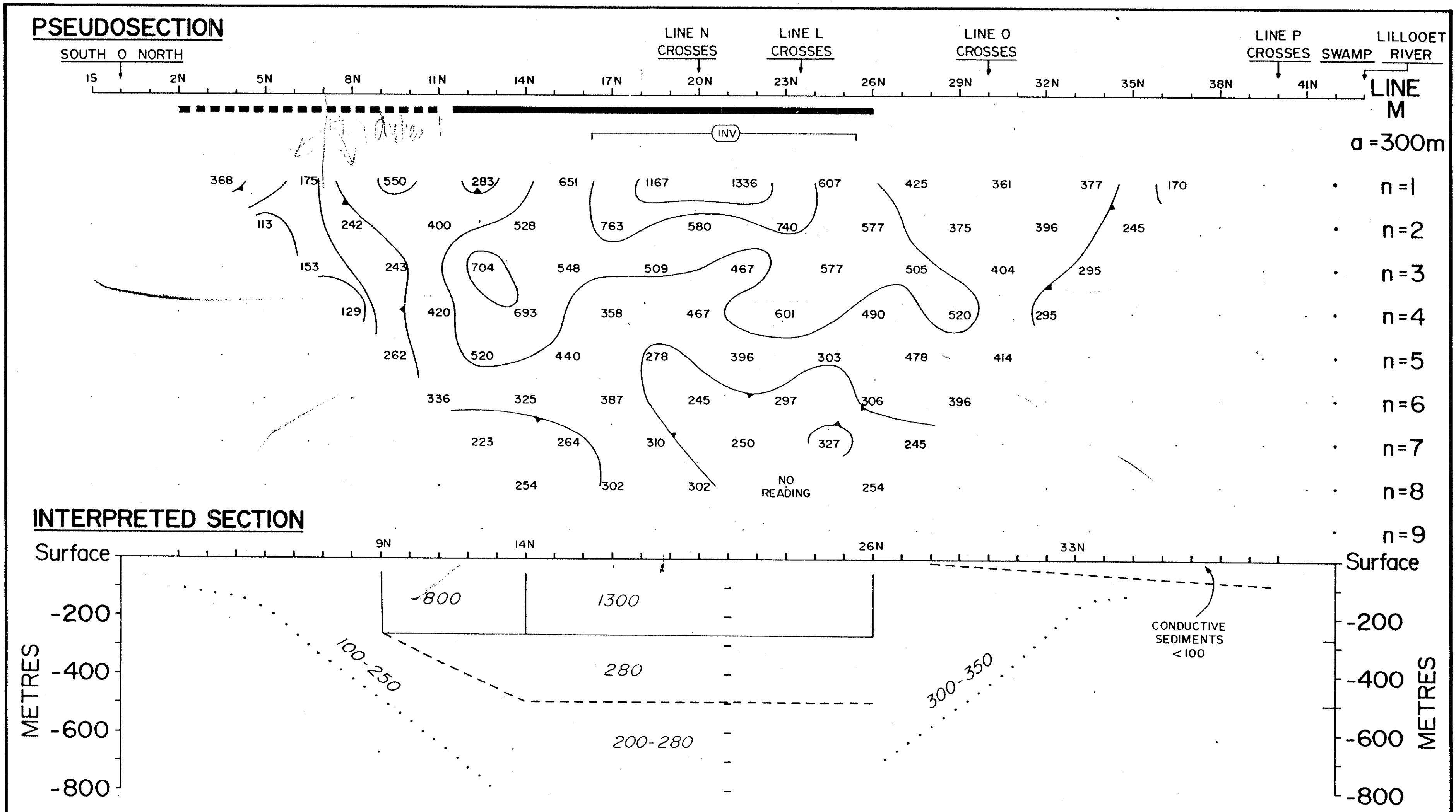
SURVEY BY PREMIER GEOPHYSICS INC., VANCOUVER, B.C.

