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11/86

DAVE PROPERTY, B.C.
GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL SURVEYS

NTS 93A/12E

53°37'N,121°35'W

for

RAYMOND A. COOK
(owner)

and

Prepared For:

CEDARMINE RESOURCES INC.
(operator)

By:

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Mineral Exploration Consultant

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HARDY ASSOCIATES (1978) LTD.
Calgary, Alberta

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CG12080

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EXECUTIVE SUMMARY

An exploration programme for gold was conducted on the DAVE claim group of Cedarmine Resources Inc. between October 7 and November 9, 1985. The property is located just west of the village of Likely in the Cariboo Mining District of British Columbia.

A grid was cut and soils were sampled at 50 m intervals and analyzed for gold, silver, copper and zinc. The grid was mapped, prospected and sampled on a reconnaissance basis. A magnetometer survey was completed using 25 m stations, and an IP survey (multi-dipole array) was conducted over a selected portion of the grid.

Five zones of potential mineralization were outlined by the combined survey methods.

The most important of these, Zone A, lies in the northern part of the grid, above and below the main road to Likely. A strong zone of high apparent chargeability is located above the road scarp, while an area of highly anomalous gold, silver and zinc was delineated at the base of the talus slope below the road. A small magnetic high is associated. Pyrite mineralization with minor chalcopyrite, very strong shearing and epidote alteration are also present, in highly weathered bedrock. The trend is westerly. Drilling has been recommended initially to test this IP anomaly at a depth of at least 150 metres.

The second important area, Zone B, is located in the northeastern portion of the grid, southwest of the Likely

bridge. This zone has a highly anomalous gold-silver expression, with some high copper and zinc, and trends northerly to northwesterly. It lies off the east flank of a strong high magnetic trend that could suggest a syenite body. IP was not done in this area and outcrop is sparse. This zone should be prospected and sampled in detail, possibly somewhat upslope from its centre, and stripping and trenching should be undertaken if results are encouraging.

Zone C, in the high southwest corner, is a strong silver anomaly with associated gold, and lies just off a strong magnetic trend. This area should be mapped and prospected in detail.

Zones D and E are also associated with a magnetic high. These are IP anomalies in the central portion of the grid, and appear to be more deeply-seated. Little or no outcrop was found, though apparent resistivity indicates shallow overburden in the area. No consistent geochemical anomalies are present, though there are scattered anomalous values of all four metals. It may be that in these areas mineralization does not extend to the bedrock surface.

1.0 INTRODUCTION

A field exploration programme involving geological, geochemical and geophysical surveys was performed during October and November, 1985 on the DAVE Grid, B.C. property of Cedarmine Resources Inc. Geochemical sampling was carried out by Ketza Enterprises Ltd., and geophysical surveys by Hardy Associates (1978) Ltd. The field programme was under the direction of Susan A. Scott, M.Sc., FGAC, who was directly responsible for the geological mapping. The work was commissioned by Raymond A. Cook on behalf of Cedarmine Resources Inc.

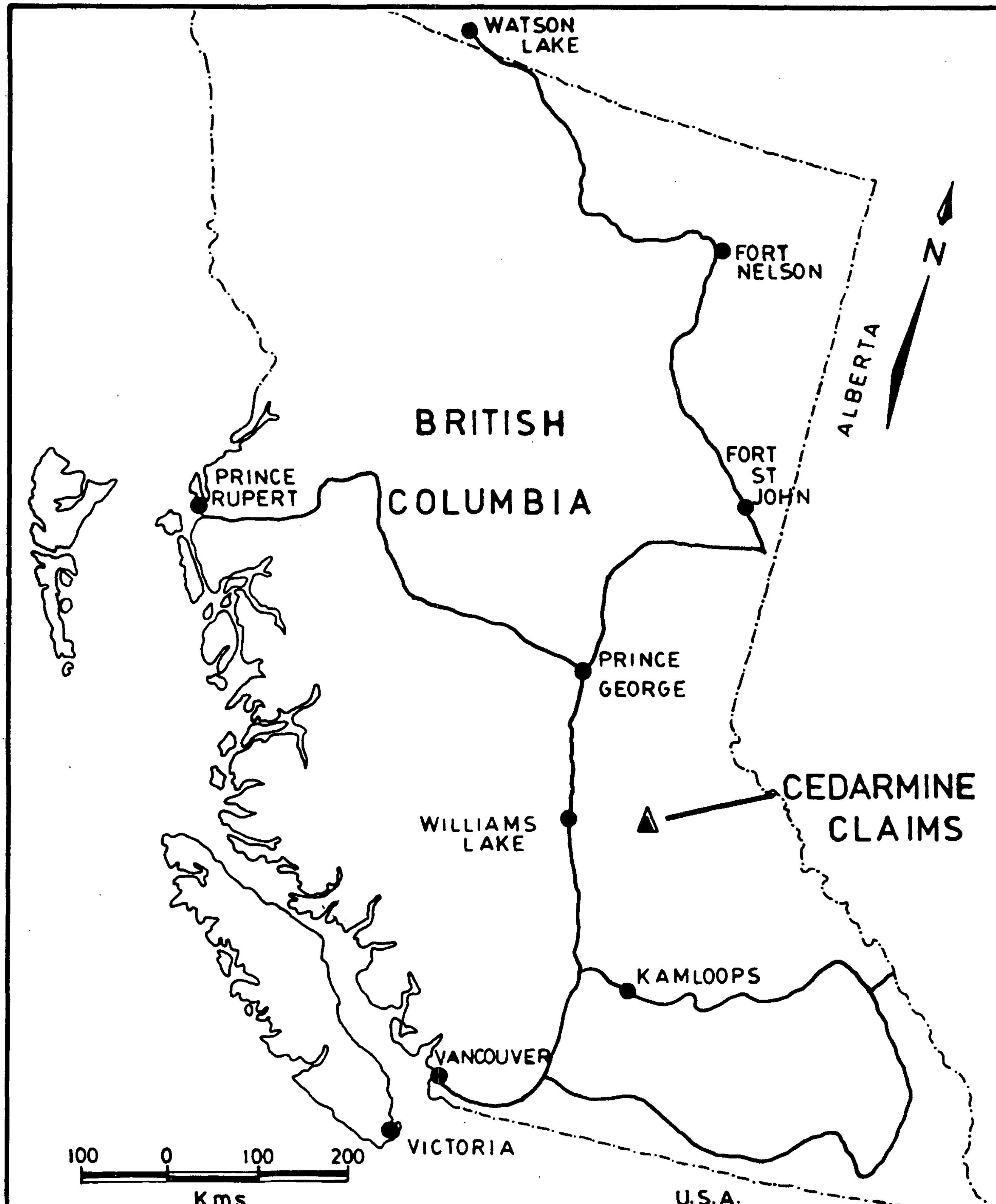
The purpose of the surveys was to locate gold-copper mineralization in bedrock which is largely overlain by glacial and fluvial deposits to varying depths.

Surveys consisted of linecutting, geological mapping and sampling of available outcrop, soil sampling and analysis, magnetometer and induced polarization measurements.

2.0 PROPERTY LOCATION AND ACCESS

The DAVE property is located in the Cariboo Mining Division of British Columbia, approximately 65 kilometres northeast of Williams Lake (Figure 1). Williams Lake is served by scheduled airlines, and the property is then reached by paved and gravel secondary highways, a distance of 85 kilometres. The town of Likely is located 0.5 kilometres east of the property.

Claim Name	Record Number
DAVE	1773
MAR	6694
STEVE	6695
NIC	6696
BRI	6697



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CEDARMINE RESOURCES INC.
LOCATION MAP

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FIGURE 1

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The ground held consists of the DAVE Group (20 units), with the MAR, STEVE, NIC and BRI claims contiguous along the north boundary of the DAVE Group (Figure 2).

3.0 TOPOGRAPHY

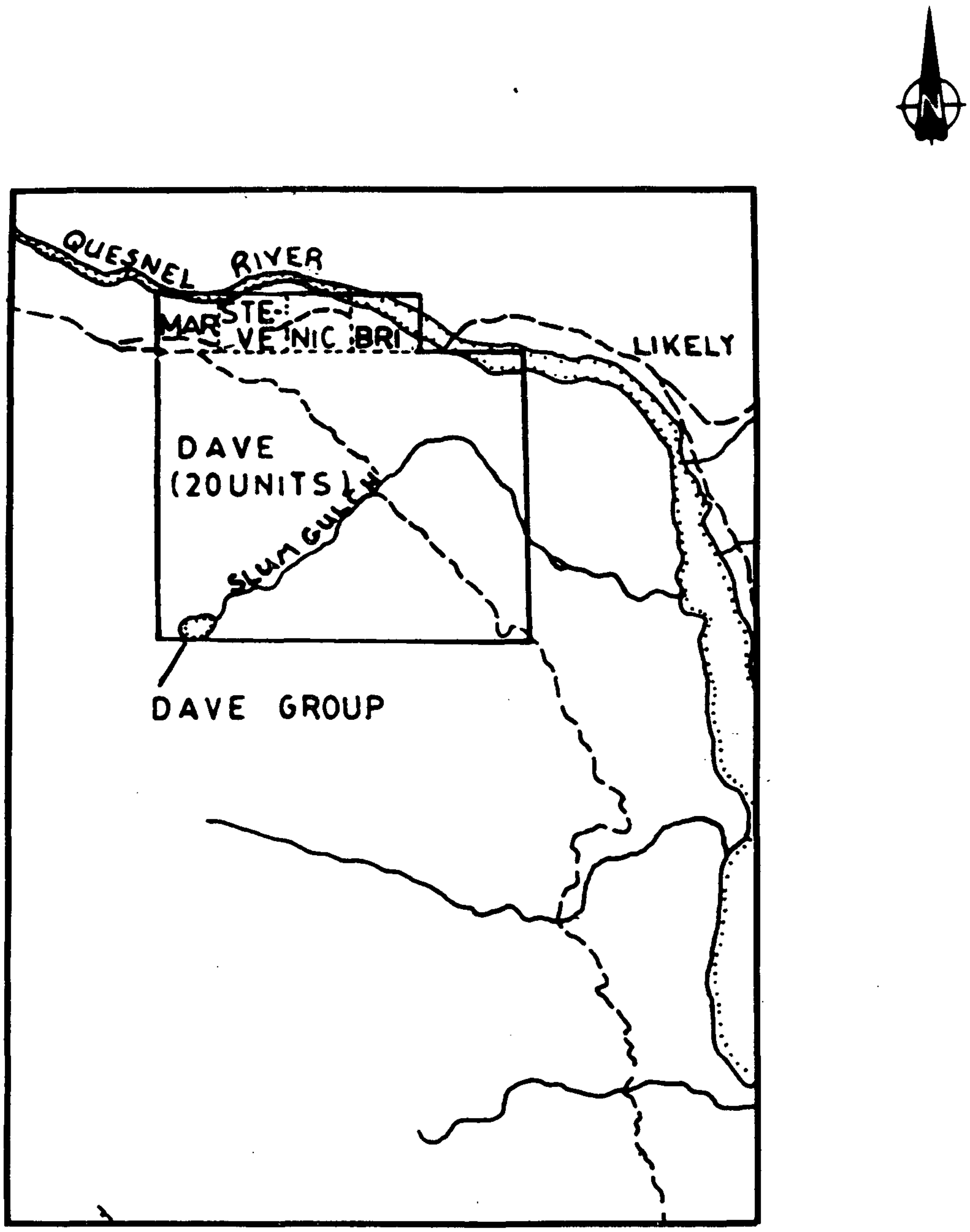
The property drops in benches from a high of 1500 metres in the southwestern portion to an elevation of 720 metres at river level on the north and east. A small creek has cut a deep, steep-sided gully in the terrain from southwest to northeast. Steep slopes are encountered just below the Horsefly Road, and on the final drop to the Quesnel River.