HORIZONTAL SCALE



LINE P

Figure 6



INTERPRETED SECTION

500 INTERPRETED TRUE RESISTIVITY IN OHM-METRES

RESISTIVITY CONTACT

PROBABLE RESISTIVITY CONTACT OR TRANSITION ZONE

LIMIT OF INTERPRETATION

PSEUDOSECTION PLOTTING

$C_1 - C_2$ CURRENT DIPOLE

$P_1 - P_2$ POTENTIAL DIPOLE

a DIPOLE LENGTH

DEFINITE ANOMALY

POSSIBLE ANOMALY

296 APPARENT RESISTIVITY IN OHM-METRES

(INV) SECTION OF DATA TREATED BY INVERSION

CONTOUR INTERVAL IS MODIFIED LOG 1, 1.5, 2, 3, 5, 7, 10

DIPOLE - DIPOLE ARRAY: C_1 a C_2 na P_1 a P_2; 90°; PLOTTED POSITION

B.C. HYDRO AND POWER AUTHORITY

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MEAGER CREEK GEOTHERMAL PROJECT

D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

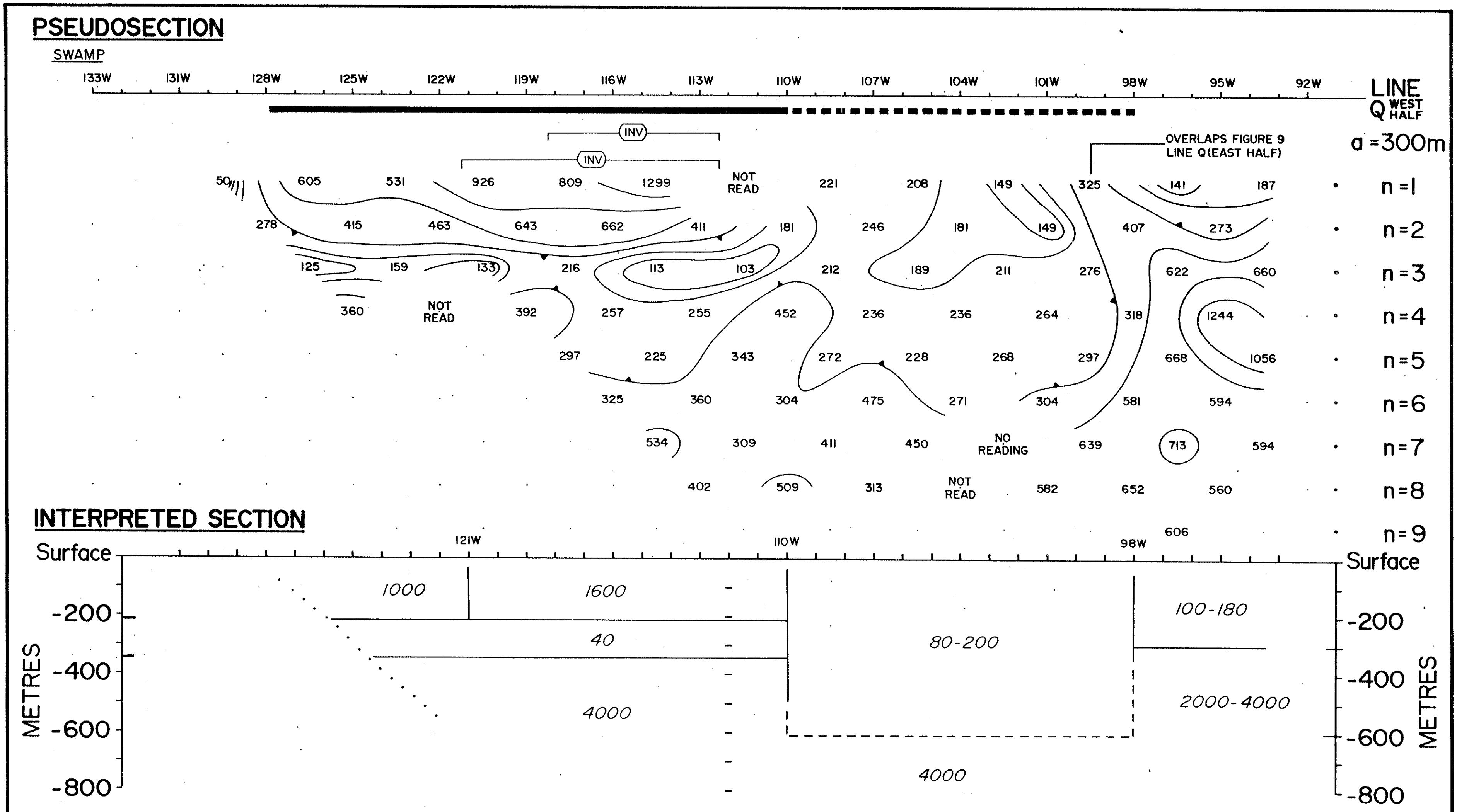
JULY 1979

SURVEY BY PREMIER GEOPHYSICS INC., VANCOUVER, B.C.

HORIZONTAL SCALE: 0 100 200 300 400 500 600 METRES

LINE M

Figure 7



INTERPRETED SECTION

500 INTERPRETED TRUE RESISTIVITY IN OHM-METRES

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DEFINITE ANOMALY

POSSIBLE ANOMALY

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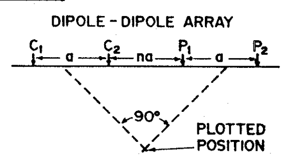

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D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

JULY 1979

SURVEY BY PREMIER GEOPHYSICS INC., VANCOUVER, B.C.

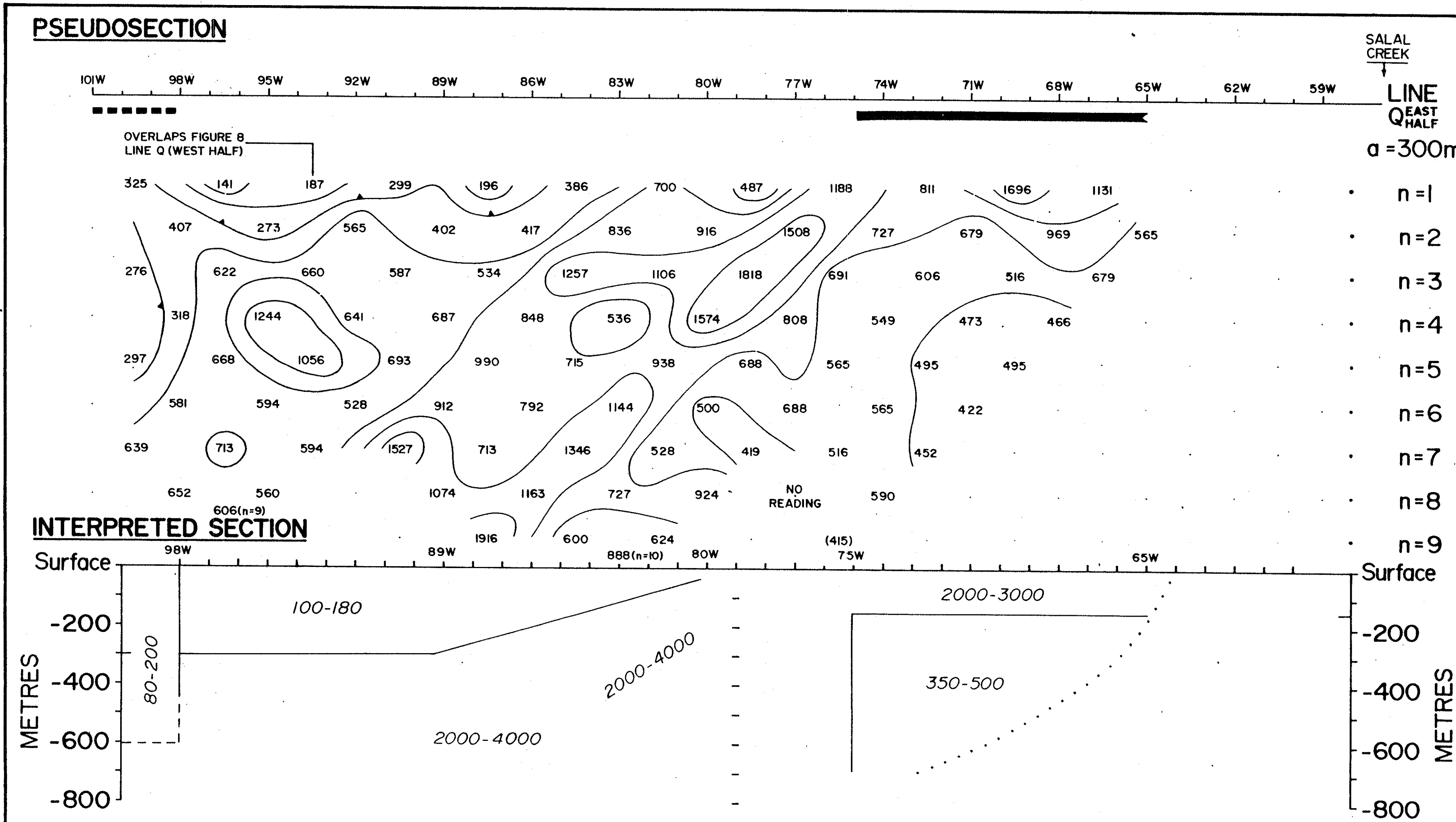
HORIZONTAL SCALE

0 100 200 300 400 500 600

METRES

LINE Q WEST HALF

Figure 8



INTERPRETED SECTION

500 INTERPRETED TRUE RESISTIVITY IN OHM-METRES

RESISTIVITY CONTACT

PROBABLE RESISTIVITY CONTACT OR TRANSITION ZONE

LIMIT OF INTERPRETATION

PSEUDOSECTION PLOTTING

DIPOLE - DIPOLE ARRAY

$C_1 - C_2$ CURRENT DIPOLE

$P_1 - P_2$ POTENTIAL DIPOLE

a DIPOLE LENGTH

DEFINITE ANOMALY

POSSIBLE ANOMALY

296 APPARENT RESISTIVITY IN OHM-METRES

(INV) SECTION OF DATA TREATED BY INVERSION

CONTOUR INTERVAL IS MODIFIED LOG 1,1.5,2,3,5,7,10

PLOTTED POSITION

B.C. HYDRO AND POWER AUTHORITY

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D.C. RESISTIVITY SURVEY

UPPER LILLOOET VALLEY

JULY 1979

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HORIZONTAL SCALE

0 100 200 300 400 500 600

METRES

LINE Q EAST HALF

Figure 9

APPENDIX A: REFERENCES

Fairbank, B.D., Shore, G.A., Werner, L.J., Nevin, A.E., and Sadlier-Brown, T.L., 1979, Report on 1978 field work, Meager Creek Geothermal Area, Upper Lillooet River, British Columbia: (unpublished) to B.C. Hydro and Power Authority, 82 pp.

Pelton, W.H., and Hallof, P.G., 1978, New techniques in the interpretation of induced polarization, resistivity and magnetic data: internal publication of Phoenix Geophysics Ltd., Toronto, Ontario, available at their offices, 9 pp.

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APPENDIX B

Resistivity Measurement Theory