4.0 REGIONAL GEOLOGY

The property lies within the eastern portion of the Quesnel Trough, a northwest-trending series of miogeosynclinal volcanics and intrusives of upper Triassic to lower Jurassic age.

The rocks of this group are mainly augite porphyries, with pyroclastic rocks usually more prevalent than flows. Regionally, the volcanic rocks are associated with a heterogeneous assemblage of volcaniclastic sediments, greywacke and minor siltstone and limestone (Souther, 1977). However, sediments are locally rare.

Chemically, the rocks of this belt are predominantly pyroxene-rich andesites and basalts. Intrusive rocks range from diorite to syenite, and are considered to be either coeval and comagmatic with the volcanics, or possibly slightly younger (lower Jurassic).



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CEDARMINE RESOURCES INC.
DAVE PROPERTY DISPOSITION MAP

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FIGURE 2

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5.0 PREVIOUS WORK

The Quesnel River in the Likely area has been a site of placer gold exploration and production since the late 1800's. Sporadic early bedrock exploration for the main sources of the placer gold has so far not met with success.

The area south and east of Likely was explored for porphyry copper in the 1960's. Cariboo-Bell Copper Mines worked on the BJ property 7 km southwest of the DAVE group, in the same volcanic belt cut by a stock which ranges in composition from monzonite to syenite, and rarely to diorite. Chalcopyrite and pyrite in small amounts are found disseminated and in fractures in the stock. The copper mineralization was found to be low grade and widely distributed. An IP survey revealed anomalies which bore a crude relationship to copper soil anomalies, but not to magnetic highs (BCDM, 1965).

A shallow adit at the north end of the present property is evidence of work done possibly around 1935. The probable target would have been gold in oxidized shear zones.

From 1968 to 1970, Ardo Mines Ltd. explored for copper on their Red Rock Claim Group, which covered the area of the DAVE Group, (Agarwal and Jameson 1969). Reconnaissance mapping, B horizon copper soil geochemistry and an IP survey (pole-dipole array) were carried out. Also, the area immediately south of the adit (below the main road) was stripped. Assays are not included in the report. Mineralization was stated to consist of disseminated pyrite, pyrrhotite and chalcopyrite, with malachite and azurite. It was hosted by a "felsic hybrid rock in immediate proximity to the andesite-hybrid rock contact" (ibid). It is not known whether this mineralization was assayed for gold.

Several copper geochemical anomalies were revealed, corresponding in part to IP anomalies. A programme of diamond drilling was carried out on what were interpreted as sulphide-bearing intrusive bodies at depths of at least 120 m. Partial results of only one hole are given. Sulphide mineralization (maximum total sulphide 6%) was encountered at a depth of 100 m.

From 1979 to 1982, and in 1984, work was done by Rhamco Resources Inc. on the DAVE group. This included prospecting, trenching, mapping, and one shallow diamond drill hole. A VLF-EM survey was performed over an area covering the southwest corner of the present grid (west of LIOE, south of TL14N). The purpose was to extend a mapped epidote skarn zone near Slum Gulch. Surface skarn contained up to 0.014 oz/t Au, and one shallow drill hole on the skarn returned 190 ppm Cu and 68 ppm Zn.

In 1984, a magnetometer survey was done by Rhamco over the same area, on a previously flagged and blazed grid.

6.0 FIELD PROGRAMME

6.1 LINECUTTING

Linecutting consisted of 33.2 km, this work being done by Ketza Enterprises Ltd. of Vancouver. Linecutting crews worked on the grid from October 8 to 17 inclusive.

The grid consists of a baseline 1.3 km long, 3 tie lines, and cross lines spaced 50 m apart (Figure 3). The area at the southwest corner of the grid was covered by a flagged and blazed grid, and these lines were used for the current soil geochemical sampling.

6.2 GEOLOGICAL MAPPING AND ROCK SAMPLING

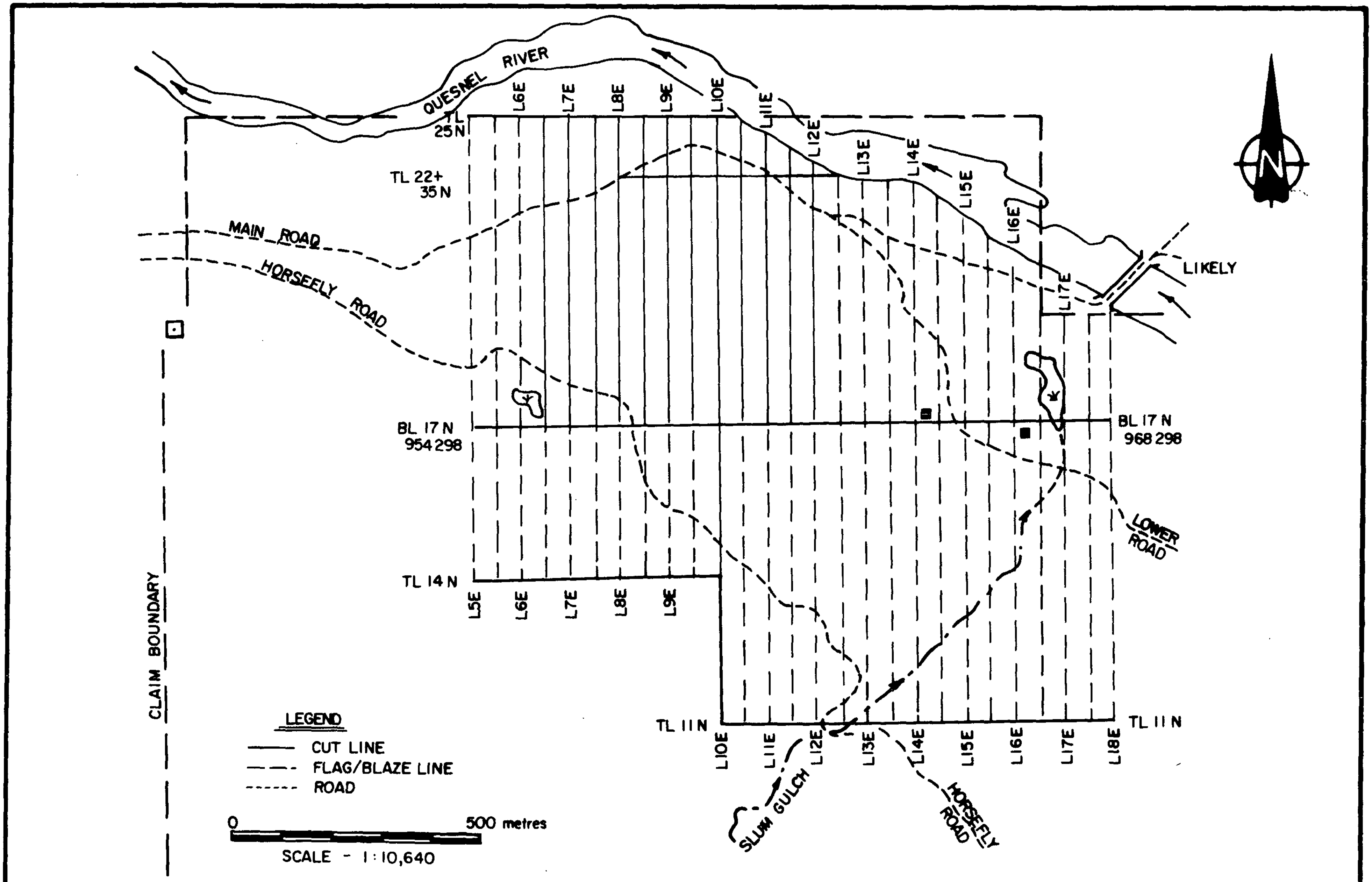
Field mapping, prospecting and rock sampling were performed by S.A. Scott and K.G. Murphy between October 8 and 28, 1985. Thirty field man-days were worked in total.

Forty two rock samples were taken during the work. Thirty three of these formed a series of 20 m chip samples along the outcrop face above the main road (DAR 1-33). All were analyzed for Au, Ag, Cu and Zn by Barringer Magenta in Calgary. Results are included in Appendix A.

6.3 GEOCHEMICAL SOIL SAMPLING

Most of the soil sampling was done by the linecutting crews simultaneously with the cutting. They took a total of 570 samples at 50 m intervals where possible on all lines. In addition, 60 samples were taken by S.A. Scott on the old grid lines at the southwest corner of the new grid.

Four locations that returned high gold analyses were resampled by S.A. Scott, with fill-in samples at 25 m intervals, making a total of 12 sample sites.



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CEDARMINE RESOURCES INC.
DAVE GRID
LIKELY, B.C.

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FIGURE 3

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All soils, a total of 642, were analyzed for Au, Ag, Cu and Zn by Barringer Magenta in Calgary. Results are included in Appendix A.

Soil samples were taken with a mattock in mineral soil at a minimum depth of 20 cm. Kraft paper bags were used; the samples were dried before being shipped to Calgary for analysis.

6.4 GEOPHYSICAL SURVEYS

A magnetometer survey was performed by W. Hemstock and R. Rose of Hardy Associates between October 18 and 25, 1985 inclusive. A total of 29.65 line-km was surveyed at 25 m intervals, with intermediate readings at 12.5 m in areas of large lateral changes.

The magnetic measurements were made with an EDA PPM 350 Total Field Magnetometer. To correct the field observations for diurnal variations in the magnetic field an EDA PPM 375 Recording Base Station Magnetometer was used. Both the field and base station magnetometers were equipped with digital memories to store data for the duration of the day. A detailed description of the equipment is given in Appendix G.

A magnetic base station was established near the Cedarmine Resources Limited field office located approximately half way between the Dave and Cedar Creek grids. The base station magnetometer was programmed to take readings every 30 seconds. At the end of each day the data sets from the field magnetometer and base station magnetometer were merged to form a set of field data corrected for diurnal variation. The results of the magnetic survey are shown on Plate 4.

An induced polarization (IP) survey was carried out between October 20 and November 9, 1985. The crew was composed of J. Balfour (chief), C. Barclay, R. Rose and sometimes W. Hemstock, all of Hardy Associates. Two field visits were made during the IP survey by W.J. Scott, Chief Geophysicist of Hardy Associates.

The grid consisted of Lines 650 to 1200 inclusive, from 1700N to the upper edge of the cut above the main road to Likely. In addition, measurements were taken in the southern ditch of the main road, to cover the north end of the grid.

A total of 6.75 km was surveyed with a multi-dipole array, with 25 m dipoles and n=1 to 4. The transmitter was a Huntec M-4 LOPO battery-operated instrument, and the receiver was a Huntec M-4. These instruments are described in Appendix G.

Measurements were made in the time domain, with a four-second period and 50% duty cycle, so that in one cycle the current was on in the positive direction for one second, off for one second, then on in the negative direction for one second, then off for one second.

During current on time, the current magnitude was recorded at the transmitter. From this current and the corresponding voltage, values of apparent resistivity were calculated. The chargeability was integrated over 500 milliseconds after a delay of 100 milliseconds, and normalized by the voltage observed while current flowed. The formulae for these calculations are presented in Appendix G. At each station, readings were stacked and averaged until stable values were obtained.

The survey was carried out under extremely adverse conditions (heavy rain, sleet and wet snowfall) which severely limited the rate of progress. Extra precautions were taken to ensure that readings were reliable. Both transmitter and receiver were enclosed in heavy plastic sheeting. The porous pots used for the receiver electrodes were filled with saturated $CuSO_4$ solution mixed with antifreeze. The contacts between lead wires and pots were sealed in plastic. At the start of each day, several readings from the previous day were repeated, and during the day many stations were read more than once, to verify the reliability of the data.

The resistivity and chargeability results are plotted as pseudosections in Appendix E.

To allow comparisons with the geology, geochemistry and magnetics, the resistivity and chargeability values were processed with a Fraser filter (Fraser, 1981) and plotted on Plate 5a and 5b. The effect of the filter is to compress the pseudo-section data into a single number for each station; the numbers are then plotted on the map and contoured to illustrate the areal variation of resistivity and chargeability. When looking at contours of filtered data, it should be remembered that anomalous values occurring at the end of a pseudosection may be suppressed by the filtering procedure. This applies particularly at the north ends of the grid lines.

7.0 DISCUSSION OF RESULTS

7.1 GEOLOGICAL MODEL

It is suggested that gold deposits in the geological environment of the DAVE claim group will occur in the following manner (Figure 4).

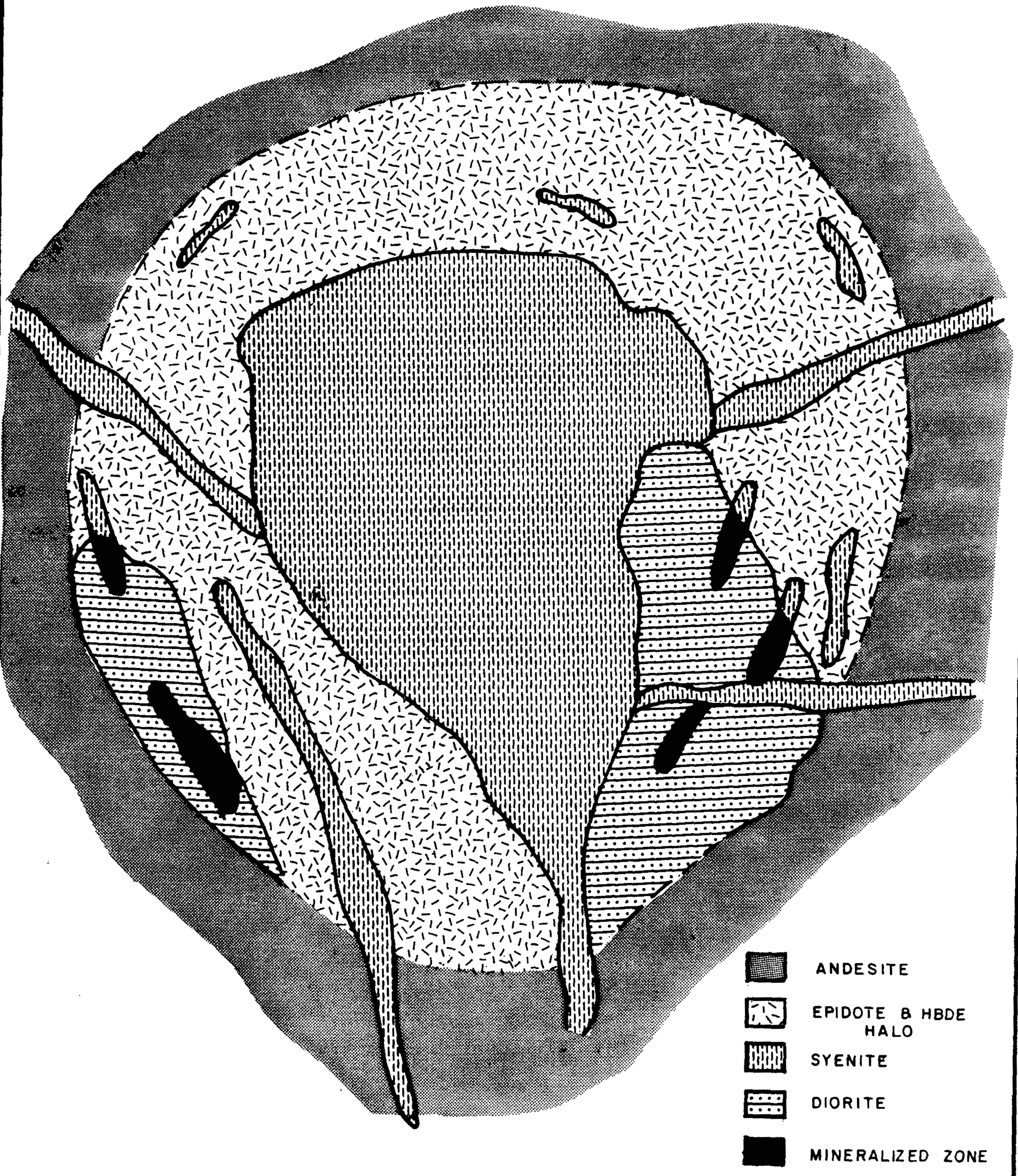
The andesitic volcanic sequence in the area contains coeval and comagmatic dioritic segregations whose margins vary from sharply defined to gradational. Shortly after the formation of this terrain, syenitic bodies were intruded, possibly as small plutons with a profusion of small dyke- and sill-like appendages that extend a considerable distance from the parent body. The syenite may also be chemically related to the andesite-diorite assemblage.

Syenite intrusion resulted in the formation of an extensive epidote-hornblende (propylitic) aureole, and in the mobilization of gold, silver and copper-bearing solutions. These solutions tended to concentrate preferentially in the coarser-textured diorite segregations.

The source of the metals may be the volcanic sequence itself.

7.2 GEOLOGY

The geological map resulting from this work is presented as Plate 1. Detailed sections of the main road outcrop and the Horsefly Road - Slum Gulch section are presented as Plate 2 and Figure 5 respectively. A detailed description of the Horsefly Road section is included as Appendix E.



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CEDARMINE RESOURCES INC.
GEOLOGIC MODEL

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FIGURE 4

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Outcrop is rare within the grid area, being found mainly along road cuts and on higher ground at the southwest corner of the grid. Along the northern edge of the grid, the main road cuts across the steep slope to the Quesnel River. This new road was built in about 1978, so the 20 metre bank above it is a relatively recent exposure.

Andesite

The country rock is andesitic, generally fine-grained, dark grey to dark green in colour. It is commonly amygdaloidal, with carbonate- and/or silica-filled cavities; locally it is basaltic in nature, as in the central-western portion of the grid, or agglomeratic, as in the northeast. Andesite breccia is also common locally. Slightly younger (Campbell 1978) maroon volcanics were seen interbedded with andesite in the roadcut near the Quesnel River Bridge.

Hornblende blebs and crystals up to 1 cm in diameter are abundant locally as an alteration feature within the andesite.

Epidote as a patchy, pale green alteration or as total rock (epidote hornfels) is seen along the Horsefly Road, and is very strong immediately north of Slum Gulch. Epidote was also observed locally in the main road outcrop, appearing to be most intense near a syenite dyke at the western end, but also strong between lines 10E and 10+50E.

Pyrite and minor chalcopyrite are usually present in the more altered andesite sections, and locally form massive blebs and lenses. Cobbles of massive sulphides (mainly pyrite) were observed and sampled in talus below the main road. Samples DR-85-3 and 4 returned values of 8 ppb Au, 420 ppm Cu and 14 ppb Au, 1360 ppm Cu respectively (see Table 1). Pyrite also occurs disseminated and as stringers in andesite, and often plates fractures and shear planes.

Diorite

Dioritic andesite and diorite were observed in the main road section accompanied by intense shearing and alteration, and in the vicinity of syenite dykes. The diorite appears compositionally similar to andesite, but is medium to coarse grained.

Syenite

Syenite occurs as dykes in the northern outcrop portion, and near and in the southern Horsefly Road section. Contacts are irregular, but most dykes appear to have a north trend and steep dip.

The syenite is pink to greyish-pink, fine to medium grained and contains disseminated grains of magnetite. It is moderately to strongly magnetic in contrast to the andesite which is weakly to moderately magnetic. Syenite texture is uniform; the rock is commonly sheared and carbonated, and may show epidote patches.

Syenite material was observed locally to "flood" andesite with pinkish feldspars.

TABLE 1. ROCK SAMPLES

SAMPLE NO.	ASSAY NO.	TYPE	LOCATION, DESCRIPTION	GEOCHEM VALUE			
				Au ppb	Ag ppm	Cu ppm	Zn ppm
DR-85-1	6305	grab	DAVE Group, Slum Gulch - zone of massive sulphide, s.edge of epidote zone (30% syenite in sa).	18	< 0.02	8	44
DR-85-2	6306	grab	10+50 E/23+00N. Gossan, top of main road cliff, sheared, py 5%	4	< 0.02	176	35
DR-85-3	6307	grab	Mineralized blasted bldrs. on talus. Py 5% dissem and on fract. Epidote, hb, cb, sil. 24N/9+80E.	8	0.07	420	31
DR-85-4	6308	grab	Massive sulphide, base of talus 24N/9+70E	14	0.19	1360	29
DR-85-5	6309	3 m chip	Across mouth of adit, contains py, cpy, gossan, malachite	16	0.31	850	41
DR-85-6	6310	grab	L13+50 E/21+55N, N edge, main rd. And. + sy. gossan, cb.	2	< 0.02	53	61
DR-85-7	6311	grab	19+00N/16+25E hbl. and., 1% py, chlorite, sheared	3	0.14	108	68
DR-85-8	6345	1 m chip	8 m in from adit portal - E side, sheared, andesite with cb, py	17	0.05	230	46
DR-85-9	6346	1 m chip	15 m in from adit portal, end face, sheared andesite with cb, py	5	0.04	206	48
DAR-85-1	6312	10 m chip	240 to 250 m east of L10E, main road o/c face	3	0.06	62	78
DAR-85-2	6313	20 m chip	220 to 240 m east of L10E, main road o/c face	2	0.15	66	92
DAR-85-3	6314	20 m chip	200 to 220 m east of L10E, main road o/c face	3	0.1	58	78
DAR-85-4	6315	20 m chip	180 to 200 m east of L10E, main road o/c face	3	0.17	120	55
DAR-85-5	6316	20 m chip	160 to 180 m east of L10E, main road o/c face	6	0.07	180	29
DAR-85-6	6317	20 m chip	140 to 160 m east of L10E, main road o/c face	5	0.08	98	43
DAR-85-7	6318	20 m chip	120 to 140 m east of L10E, main road o/c face	4	0.09	86	36
DAR-85-8	6319	20 m chip	100 to 120 m east of L10E, main road o/c face	4	0.03	126	28

TABLE 1. ROCK SAMPLES (CONTINUED)