Measurements of the earth's electrical properties are routinely used to gain insight into the physical makeup of what lies below the surface. In geothermal exploration, the leading approach is "resistivity", an active survey method in which the electrical resistivity characteristics of a selected region are studied. Quantitative estimates of the resistivity value are derived for specific volumes of the subsurface.

Electrical conductivity in rocks (with the exception of metallic or carbonaceous rocks) is principally due to ionic conduction in water-filled, connected pore space. This pore space may be an inherent characteristic of the rock, as in a sandstone, or may derive from interconnected fractures in an otherwise non-porous rock such as the granite basement of the Meager Mountain area.

The resistivity anomaly permitted by the increased fluid communication within a porous or permeable zone may be enhanced in a thermal environment by two factors

a) elevated fluid temperatures
b) dissolved solids, which are characteristically high in geothermal waters.

In the predominantly water-saturated Meager Mountain environment, variation of observed resistivity within a single non-metallic non-carbonaceous rock unit (such as the granitic basement) is interpreted as a function of the degree of fracturing of the rock, with possible contribution from elevated fluid temperatures and to a lesser extent, elevated fluid salinity.

APPENDIX C

Dipole-Dipole Array Theory

Dipole-dipole array surveys are used at Meager Creek when terrain and penetration requirements permit. Dipole-dipole is a standard reconnaissance array, with good vertical resolution, good definition of lateral resistivity changes, and proven operating logistics. It is used in the Meager area along valley bottoms where long, straight survey lines can be laid out. Comparative performance characteristics of the pole-pole and dipole-dipole resistivity arrays have been reviewed previously by Shore (1978). A drawing of a dipole-dipole array is included in Figure 3 - 9. Current is passed into the ground through two current electrodes (current dipole) and the resultant electrical potential measured across two potential electrodes (potential dipole).