SAMPLE NO.	ASSAY NO.	TYPE	LOCATION, DESCRIPTION	GEOCHEM VALUE Au ppb	Ag ppm	Cu ppm	Zn ppm
DAR-85-9	6320	20 m chip	80 to 100 m east of L10E, main road o/c face	< 2	< 0.02	97	34
DAR-85-10	6321	20 m chip	60 to 80 m east of L10E, main road o/c face	5	0.14	145	36
DAR-85-11	6322	20 m chip	40 to 60 m east of L10E, main road o/c face	4	0.03	152	46
DAR-85-12	6323	20 m chip	20 to 40 m east of L10E, main road o/c face	3	0.03	119	44
DAR-85-13	6324	20 m chip	L10+00E to 20 m east of L10E, main road o/c face	11	0.31	720	46
DAR-85-14	6325	20 m chip	L10+00E to 20 m west of L10E, main road o/c face	3	< 0.02	192	40
DAR-85-15	6326	20 m chip	20 to 40 m west of L10E, main road o/c face	6	0.05	610	35
DAR-85-16	6327	20 m chip	40 to 60 m west of L10E, main road o/c face	4	0.09	230	37
DAR-85-17	6328	20 m chip	60 to 80 m west of L10E, main road o/c face	3	0.03	100	100
DAR-85-18	6329	20 m chip	80 to 100 m west of L10E, main road o/c face	2	< 0.02	111	34
DAR-85-19	6330	20 m chip	100 to 120 m west of L10E, main road o/c face	8	0.04	290	34
DAR-85-20	6331	20 m chip	120 to 140 m west of L10E, main road o/c face	4	< 0.02	190	37
DAR-85-21	6332	20 m chip	140 to 160 m west of L10E, main road o/c face	10	0.09	320	20
DAR-85-22	6333	20 m chip	160 to 180 m west of L10E, main road o/c face	11	0.06	440	20
DAR-85-23	6334	20 m chip	180 to 200 m west of L10E, main road o/c face	8	0.07	270	36
DAR-85-24	6335	20 m chip	200 to 220 m west of L10E, main road o/c face	12	0.1	330	32
DAR-85-25	6336	20 m chip	220 to 240 m west of L10E, main road o/c face	4	0.05	280	18
DAR-85-26	6337	20 m chip	240 to 260 m west of L10E, main road o/c face	6	< 0.02	270	20

TABLE 1. ROCK SAMPLES (CONTINUED)

SAMPLE NO.	ASSAY NO.	TYPE	LOCATION, DESCRIPTION	GEOCHEM VALUE			
				Au ppb	Ag ppm	Cu ppm	Zn ppm
DAR-85-27	6338	20 m chip	260 to 280 m west of L10E, main road o/c face	5	0.09	330	13
DAR-85-28	6339	20 m chip	280 to 300 m west of L10E, main road o/c face	3	0.07	159	19
DAR-85-29	6340	20 m chip	300 to 320 m west of L10E, main road o/c face	3	< 0.02	192	30
DAR-85-30	6341	20 m chip	320 to 340 m west of L10E, main road o/c face	25	0.06	128	28
DAR-85-31	6342	20 m chip	340 to 360 m west of L10E, main road o/c face	10	0.11	40	33
DAR-85-32	6343	20 m chip	360 to 380 m west of L10E, main road o/c face	6	< 0.02	68	40
DAR-85-33	6344	20 m chip	380 to 400 m west of L10E, main road o/c face	6	< 0.02	93	46

Structure

Shearing is almost ubiquitous within the grid area, varying from slight to intense. Shearing and alteration have destroyed rock texture and structure in much of the main road outcrop, where oxidation has also produced a pronounced reddish colour. The same destruction of texture is seen to a lesser degree in the Horsefly Road-Slum Gulch section. Elsewhere, shearing, carbonatization and rusty oxidation are strong, as at (BL/16+50N) and near (BL/17+50N).

No single shear direction predominates. In the south, a northeasterly orientation is common, but in the north an east-west to northwesterly direction is more often seen. This direction parallels both the Quesnel River at this point, and the regional strike of the volcanics.

Two north-south fault zones were observed in the main road outcrop, with dips of 20 to 40^{o} east.

DAVE Adit

The area of the old adit near (L12E,23N) was examined, and three samples were taken (DR-85-5,8 and 9). Best results were 17 ppb Au, 850 ppm Cu. The adit is driven beside highly sheared, rusty andesite. The rock is carbonated and contains stringers of mainly pyrite, with some chalcopyrite, magnetite, bornite and brown sphalerite. Malachite stain is common near the mouth of the adit.

A 1 m syenite dyke occurs 30 m northwest of the adit. A 5 m wide (?) highly altered and weathered pyroxenite dyke was seen

25 metres southeast of the adit. This material is dark brownish, crumbling and weakly magnetic.

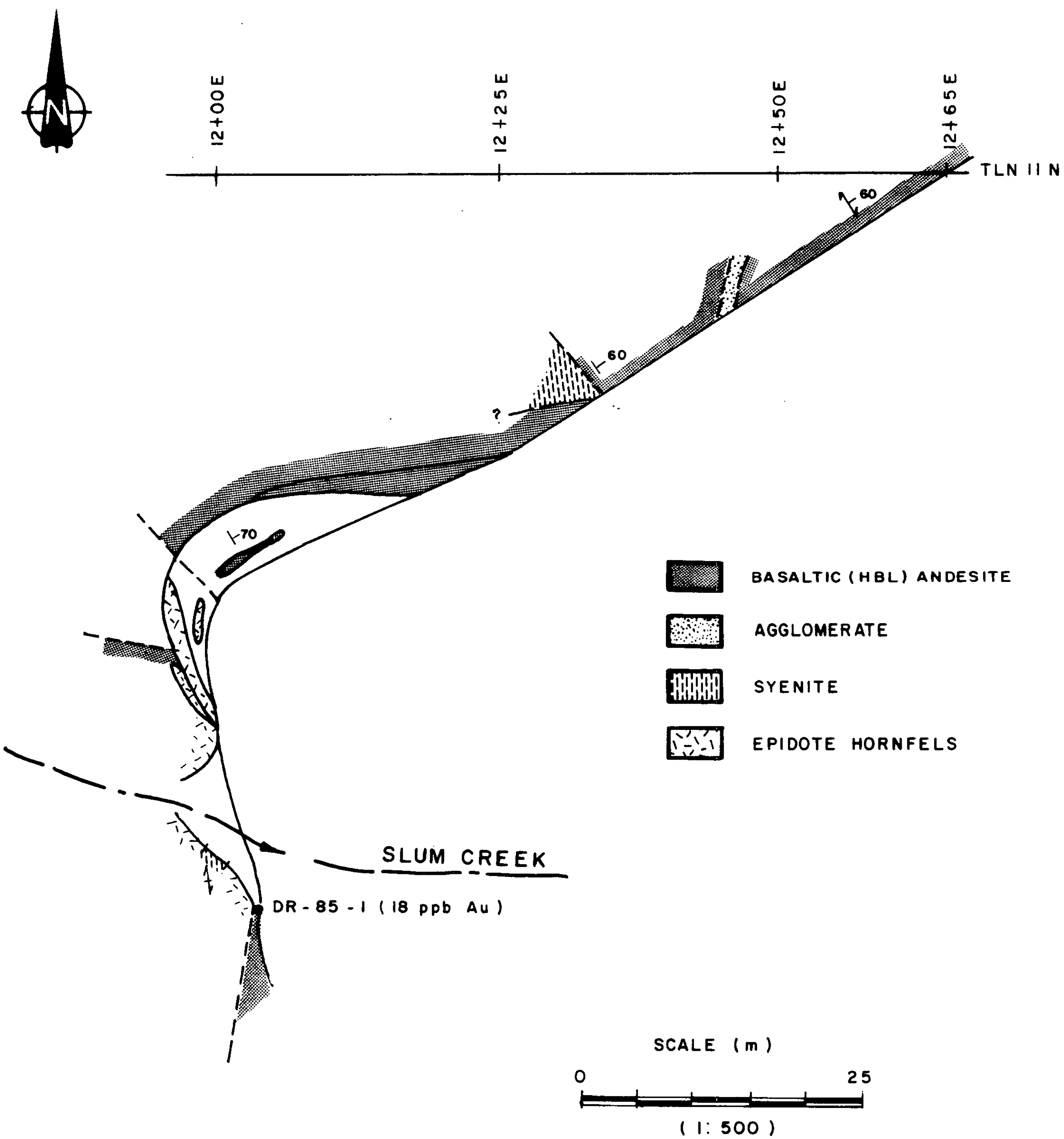
Mineralization

Two main zones of mineralization are evident from outcrop on the DAVE grid, both basically similar in occurrence. Both consist predominantly of massive pyrite lenses with minor chalcopyrite.

The larger (outcropping) of these is at the north end of the grid, extending from the adit area at (L12E,22N) westward to (L8E,22+50N), a distance of 750 metres (Plates 1 and 2). This zone appears to run parallel to much of the shearing, but because of lack of outcrop, it cannot be properly delineated on surface.

Sampling of weathered rock has returned values to a maximum of 16 ppb Au, 31 ppm Ag, 850 ppm Cu and 100 ppm Zn (DAR sample series). However, the intense alteration of the rock has resulted in almost total breakdown of the surface material probably releasing considerable metal content. Assays of the material at depth by drilling should give a more reliable result.

The second, and smaller area is in the Horsefly Road/Slum Creek junction. There, lenses and stringers of pyrite with minor chalcopyrite are associated with gossan and intense epidote alteration. A sample of this material assayed 18 ppb Au, 0.02 ppm Ag, 8 ppm Cu and 44 ppm Zn (DR-85-1).



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CEDARMINE RESOURCES INC.
DAVE GRID HORSEFLY ROAD
OUTCROP DETAIL

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FIGURE 5

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7.3 SOIL GEOCHEMISTRY

Contoured analytical results are presented as Plates 3a,b,c and d. Two main areas are strongly anomalous in gold and silver with spotty copper and zinc enrichment.

The most extensive and consistently anomalous area is that below the main road outcrop between lines 5+50E and 9+50E. The area around the adit at 11+50E is also anomalous, and may be connected with the main zone (sampling was not possible at several stations between the two zones).

Both of these anomalies may be displaced downhill from their source area, given their position on and at the base of steep slopes. However, it must be noted that a part of the gold zone extends above the steepest slope at (L8E,22N), (L9+50E,22N) and (11+50E,22N).

The second, highly anomalous area is one where outcrop is extremely sparse. This area extends from (L16E,21N) south to (L17E,17+50N). Spotty highs extend farther south to 15N.

A potential problem must be recognized throughout the grid, especially in the lower terrain near the Quesnel River. This is the "free gold effect"; which could be encountered in any placer environment. Supporting copper and zinc values tend to discount this explanation for high gold and silver values, however, and some supporting copper and zinc enrichment is present in both highly anomalous zones. Four high gold values from the northeastern portion were resampled and of the four, the two at (16+50E,19N) and (17+50E,17N) returned anomalous results in gold either from the initial site or one 25 m away.

A zone of anomalous silver is present in the southwest corner of the grid. It is supported by spotty high gold, copper and zinc values, and appears to be of secondary importance.

Sporadic anomalous values in gold, silver and copper are found through the central portion of the grid, where no outcrop occurs, and depth of overburden is unkown. It is difficult to place much importance upon these values, except in association with geophysical features.

Basic statistical data for the four elements were obtained from Barringer Magenta, and are included in Appendix A. From these data, the anomalous levels of 20 ppb Au, 400 ppb Ag, 200 ppm Cu and 200 ppm Zn were chosen (approximately mean + 2x standard deviation).

The correlation coefficients show that there are no positive correlations among the different element sets, either in untransformed or in log-transformed data. However, the compilation map (Plate 6) does reveal a certain coincidence of anomalous zones of silver and gold, as discussed above. The lack of correlation between entire data sets is likely due to differing chemical mobilities of the elements.

7.4 MAGNETIC SURVEY

The results of the magnetic survey are presented in contoured form on Plate 4. A base value of 50,000 nT was subtracted from all the readings. The total amplitude of variations in the survey area is approximately 3500 nT.

There appear to be 3 strong magnetic trends in the survey area, all striking approximately NW/SE. The first of these extends from 11E,21N, southwest to about 18E,13N. A small northward extension of this occurs at about 23N between 10E and 11E. Within this magnetic trend there appear to be small cross-cutting features striking slightly north of east such as from 14 to 15E at 1750N. These cross-cutting features may be indicative of faulting.

The second strong magnetic trend runs from about 5E,19N, southeast to about 15E,11N. This trend appears to be interrupted in the region of 10E,17N, possibly by a major fault.