The formula for calculation of apparent resistivity is:

$$R(A) = \pi a(n)(n+1)(n+2)Vp/Ig$$

where R(A) = apparent resistivity in ohm metres

a = length in metres of each survey dipole

n = integer multiple of distance "a", defining separation distance between the two survey dipoles

Vp = measured primary voltage across potential dipole, in volts

Ig = current in amperes passed through current dipole

APPENDIX D: Computer Inversion Study Printouts

Line M

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Thk1
0	1.E-01	.00704	1500.0	300.0	250.0
1	1.E-01	.00643	1397.6	284.5	254.0
2	1.E-03	.00633	1324.2	279.7	263.6

Pct Std Deviations	20.6	8.3	13.8

Correlation Matrix	1.0000		
	.4676	1.0000	
	-.8286	-.7074	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	1167.0	1191.5	-2.1	1
2	1	1336.0	1191.5	10.6	1
3	2	763.0	754.9	1.1	1
4	2	580.0	754.9	-30.1	1
5	2	740.0	754.9	-2.0	1
6	3	509.0	497.9	2.2	1
7	3	467.0	497.9	-6.6	1
8	4	358.0	386.3	-7.9	1
9	4	467.0	386.3	17.3	1
10	4	601.0	386.3	35.7	1
11	5	278.0	339.9	-22.3	1
12	5	396.0	339.9	14.2	1
13	6	387.0	319.1	17.6	1
14	6	245.0	319.1	-30.2	1
15	6	297.0	319.1	-7.4	1
16	7	310.0	308.5	.5	1
17	7	250.0	308.5	-23.4	1
18	8	302.0	302.5	-.2	1
19	8	302.0	302.5	-.2	1

Line N, # 1

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Thk1
0	1.E-01	.01853	5000.0	250.0	200.0
1	1.E-01	.00532	4172.0	245.9	183.0
2	1.E-03	.00515	3893.1	245.5	184.5
3	1.E-05	.00515	3892.3	245.4	184.6

Pct Std Deviations	24.9	8.1	8.9

Correlation Matrix	1.0000		
	.4078	1.0000	
	-.8704	-.5866	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	2594.0	2199.7	15.2	1
2	1	1924.0	2199.7	-14.3	1
3	2	704.0	757.5	-7.6	1
4	2	735.0	757.5	-3.1	1
5	3	360.0	372.3	-3.4	1
6	3	471.0	372.3	21.0	1
7	4	230.0	289.3	-25.8	1
8	4	311.0	289.3	7.0	1
9	5	230.0	268.7	-16.8	1
10	5	276.0	268.7	2.7	1
11	6	327.0	261.2	20.1	1
12	6	244.0	261.2	-7.1	1

Line N, # 2

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Thk1
0	1.E-01	.01092	13278.8	233.8	290.1
1	1.E-01	.00939	14634.6	217.2	290.4
2	1.E-03	.00934	14869.7	209.0	290.3

Pct Std Deviations	18.5	32.0	6.0

Correlation Matrix	1.0000		
	.4263	1.0000	
	-.8167	-.7328	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	13131.0	12661.7	3.6	1
2	1	10861.0	12661.7	-16.6	1
3	2	3280.0	6907.3	-110.6	0
4	2	9492.0	6907.3	27.2	1
5	3	2262.0	2953.2	-30.6	1
6	3	3487.0	2953.2	15.3	1
7	4	975.0	1198.9	-23.0	1
8	4	1285.0	1198.9	6.7	1
9	5	522.0	555.9	-6.5	1
10	5	675.0	555.9	17.6	1
11	6	266.0	342.0	-28.6	1
12	6	396.0	342.0	13.6	1

Line O, # 1

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Thk1
0	1.E-01	.08385	1000.0	100.0	200.0
1	1.E-01	.00717	848.4	207.6	191.3
2	1.E-03	.00612	945.2	224.3	154.7
3	1.E-05	.00602	1133.6	224.4	141.3
4	1.E-07	.00601	1176.6	224.6	140.0

Pct Std Deviations	75.7	7.1	32.3

Correlation Matrix	1.0000		
	.5898	1.0000	
	-.9550	-.6794	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	451.0	560.6	-24.3	1
2	1	546.0	560.6	-2.7	1
3	1	752.0	560.6	25.5	1
4	2	274.0	303.7	-10.8	1
5	2	315.0	303.7	3.6	1
6	3	318.0	252.8	20.5	1
7	3	266.0	252.8	5.0	1
8	3	218.0	252.8	-15.9	1
9	4	271.0	239.5	11.6	1
10	4	224.0	239.5	-6.9	1
11	5	281.0	234.2	16.7	1
12	5	235.0	234.2	.3	1
13	5	178.0	234.2	-31.6	1
14	6	240.0	231.4	3.6	1
15	6	227.0	231.4	-2.0	1
16	7	276.0	229.8	16.7	1
17	7	180.0	229.8	-27.7	1