A third zone of high magnetics trends southeast from 5E,16N to about 6E,14N and may extend on from 10E,13N to 12E,11N. These magnetic trends are interrupted in ways that suggest that possible cross-faulting may exist. One such fault appears to trend southwest from approximately 16+50E,21N to approximately 10E,16N. A second major fault appears to be indicated running from 12E,22+50N southwest to 17+50E,15N.

An isolated positive-negative pair occurs about 23N on Line 750E. This feature appears to be caused by a short magnetic dipole which may well be buried iron such as an old culvert.

7.5 INDUCED POLARIZATION

Plates 5A and 5B show the apparent resistivity and chargeability results obtained by applying a fraser-filter to the pseudosections on each line. The apparent resistivity contours of Plate 5A appear to represent primarily the influence of increasing overburden thickness in part of the survey area. In the north-central part of the area, shallow bedrock appears to be reflected in apparent resistivities higher than 1000 ohm-meters. Similarly in the southwest part of the IP survey area, high resistivities again reflect shallow bedrock. In the east central part of the IP survey area, filtered resistivities dropped to less than 600 ohm-meters. In this area, it appears that overburden thicknesses are greater.

Table 2 summarises the identification of individual anomalies from the pseudosections of Appendix E. In the east central part of the zone where apparent resistivities indicate that overburden thicknesses increase, the apparent chargeabilities are generally less than 2 ms. It is unlikely that the overburden is so thick as to mask IP effects in the bedrock and it therefore appears that this area has intrinsically low chargeabilities, which represent background values for the area.

Two strong chargeability highs are observable in the filtered data on Plate 5B. The first of these in the northern part of the survey area has a shallow U-shape that extends from approximately 8E,22+50N to approximately 11+50E/23+00N. In this zone the apparent chargeabilities observed on the area above the roadcut range as high as 7 ms. Stronger values in the road cut, as high as 10 ms, are probably related to a much shorter distance between the electrodes and the chargeable material. This high chargeability zone appears to be open both to the northeast and to the northwest.

A second zone of high chargeabilities trends southeast from 7+50E,20N to 9E,18N. This zone strengthens to the southeast

TABLE 2

SUMMARY OF RESULTS FROM IP SURVEY

DAVE GRID

LINE NUMBER	CHAINAGE OF ANOMALOUS FEATURES		COMMENTS
	FROM	TO	
6+50	1850	1950	Not possible to determine closure of anomaly at south end due to swamp. Feature appears deep seated
7+00	1930	1980	Narrow anomalous zone
	2075	2150	Weak, deeper seated anomaly
7+50	1950	2100	Broad anomaly with near surface expression at 2050 deepening to S and N
8+00	1800	2000	Broad anomaly, appears deep seated
8+50	1800	1875	High chargeability values measured near surface
	1975	2000	Deep seated anomaly
9+00	1800	1875	
	2200	2250	Deep seated anomaly
9+50	1800	1825	Deep seated weak anomaly
	2150	2250	
10+00	1675	1775	Deep seated anomaly
	2100	2225	Deep seated anomaly
10+50	2050	2150	Deep seated anomaly
11+00	1750	1775	Difficult to assess anomaly because survey could not be extended to south
	2125	2200	Deep seated anomaly

LINE NUMBER	CHAINAGE OF ANOMALOUS FEATURES		COMMENTS
	FROM	TO	
11+50			Generally low chargeability values with negative values at north end
12+00			Generally low chargeability
Main road to Likely			Generally high chargeabilities along this line
	125	250	High chargeabilities near surface
	375	525	Deep seated anomaly Due to powerlines, readings were less stable along this line and readings have an error of approximately ±10% Culvert makes chargeabilities unreliable E of 600E.

and appears to be open beyond the survey grid. From the results on the individual pseudosections it appears that the top of this zone is plunging as the zone trends southeast and also that it may broaden slightly at depth.

A third area of apparent high chargeabilities occurs on Line 650E between 18 and 19N in the extreme southwest corner of the IP survey area. From the observations on one line it is not possible to determine what the trend of this zone may be.

7.6 COMPILATION OF RESULTS

Plate 6 shows a compilation of the significant features observed in each of these surveys. In general, the trend of the magnetic highs agrees with the regional trend observed in the geologic mapping. In the geologic mapping only a few syenite outcrops were observed. In these outcrops, the syenite was more strongly magnetic than any other rocks mapped in the area. Syenite outcrops were observed only in five places in the survey area and all of these were within 50 m of the magnetic highs mapped on the compilation sheet. Since no other strongly magnetic rocks were observed in the mapping, a tentative correlation may be made between the magnetic highs on Plate 6 and syenite bodies. Thus the major faults indicated in the magnetic data must post date the emplacement of the syenite.

8.0 CONCLUSIONS AND RECOMMENDATIONS

In looking at the geochemical results, it is clear that only in very few places do all the four elements measured have high concentrations. In the northwest corner of the grid near the fish hatchery, however, (Zone A on Plate 6) high gold, silver and zinc anomalies lie on the extension of the high chargeability zone observed in the IP survey. Northward lineations in the geochemical results may result from downslope migration of the metals from uphill sources. The strong IP chargeabilities lie on the southern margin of the small magnetic high running southwest from 10E/23N but there are no strong magnetic expressions to the northwest of that down in the area by the fish hatchery.

In the extreme eastern part of the survey area, a series of high gold/silver anomalies (Zone B) trends south/southeast and is just east of the strong magnetic expression. The relationship between these geochemical highs and the magnetic expression suggests that the source of the geochemical highs may lie in zones of alteration marginal to the syenites. On the other hand, the linear nature of the geochemical anomalies may suggest an association with fluvial gravels. These choices can only be resolved with further field work as discussed below.

Zone C in the southwest part of the grid has only weak association of gold but strong silver, copper and zinc. It appears to be on the southern flank of a magnetic high which is not well delineated by the present survey. Zone C may again be in marginal association.

Zone D is an area which is outlined primarily by high chargeabilities observed on the IP survey. There are no very strong, clear correlations observed in the geochemical results. The importance of this IP anomaly is somewhat downgraded by this lack of geochemical expression because the high resistivities imply that in this area soil is relatively thin and therefore there should be geochemical expression of any mineralized zones that occur. This IP response may therefore arise from the disseminated pyrite observed in andesite outcrops elsewhere in the survey area. Alternatively, the economic mineralization may lie only at depth and thus not give rise to surface geochemical expression.

Zone E is outlined essentially by a small set of high chargeability readings at the extreme western extent of the IP grid. There is no strong geochemical correlation with this IP response even though the apparent resistivities imply bedrock is shallow in this area as well. Zones D and E would assume greater importance if further work indicates economic mineralization at depth in Zone A.

At 8+50E,18+25N there is a small outcrop of hornblende andesite which, while red-stained, has no apparent sulphides associated with it. This is within the anomalous zone D.

In looking at all these results it is apparent that the two areas of highest priority are the areas A and B where multi-element geochemical anomalies lie in favourable geologic positions.

In this area, the lack of strong geochemical expression on top of the hill implies that the source of metallic mineralization must lie at depth within the rocks. On the pseudosections for Lines 10 through 12, the highest IP chargeabilities are observed at depth at the very ends of the lines. Thus both the geochemistry and the IP imply that that highest values are at considerable depth in this area. It is recommended that an assessment of this zone be carried out by drilling a minimum of two holes, both situated on the main road to Likely. The first recommended hole is situated on the road at approximately 11+25E. It should be drilled at a steep angle to the south-southwest and it should be continued for at least 150 m to provide a satisfactory test of the IP anomaly.

The second hole is recommended to be at approximately 8E on the road. This hole should be drilled steeply down to the east-southeast and should be continued to at least 150 m in order to adequately test the IP anomaly. If neither of these holes shows encouraging results, then some other source should be sought for the geochemical anomaly of Zone A. In that case consideration should be given to extending the IP survey into the northwest corner of the grid.

There is not yet sufficient information in Zone B to justify drilling. However, a further examination of the high geochemical anomaly in the neighborhood of 16+50E,19N, should be undertaken. This study should take the form of detailed mapping and prospecting in the area east of the unnamed pond with stripping where necessary. If this examination provides encouraging results, consideration could be given to a detailed IP survey on three or four lines in the immediate neighborhood of the encouraging geochemical results.

Zone C is encouraging becuase of the correlation between the high magnetics and the multi-element geochemical anomaly. This area should be examined in detail with mapping and prospecting and again consideration should be given to stripping if necessary to provide adequate geologic control. If the results are encouraging, IP surveys may be warranted in this area as well.

Both Zones D and E are IP responses with no large apparent geochemical anomalies. If the drilling on Zone A gives more encouraging results at depth, then there is a possibility that Zones D and E represent similar geologic situations and consideration should be given to testing Zone D at significant depths. Consideration should be given to defining the total extent of the anomaly in Zone D prior to choosing an optimum drilling site.

Respectfully submitted,

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HARDY ASSOCIATES (1978) LTD.

Per:

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APPENDIX A

GEOCHEMICAL ANALYSES

BARRINGER MAGENTA
Laboratories (Alberta) Ltd.

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CALGARY, ALBERTA
T2E 6K3
PHONE: (403) 250-1901

13-NOV-85

COPY: 1 OF 2

AUTHORITY:S. SCOTT

CEDARMINE RESOURCES INC.
631 - 19 STREET N.E.
CALGARY, ALBERTA T2E 4X1

ATTN: R. COOK

PROJECT: LIKELY-E DAVE

WORK ORDER: 8270D-85

*** FINAL REPORT ***

GEOCHEMICAL LABORATORY REPORT

SAMPLE TYPE: ROCK

SAMPLE NUMBER	FIRE ASSAY AU PPB	FIRE ASSAY AG PPM	CU PPM	ZN PPM
6310	2.0	<0.02	53.0	61.0
6311	3.0	0.14	108.0	68.0
6312	3.0	0.06	62.0	78.0
6313	2.0	0.15	66.0	92.0
6314	3.0	0.1	58.0	78.0
6315	3.0	0.17	120.0	55.0
6316	6.0	0.07	180.0	29.0
6317	5.0	0.08	98.0	43.0
6318	4.0	0.09	86.0	36.0
6319	4.0	0.03	126.0	28.0
6320	<2.0	<0.02	97.0	34.0
6321	5.0	0.14	145.0	36.0
6322	4.0	0.03	152.0	46.0
6323	3.0	0.03	119.0	44.0
6324	11.0	0.31	720.0	46.0
6325	3.0	<0.02	192.0	40.0
6326	6.0	0.05	610.0	25.0
6327	4.0	0.09	230.0	37.0
6328	3.0	0.03	100.0	100.0
6329	2.0	<0.02	111.0	34.0
6330	8.0	0.04	290.0	24.0
6331	4.0	<0.02	190.0	37.0
6332	10.0	0.09	320.0	20.0
6333	11.0	0.06	440.0	20.0
6334	8.0	0.07	270.0	36.0
6335	12.0	0.1	330.0	32.0
6336	4.0	0.05	280.0	18.0
6337	6.0	<0.02	270.0	20.0
6338	5.0	0.09	330.0	13.0
6339	3.0	0.07	159.0	19.0

BARRINGER MAGENTA
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ATTN: R. COOK

PROJECT: LIKELY-CC, DAVE

WORK ORDER: 8270D-85

*** FINAL REPORT ***

GEOCHEMICAL LABORATORY REPORT

SAMPLE TYPE: ROCK

SAMPLE NUMBER	FIRE ASSAY AU PPB	FIRE ASSAY AG PPM	CU PPM	ZN PPM
6340	3.0	<0.02	192.0	30.0
6341	25.0	0.06	128.0	28.0
6342	10.0	0.11	40.0	33.0
6343	6.0	<0.02	68.0	40.0
DAVE 6344	6.0	<0.02	93.0	46.0
6345	17.0	0.05	230.0	46.0
6346	5.0	0.04	206.0	48.0

OF DATA SEGMENTS TO FOLLOW = 3
Sample Type for this Segment = ROCK
OF ELEMENTS THIS SEGMENT = 4
OF SAMPLE NUMBERS THIS SEGMENT = 9

	AU PPB	AG PPM	CU PPM	ZN PPM
6305	18.0	<0.02	8.0	44.0
6306	4.0	<0.02	176.0	35.0
6307	8.0	0.07	420.0	31.0
6308	14.0	0.19	1360.0	29.0
6309	16.0	0.31	850.0	41.0

DAVE

Sample Type for this Segment = SOIL
OF ELEMENTS THIS SEGMENT = 2
OF SAMPLE NUMBERS THIS SEGMENT = 622

	AU PPB	AG PPM	CU PPM	ZN PPM
5+00E14+00 N	8.0	0.28	56.0	160.0
5+00E14+50 N	6.0	<0.02	44.0	170.0
5+00E15+00 N	<2.0	0.48	33.0	141.0
5+00E15+50 N	<2.0	0.53	95.0	137.0
5+00E16+00 N	<2.0	0.15	35.0	92.0
5+00E16+50 N	3.0	0.09	80.0	86.0
5+00E17+00 N	6.0	0.06	38.0	127.0
5+00E17+50 N	2.0	0.13	48.0	116.0
5+00E18+00 N	4.0	0.1	82.0	96.0
5+00E18+50 N	MS	MS	MS	MS
5+00E19+00 N	2.0	0.16	41.0	125.0
5+00E19+50 N	3.0	0.17	83.0	115.0
5+00E20+00 N	8.0	0.28	35.0	75.0
5+00E20+50 N	10.0	0.31	28.0	70.0
5+00E21+00 N	4.0	0.17	36.0	100.0
5+00E21+50 N	MS	MS	MS	MS
5+00E22+00 N	MS	MS	MS	MS
5+00E22+50 N	MS	MS	MS	MS
5+00E23+00 N	14.0	0.1	156.0	68.0
5+00E23+50 N	9.0	0.18	40.0	140.0
5+00E24+00 N	15.0	0.3	28.0	168.0
5+00E24+50 N	3.0	0.23	162.0	135.0
5+00E25+00 N	MS	MS	MS	MS
5+50E14+00 N	32.0	0.26	44.0	125.0
5+50E14+50 N	4.0	0.14	49.0	140.0
5+50E15+00 N	3.0	0.23	16.0	109.0
5+50E15+50 N	2.0	0.17	45.0	103.0
5+50E16+00 N	12.0	0.12	35.0	143.0
5+50E16+50 N	<2.0	0.15	62.0	96.0
5+50E17+00 N	<2.0	0.13	58.0	107.0
5+50E17+50 N	3.0	0.05	113.0	95.0
5+50E18+00 N	5.0	0.04	63.0	89.0
5+50E18+50 N	<2.0	0.23	62.0	85.0
5+50E19+00 N	12.0	0.72	113.0	96.0
5+50E19+50 N	14.0	0.24	150.0	70.0
5+50E20+00 N	25.0	0.15	69.0	108.0
5+50E20+50 N	4.0	0.14	45.0	74.0

5+50E21+00 N	17.0	0.57	30.0	175.0
5+50E21+50 N	MS	MS	MS	MS
5+50E22+00 N	MS	MS	MS	MS
5+50E22+50 N	MS	MS	MS	MS
5+50E23+00 N	3.0	0.23	11.0	68.0
5+50E23+50 N	6.0	0.62	27.0	151.0
5+50E24+00 N	12.0	0.84	28.0	165.0
5+50E24+50 N	30.0	0.42	161.0	141.0
5+50E25+00 N	MS	MS	MS	MS
6+00E14+00 N	8.0	0.39	22.0	115.0
6+00E14+50 N	3.0	0.27	31.0	116.0
6+00E15+00 N	6.0	0.19	31.0	102.0
6+00E15+50 N	5.0	0.27	29.0	123.0
6+00E16+00 N	2.0	0.14	60.0	95.0
6+00E16+50 N	14.0	0.54	110.0	100.0
6+00E17+00 N	4.0	0.34	23.0	100.0
6+00E17+50 N	2.0	0.4	18.0	106.0
6+00E18+00 N	<2.0	0.54	84.0	85.0
6+00E18+50 N	<2.0	0.24	24.0	91.0
6+00E19+00 N	20.0	0.19	78.0	83.0
6+00E19+50 N	14.0	0.15	86.0	77.0
6+00E20+00 N	3.0	0.45	13.0	76.0
6+00E20+50 N	8.0	0.44	34.0	127.0
6+00E21+00 N	20.0	0.29	28.0	98.0
6+00E21+50 N	16.0	0.17	61.0	73.0
6+00E22+00 N	18.0	0.26	320.0	60.0
6+00E22+50 N	13.0	0.16	124.0	64.0
6+00E23+00 N	17.0	0.31	71.0	95.0
6+00E23+50 N	15.0	0.41	43.0	182.0
6+00E24+00 N	220.0	0.46	37.0	310.0
6+50E14+00 N	6.0	0.2	90.0	88.0
6+50E14+50 N	10.0	0.28	79.0	93.0
6+50E15+00 N	<2.0	0.13	47.0	71.0
6+50E15+50 N	<2.0	0.16	30.0	78.0
6+50E16+00 N	<2.0	0.25	43.0	132.0
6+50E16+50 N	<2.0	0.3	160.0	108.0
6+50E17+00 N	<2.0	0.27	31.0	148.0
6+50E17+50 N	MS	MS	MS	MS
6+50E18+00 N	MS	MS	MS	MS
6+50E18+50 N	4.0	0.16	25.0	69.0
6+50E19+00 N	5.0	0.25	34.0	104.0
6+50E19+50 N	8.0	0.15	33.0	101.0
6+50E20+00 N	6.0	0.33	34.0	121.0
6+50E20+50 N	5.0	0.17	34.0	129.0
6+50E21+00 N	4.0	0.21	29.0	119.0
6+50E21+50 N	7.0	0.07	124.0	65.0
6+50E22+00 N	5.0	<0.02	106.0	65.0
6+50E22+50 N	MS	MS	MS	MS
6+50E23+00 N	MS	MS	MS	MS
6+50E23+50 N	9.0	0.3	52.0	166.0
6+50E24+00 N	10.0	0.3	53.0	250.0
6+50E24+50 N	35.0	0.55	81.0	176.0
6+50E25+00 N	54.0	0.54	65.0	158.0
7+00E14+00 N	5.0	0.13	57.0	84.0
7+00E14+50 N	9.0	0.24	93.0	134.0

7+00E15+00 N	9.0	0.2	24.0	97.0
7+00E15+50 N	2.0	0.21	34.0	129.0
7+00E16+00 N	5.0	0.56	28.0	109.0
7+00E16+50 N	18.0	0.45	31.0	131.0
7+00E17+00 N	4.0	0.46	265.0	154.0
7+00E17+50 N	17.0	0.14	51.0	125.0
7+00E18+00 N	4.0	0.23	31.0	91.0
7+00E18+50 N	3.0	0.26	23.0	125.0
7+00E19+00 N	20.0	0.17	59.0	82.0
7+00E19+50 N	3.0	0.25	35.0	113.0
7+00E20+00 N	3.0	0.23	19.0	87.0
7+00E20+50 N	2.0	0.33	29.0	102.0
7+00E21+00 N	3.0	0.18	66.0	90.0
7+00E21+50 N	7.0	0.19	42.0	89.0
7+00E22+00 N	15.0	0.23	103.0	71.0
7+00E22+50 N	MS	MS	MS	MS
7+00E23+00 N	MS	MS	MS	MS
7+00E23+50 N	3.0	0.24	53.0	106.0
7+00E24+00 N	5.0	0.6	34.0	300.0
7+00E24+50 N	MS	MS	MS	MS
7+00E25+00 N	36.0	0.57	104.0	109.0
7+00E25+50 N	6.0	0.58	103.0	150.0
7+50E14+00 N	35.0	0.54	49.0	141.0
7+50E14+50 N	2.0	0.24	58.0	103.0
7+50E15+00 N	12.0	0.22	48.0	128.0
7+50E15+50 N	8.0	0.41	18.0	93.0
7+50E16+00 N	15.0	0.33	22.0	178.0
7+50E16+50 N	6.0	0.2	32.0	195.0
7+50E17+00 N	3.0	0.21	39.0	207.0
7+50E17+50 N	6.0	0.65	560.0	89.0
7+50E18+00 N	9.0	0.24	24.0	135.0
7+50E18+50 N	6.0	0.19	30.0	106.0
7+50E19+00 N	2.0	0.17	39.0	102.0
7+50E19+50 N	<2.0	0.29	42.0	101.0
7+50E20+00 N	<2.0	0.21	26.0	84.0
7+50E20+50 N	5.0	0.18	121.0	70.0
7+50E21+00 N	6.0	0.14	56.0	75.0
7+50E21+50 N	3.0	0.23	29.0	85.0
7+50E22+00 N	3.0	0.14	135.0	63.0
7+50E22+50 N	4.0	0.11	63.0	81.0
7+50E23+00 N	MS	MS	MS	MS
7+50E23+50 N	26.0	0.2	90.0	192.0
7+50E24+00 N	80.0	0.6	280.0	133.0
7+50E24+50 N	MS	MS	MS	MS
7+50E25+00 N	42.0	0.47	74.0	166.0
8+00E14+00 N	34.0	0.17	27.0	117.0
8+00E14+50 N	<2.0	0.2	38.0	90.0
8+00E15+00 N	<2.0	0.29	34.0	109.0
8+00E15+50 N	<2.0	0.26	51.0	105.0
8+00E16+00 N	<2.0	0.22	22.0	116.0
8+00E16+50 N	<2.0	0.48	76.0	132.0
8+00E17+00 N	<2.0	0.34	23.0	163.0
8+00E17+50 N	<2.0	0.14	34.0	75.0
8+00E18+00 N	27.0	0.09	50.0	80.0
8+00E18+50 N	14.0	0.17	270.0	60.0