Line O, # 2

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Thk1
0	1.E-01	.01013	1000.0	200.0	200.0
1	1.E-01	.00433	895.6	189.3	180.4
2	1.E-03	.00429	851.6	186.7	184.0

Pct Std Deviations	28.6	8.1	18.4

Correlation Matrix	1.0000		
	.5794	1.0000	
	-.9013	-.7402	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	546.0	589.6	-8.0	1
2	1	752.0	589.6	21.6	1
3	1	458.0	589.6	-28.7	1
4	2	315.0	322.0	-2.2	1
5	2	347.0	322.0	7.2	1
6	3	266.0	238.0	10.5	1
7	3	218.0	238.0	-9.2	1
8	3	212.0	238.0	-12.3	1
9	4	224.0	212.9	5.0	1
10	4	186.0	212.9	-14.5	1
11	5	235.0	203.6	13.4	1
12	5	178.0	203.6	-14.4	1
13	6	227.0	199.2	12.3	1
14	7	180.0	196.7	-9.3	1

Line Q, # 1

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Rho3	Thk1	Thk2
0	1.E-01	.01634	1500.0	30.0	1000.0	200.0	100.0
1	1.E-01	.00639	1608.8	33.1	1038.4	204.7	90.6
2	1.E-03	.00626	1665.0	31.7	1758.8	203.9	94.8
3	1.E-05	.00608	1650.4	36.5	3022.2	205.1	111.1
4	1.E-05	.00604	1653.3	42.6	3776.1	204.7	128.2

Pct Std Deviations	45.7	99999.9	59829.1	99999.9	99999.9

Correlation Matrix	1.0000				
	.6969	1.0000			
	.2560	.6455	1.0000		
	-.7088	-.9998	-.6380	1.0000	
	.6969	1.0000	.6456	-.9998	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	809.0	1031.4	-21.6	1
2	1	1299.0	1031.4	25.9	1
3	2	662.0	394.9	67.6	0
4	2	411.0	394.9	4.1	1
5	3	216.0	234.2	-7.8	1
6	3	113.0	234.2	-51.8	0
7	4	257.0	237.5	8.2	1
8	4	255.0	237.5	7.4	1
9	5	297.0	275.6	7.8	1
10	5	225.0	275.6	-18.3	1
11	6	325.0	318.9	1.9	1
12	6	360.0	318.9	12.9	1
13	7	534.0	362.3	47.4	0
14	8	402.0	405.1	-.8	1

Line Q, #2

B.C. HYDRO AND POWER AUTHORITY JULY 1979

Electrode Interval= 300

Iter	Lambda	Rchsq	Rho1	Rho2	Rho3	Thk1	Thk2
0	1.E-01	.00761	1800.0	30.0	4000.0	200.0	100.0
1	1.E-01	.00546	1665.5	31.5	4000.1	202.2	95.3
2	1.E-03	.00538	1554.8	31.6	4068.3	208.7	95.3
3	1.E-05	.00538	1557.6	40.6	4493.6	208.5	122.8

Pct Std Deviations	51.8	99999.9	62907.3	4474.2	99999.9

Correlation Matrix	1.0000				
	-.8435	1.0000			
	-.0834	-.1340	1.0000		
	.8259	-.9994	.1527	1.0000	
	-.8436	1.0000	-.1338	-.9994	1.0000

I	Nspac	Obs	Cal	Pctdif	Wts
1	1	926.0	993.7	-6.8	1
2	1	809.0	993.7	-18.6	1
3	1	1299.0	993.7	30.7	1
4	2	643.0	393.4	63.5	0
5	2	662.0	393.4	68.3	0
6	2	411.0	393.4	4.5	1
7	3	133.0	236.7	-43.8	0
8	3	216.0	236.7	-8.7	1
9	3	113.0	236.7	-52.3	0
10	4	392.0	240.1	63.3	0
11	4	257.0	240.1	7.1	1
12	4	255.0	240.1	6.2	1
13	5	297.0	278.8	6.5	1
14	5	225.0	278.8	-19.3	1
15	6	325.0	323.5	.5	1
16	6	360.0	323.5	11.3	1
17	7	534.0	368.5	44.9	0
18	8	402.0	413.0	-2.7	1