8+00E19+00 N	<2.0	0.32	73.0	78.0
8+00E19+50 N	<2.0	0.12	37.0	110.0
8+00E20+00 N	<2.0	0.21	76.0	75.0
8+00E20+50 N	<2.0	0.13	16.0	70.0
8+00E21+00 N	<2.0	0.21	25.0	100.0
8+00E21+50 N	<2.0	0.12	37.0	97.0
8+00E22+00 N	30.0	0.14	62.0	83.0
8+00E22+50 N	2.0	0.07	61.0	69.0
8+00E23+00 N	MS	MS	MS	MS
8+00E23+50 N	MS	MS	MS	MS
8+00E24+00 N	6.0	0.28	23.0	160.0
8+00E24+50 N	10.0	0.15	66.0	270.0
8+00E25+00 N	MS	MS	MS	MS
8+50E14+00 N	<2.0	0.48	79.0	117.0
8+50E14+50 N	<2.0	0.1	45.0	110.0
8+50E15+00 N	12.0	0.24	26.0	113.0
8+50E15+50 N	6.0	0.24	36.0	151.0
8+50E16+00 N	15.0	0.27	54.0	132.0
8+50E16+50 N	75.0	0.3	21.0	170.0
8+50E17+00 N	6.0	0.21	88.0	140.0
8+50E17+50 N	9.0	0.16	128.0	64.0
8+50E18+00 N	10.0	0.02	80.0	71.0
8+50E18+50 N	6.0	0.2	75.0	89.0
8+50E19+00 N	17.0	0.27	64.0	95.0
8+50E19+50 N	8.0	0.24	35.0	61.0
8+50E20+00 N	MS	MS	MS	MS
8+50E20+50 N	10.0	0.09	56.0	83.0
8+50E21+00 N	7.0	0.12	43.0	80.0
8+50E21+50 N	10.0	0.21	55.0	128.0
8+50E22+00 N	<2.0	0.29	28.0	120.0
8+50E22+71 N	18.0	0.18	115.0	53.0
8+50E23+00 N	MS	MS	MS	MS
8+50E23+50 N	MS	MS	MS	MS
8+50E24+00 N	33.0	0.81	68.0	430.0
8+50E24+50 N	141.0	0.36	35.0	280.0
8+50E25+00 N	MS	MS	MS	MS
9+00E14+00 N	<2.0	0.38	100.0	133.0
9+00E14+50 N	<2.0	0.23	20.0	94.0
9+00E15+00 N	14.0	0.21	16.0	90.0
9+00E15+50 N	10.0	0.17	162.0	68.0
9+00E16+00 N	<2.0	0.15	66.0	148.0
9+00E16+50 N	<2.0	0.21	48.0	183.0
9+00E17+00 N	8.0	0.08	97.0	78.0
9+00E17+50 N	11.0	0.14	150.0	57.0
9+00E18+00 N	21.0	0.23	64.0	85.0
9+00E18+50 N	6.0	0.45	27.0	104.0
9+00E19+00 N	4.0	0.26	38.0	111.0
9+00E19+50 N	70.0	0.3	92.0	87.0
9+00E20+00 N	10.0	0.05	90.0	58.0
9+00E20+50 N	15.0	0.23	48.0	100.0
9+00E21+00 N	MS	MS	MS	MS
9+00E21+50 N	4.0	0.09	60.0	81.0
9+00E22+00 N	16.0	0.14	36.0	103.0
9+00E22+50 N	3.0	0.09	68.0	82.0
9+00E23+00 N	MS	MS	MS	MS
9+00E23+50 N	MS	MS	MS	MS

9+00E24+00	N	MS	MS	MS	MS
9+00E24+50	N	6.0	<0.02	80.0	169.0
9+00E25+00	N	MS	MS	MS	MS
9+50E14+00	N	5.0	0.08	60.0	110.0
9+50E14+50	N	4.0	0.1	28.0	110.0
9+50E15+00	N	4.0	0.18	45.0	102.0
9+50E15+50	N	8.0	0.3	15.0	84.0
9+50E16+00	N	8.0	0.5	182.0	113.0
9+50E16+50	N	7.0	0.8	160.0	91.0
9+50E17+00	N	9.0	0.18	93.0	77.0
9+50E17+50	N	11.0	2.45	520.0	87.0
9+50E18+00	N	7.0	0.21	35.0	134.0
9+50E18+50	N	5.0	0.14	31.0	100.0
9+50E19+00	N	25.0	0.09	53.0	90.0
9+50E19+50	N	5.0	0.12	23.0	98.0
9+50E20+00	N	3.0	0.43	38.0	76.0
9+50E20+50	N	<2.0	<0.02	7.0	42.0
9+50E21+00	N	3.0	<0.02	24.0	52.0
9+50E21+50	N	14.0	0.15	43.0	91.0
9+50E22+00	N	33.0	0.05	65.0	59.0
9+50E22+50	N	10.0	0.15	37.0	97.0
9+50E23+00	N	MS	MS	MS	MS
9+50E23+50	N	MS	MS	MS	MS
9+50E24+00	N	MS	MS	MS	MS
9+50E24+50	N	10.0	0.35	70.0	88.0
9+50E25+00	N	MS	MS	MS	MS
10+00E11+00	N	<2.0	0.21	31.0	114.0
10+00E11+50	N	<2.0	0.18	66.0	138.0
10+00E12+00	N	<2.0	0.18	28.0	95.0
10+00E12+50	N	<2.0	0.32	74.0	88.0
10+00E13+00	N	13.0	0.62	205.0	120.0
10+00E13+50	N	16.0	0.26	60.0	163.0
10+00E14+00	N	10.0	0.06	50.0	75.0
10+00E14+50	N	5.0	0.06	46.0	80.0
10+00E15+00	N	13.0	<0.02	156.0	72.0
10+00E15+50	N	18.0	0.08	39.0	92.0
10+00E16+00	N	15.0	0.17	113.0	96.0
10+00E16+50	N	6.0	0.08	37.0	82.0
10+00E17+00	N	3.0	0.15	33.0	109.0
10+00E17+50	N	6.0	0.1	85.0	92.0
10+00E18+00	N	6.0	<0.02	52.0	81.0
10+00E18+50	N	6.0	0.1	39.0	89.0
10+00E19+00	N	2.0	0.32	70.0	130.0
10+00E19+50	N	<2.0	<0.02	11.0	29.0
10+00E20+00	N	MS	MS	MS	MS
10+00E20+50	N	MS	MS	MS	MS
10+00E21+00	N	2.0	0.08	55.0	72.0
10+00E21+50	N	<2.0	0.09	61.0	84.0
10+00E22+00	N	9.0	0.06	40.0	89.0
10+00E22+50	N	3.0	0.07	17.0	61.0
10+00E23+00	N	4.0	0.16	119.0	115.0
10+00E23+50	N	MS	MS	MS	MS
10+00E24+00	N	6.0	0.27	130.0	90.0
10+50E11+00	N	3.0	0.35	108.0	250.0
10+50E11+50	N	<2.0	0.05	31.0	120.0
10+50E12+00	N	<2.0	<0.02	39.0	115.0
10+50E12+50	N	<2.0	0.11	35.0	110.0

10+50E13+00 N	<2.0	0.02	42.0	90.0
10+50E13+50 N	<2.0	0.04	22.0	85.0
10+50E14+00 N	5.0	0.15	48.0	120.0
10+50E14+50 N	5.0	0.33	71.0	172.0
10+50E15+00 N	10.0	0.12	410.0	73.0
10+50E15+50 N	5.0	<0.02	17.0	96.0
10+50E16+00 N	3.0	0.28	29.0	107.0
10+50E16+50 N	8.0	0.06	39.0	86.0
10+50E17+00 N	8.0	0.18	59.0	102.0
10+50E17+50 N	8.0	0.1	37.0	84.0
10+50E18+00 N	4.0	0.12	34.0	135.0
10+50E18+50 N	6.0	<0.02	75.0	79.0
10+50E19+00 N	6.0	0.32	42.0	119.0
10+50E19+50 N	8.0	0.08	39.0	68.0
10+50E20+00 N	MS	MS	MS	MS
10+50E20+50 N	MS	MS	MS	MS
10+50E21+00 N	12.0	0.24	66.0	91.0
10+50E21+50 N	6.0	0.11	56.0	113.0
10+50E22+00 N	6.0	0.21	41.0	127.0
10+50E22+50 N	5.0	0.06	123.0	67.0
10+50E23+00 N	10.0	0.18	460.0	111.0
10+50E23+50 N	MS	MS	MS	MS
11+00E11+00 N	8.0	<0.02	48.0	109.0
11+00E11+50 N	9.0	<0.02	42.0	159.0
11+00E12+00 N	5.0	0.23	105.0	113.0
11+00E12+50 N	6.0	<0.02	33.0	85.0
11+00E13+00 N	<2.0	0.14	60.0	103.0
11+00E13+50 N	6.0	0.14	64.0	88.0
11+00E14+00 N	10.0	0.18	105.0	114.0
11+00E14+50 N	6.0	<0.02	38.0	90.0
11+00E15+00 N	6.0	<0.02	119.0	67.0
11+00E15+50 N	3.0	0.12	36.0	99.0
11+00E16+00 N	2.0	0.03	40.0	145.0
11+00E16+50 N	5.0	0.42	214.0	108.0
11+00E17+00 N	15.0	0.12	53.0	82.0
11+00E17+50 N	6.0	0.11	36.0	99.0
11+00E18+00 N	5.0	0.21	35.0	72.0
11+00E18+50 N	<2.0	<0.02	85.0	67.0
11+00E19+00 N	2.0	0.25	26.0	101.0
11+00E19+50 N	6.0	0.08	55.0	68.0
11+00E20+00 N	6.0	0.09	33.0	80.0
11+00E20+50 N	4.0	0.13	45.0	68.0
11+00E21+00 N	6.0	0.16	47.0	63.0
11+00E21+50 N	6.0	0.1	164.0	124.0
11+00E22+00 N	2.0	0.09	101.0	126.0
11+00E22+50 N	2.0	0.44	570.0	76.0
11+00E23+00 N	MS	MS	MS	MS
11+00E23+50 N	20.0	<0.02	213.0	80.0
11+50E11+00 N	<2.0	0.09	29.0	122.0
11+50E11+50 N	10.0	0.26	44.0	170.0
11+50E12+00 N	<2.0	0.04	22.0	71.0
11+50E12+50 N	4.0	<0.02	19.0	102.0
11+50E13+00 N	<2.0	0.1	83.0	76.0
11+50E13+50 N	4.0	0.15	99.0	100.0
11+50E14+00 N	4.0	0.27	38.0	107.0
11+50E14+50 N	6.0	0.3	50.0	109.0

11+50E15+00 N	6.0	0.1	63.0	135.0
11+50E15+50 N	5.0	0.05	49.0	97.0
11+50E16+00 N	5.0	0.29	20.0	106.0
11+50E16+50 N	11.0	0.12	115.0	83.0
11+50E17+00 N	10.0	0.35	125.0	77.0
11+50E17+50 N	4.0	0.22	30.0	121.0
11+50E18+00 N	3.0	0.25	28.0	115.0
11+50E18+50 N	2.0	0.12	37.0	88.0
11+50E19+00 N	5.0	0.08	33.0	101.0
11+50E19+50 N	10.0	0.1	32.0	100.0
11+50E20+00 N	9.0	0.09	20.0	73.0
11+50E20+50 N	7.0	0.05	41.0	61.0
11+50E21+00 N	2.0	0.3	40.0	163.0
11+50E21+50 N	<2.0	0.25	70.0	137.0
11+50E22+00 N	33.0	0.18	290.0	90.0
11+50E22+50 N	MS	MS	MS	MS
11+50E23+00 N	24.0	0.39	66.0	88.0
12+00E11+00 N	12.0	0.04	79.0	58.0
12+00E11+50 N	7.0	0.06	27.0	70.0
12+00E12+00 N	3.0	0.09	42.0	89.0
12+00E12+50 N	32.0	0.21	120.0	90.0
12+00E13+00 N	14.0	0.06	76.0	68.0
12+00E13+50 N	24.0	0.36	25.0	87.0
12+00E14+00 N	2.0	0.28	35.0	153.0
12+00E14+50 N	2.0	0.1	48.0	130.0
12+00E15+00 N	6.0	0.23	30.0	117.0
12+00E15+50 N	3.0	0.14	13.0	83.0
12+00E16+00 N	12.0	0.2	50.0	72.0
12+00E16+50 N	9.0	0.33	360.0	44.0
12+00E17+00 N	11.0	0.32	45.0	81.0
12+00E17+50 N	5.0	0.16	35.0	87.0
12+00E18+00 N	4.0	0.08	43.0	56.0
12+00E18+50 N	9.0	0.1	34.0	79.0
12+00E19+00 N	14.0	0.15	33.0	98.0
12+00E19+50 N	18.0	0.25	48.0	106.0
12+00E20+00 N	9.0	0.03	58.0	75.0
12+00E20+50 N	5.0	0.2	37.0	144.0
12+00E21+00 N	9.0	0.21	146.0	121.0
12+00E21+50 N	6.0	<0.02	29.0	176.0
12+00E22+00 N	5.0	0.21	55.0	216.0
12+00E22+50 N	MS	MS	MS	MS
12+00E23+00 N	<2.0	0.27	179.0	216.0
12+50E11+00 N	6.0	0.02	75.0	54.0
12+50E11+50 N	<2.0	0.04	24.0	71.0
12+50E12+00 N	36.0	0.44	360.0	95.0
12+50E12+50 N	12.0	<0.02	150.0	81.0
12+50E13+00 N	<2.0	0.25	26.0	104.0
12+50E13+50 N	6.0	0.06	39.0	111.0
12+50E14+00 N	<2.0	0.14	31.0	93.0
12+50E14+50 N	4.0	0.12	36.0	119.0
12+50E15+00 N	3.0	0.1	26.0	97.0
12+50E15+50 N	4.0	0.2	29.0	120.0
12+50E16+00 N	2.0	0.25	20.0	65.0
12+50E16+50 N	<2.0	0.16	35.0	62.0
12+50E17+00 N	3.0	0.21	20.0	102.0
12+50E17+50 N	25.0	0.45	15.0	98.0

12+50E18+00	N	7.0	0.14	35.0	66.0
12+50E18+50	N	21.0	0.23	35.0	121.0
12+50E19+00	N	8.0	0.11	28.0	53.0
12+50E19+50	N	18.0	0.28	49.0	69.0
12+50E20+00	N	18.0	0.06	89.0	86.0
12+50E20+50	N	23.0	0.33	127.0	120.0
12+50E21+00	N	3.0	0.09	36.0	113.0
12+50E21+50	N	8.0	0.21	134.0	230.0
12+50E22+00	N	MS	MS	MS	MS
12+50E22+50	N	<2.0	0.24	41.0	194.0
12+50E23+00	N	<2.0	0.26	71.0	124.0
13+00E11+00	N	8.0	0.12	86.0	73.0
13+00E11+50	N	5.0	0.1	93.0	78.0
13+00E12+00	N	3.0	0.18	39.0	79.0
13+00E12+50	N	4.0	0.7	810.0	88.0
13+00E13+00	N	2.0	0.25	45.0	81.0
13+00E13+50	N	<2.0	0.15	9.0	98.0
13+00E14+00	N	4.0	0.08	30.0	89.0
13+00E14+50	N	6.0	<0.02	45.0	70.0
13+00E15+00	N	5.0	0.08	60.0	85.0
13+00E15+50	N	3.0	0.26	22.0	112.0
13+00E16+00	N	7.0	0.2	30.0	79.0
13+00E16+50	N	10.0	0.16	52.0	70.0
13+00E17+00	N	6.0	0.11	25.0	65.0
13+00E17+50	N	6.0	0.06	46.0	72.0
13+00E18+00	N	8.0	0.13	40.0	72.0
13+00E18+50	N	6.0	0.07	28.0	66.0
13+00E19+00	N	7.0	0.17	53.0	120.0
13+00E19+50	N	3.0	0.13	114.0	142.0
13+00E20+00	N	6.0	0.08	69.0	131.0
13+00E20+50	N	<2.0	0.1	55.0	168.0
13+00E21+00	N	4.0	0.24	31.0	180.0
13+00E21+50	N	8.0	0.22	193.0	270.0
13+00E22+00	N	4.0	0.22	28.0	310.0
13+00E22+50	N	4.0	0.18	24.0	111.0
13+50E11+00	N	8.0	0.26	65.0	82.0
13+50E11+50	N	5.0	0.06	61.0	67.0
13+50E12+00	N	4.0	0.27	154.0	91.0
13+50E12+50	N	5.0	0.2	44.0	120.0
13+50E13+00	N	4.0	0.33	31.0	148.0
13+50E13+50	N	<2.0	0.13	25.0	121.0
13+50E14+00	N	5.0	0.37	31.0	99.0
13+50E14+50	N	3.0	0.17	25.0	120.0
13+50E15+00	N	<2.0	0.11	29.0	81.0
13+50E15+50	N	<2.0	0.3	24.0	109.0
13+50E16+00	N	7.0	0.06	71.0	83.0
13+50E16+50	N	5.0	0.12	89.0	101.0
13+50E17+00	N	18.0	0.08	40.0	126.0
13+50E17+50	N	124.0	0.16	30.0	179.0
13+50E18+00	N	<2.0	0.28	51.0	230.0
13+50E18+50	N	<2.0	0.24	91.0	155.0
13+50E19+00	N	<2.0	0.28	56.0	161.0
13+50E19+50	N	18.0	0.46	109.0	116.0
13+50E20+00	N	<2.0	0.14	55.0	190.0
13+50E20+50	N	9.0	0.09	53.0	212.0

13+50E21+00 N	<2.0	0.08	36.0	207.0
13+50E21+50 N	MS	MS	MS	MS
13+50E22+00 N	<2.0	0.33	31.0	140.0
13+50E22+50 N	<2.0	0.3	45.0	80.0
14+00E11+00 N	3.0	0.41	22.0	86.0
14+00E11+50 N	4.0	0.06	83.0	67.0
14+00E12+00 N	<2.0	0.14	37.0	89.0
14+00E12+50 N	3.0	0.11	39.0	71.0
14+00E13+00 N	7.0	0.15	18.0	102.0
14+00E13+50 N	<2.0	0.09	53.0	74.0
14+00E14+00 N	<2.0	0.18	35.0	89.0
14+00E14+50 N	<2.0	0.04	39.0	44.0
14+00E15+00 N	<2.0	0.23	26.0	103.0
14+00E15+50 N	4.0	0.07	44.0	83.0
14+00E16+00 N	<2.0	0.1	54.0	76.0
14+00E16+50 N	<2.0	0.11	36.0	124.0
14+00E17+00 N	3.0	0.34	90.0	144.0
14+00E17+50 N	36.0	0.24	21.0	95.0
14+00E18+00 N	<2.0	0.21	23.0	100.0
14+00E18+50 N	13.0	0.25	118.0	95.0
14+00E19+00 N	<2.0	0.21	26.0	190.0
14+00E19+50 N	<2.0	0.12	65.0	94.0
14+00E20+00 N	<2.0	0.07	57.0	103.0
14+00E20+50 N	<2.0	0.1	100.0	82.0
14+00E21+00 N	<2.0	0.1	90.0	92.0
14+00E21+50 N	<2.0	0.18	68.0	106.0
14+00E22+00 N	6.0	0.32	137.0	170.0
14+00E22+50 N	7.0	0.22	48.0	77.0
14+50E11+00 N	<2.0	0.29	22.0	148.0
14+50E11+50 N	<2.0	0.11	18.0	69.0
14+50E12+00 N	<2.0	0.2	52.0	68.0
14+50E12+50 N	4.0	0.07	56.0	65.0
14+50E13+00 N	3.0	0.14	24.0	67.0
14+50E13+50 N	<2.0	0.14	21.0	98.0
14+50E14+00 N	5.0	0.18	32.0	104.0
14+50E14+50 N	12.0	0.15	29.0	87.0
14+50E15+00 N	10.0	0.14	31.0	101.0
14+50E15+50 N	3.0	0.26	36.0	153.0
14+50E16+00 N	6.0	0.18	46.0	88.0
14+50E16+50 N	MS	MS	MS	MS
14+50E17+00 N	<2.0	0.1	91.0	92.0
14+50E17+50 N	26.0	0.12	47.0	131.0
14+50E18+00 N	MS	MS	MS	MS
14+50E18+50 N	MS	MS	MS	MS
14+50E19+00 N	<2.0	0.15	58.0	149.0
14+50E19+50 N	<2.0	0.14	45.0	145.0
14+50E20+00 N	5.0	0.12	105.0	71.0
14+50E20+50 N	1480.0	0.68	26.0	107.0
14+50E21+00 N	MS	MS	MS	MS
14+50E21+50 N	MS	MS	MS	MS
14+50E22+00 N	<2.0	0.24	89.0	112.0
15+00E11+00 N	4.0	0.1	28.0	100.0
15+00E11+50 N	<2.0	0.11	21.0	108.0
15+00E12+00 N	9.0	0.09	63.0	79.0
15+00E12+50 N	15.0	0.15	57.0	80.0

15+00E13+00 N	<2.0	0.12	41.0	92.0
15+00E13+50 N	6.0	0.11	16.0	65.0
15+00E14+00 N	45.0	0.23	53.0	71.0
15+00E14+50 N	<2.0	0.16	24.0	107.0
15+00E15+00 N	<2.0	0.21	310.0	52.0
15+00E15+50 N	<2.0	0.1	26.0	82.0
15+00E16+00 N	<2.0	0.1	27.0	80.0
15+00E16+50 N	<2.0	0.1	170.0	100.0
15+00E17+00 N	<2.0	0.1	83.0	125.0
15+00E17+50 N	<2.0	0.22	114.0	92.0
15+00E18+00 N	<2.0	0.1	75.0	83.0
15+00E18+50 N	<2.0	0.17	51.0	124.0
15+00E19+00 N	3.0	0.24	63.0	125.0
15+00E19+50 N	9.0	0.3	101.0	137.0
15+00E20+00 N	7.0	0.32	42.0	130.0
15+00E20+50 N	30.0	0.24	56.0	152.0
15+00E21+00 N	27.0	0.6	52.0	124.0
15+00E21+50 N	<2.0	0.34	29.0	191.0
15+50E11+00 N	<2.0	0.3	37.0	120.0
15+50E11+50 N	5.0	0.2	35.0	103.0
15+50E12+00 N	30.0	0.25	26.0	125.0
15+50E12+50 N	7.0	0.21	56.0	87.0
15+50E13+00 N	9.0	0.16	57.0	99.0
15+50E13+50 N	<2.0	0.21	33.0	115.0
15+50E14+00 N	6.0	0.53	107.0	194.0
15+50E14+50 N	14.0	0.18	67.0	130.0
15+50E15+00 N	<2.0	0.1	151.0	88.0
15+50E15+50 N	<2.0	0.1	113.0	105.0
15+50E16+00 N	<2.0	0.26	39.0	169.0
15+50E16+50 N	18.0	0.27	41.0	61.0
15+50E17+00 N	<2.0	0.36	100.0	138.0
15+50E17+50 N	<2.0	0.21	340.0	68.0
15+50E18+00 N	<2.0	0.23	37.0	103.0
15+50E18+50 N	<2.0	0.3	37.0	138.0
15+50E19+00 N	<2.0	0.24	55.0	149.0
15+50E19+50 N	10.0	0.14	70.0	136.0
15+50E20+00 N	<2.0	0.42	127.0	206.0
15+50E20+50 N	10.0	0.22	91.0	92.0
15+50E21+00 N	6.0	0.34	36.0	192.0
15+50E21+50 N	<2.0	0.2	68.0	80.0
16+00E11+00 N	24.0	0.09	61.0	82.0
16+00E11+50 N	10.0	0.16	14.0	97.0
16+00E12+00 N	7.0	0.29	18.0	88.0
16+00E12+50 N	6.0	0.2	51.0	87.0
16+00E13+00 N	<2.0	0.21	21.0	150.0
16+00E13+50 N	7.0	0.14	51.0	137.0
16+00E14+00 N	12.0	0.38	69.0	93.0
16+00E14+50 N	11.0	0.12	62.0	89.0
16+00E15+00 N	10.0	0.26	89.0	90.0
16+00E15+50 N	7.0	0.13	33.0	77.0
16+00E16+00 N	9.0	0.24	32.0	156.0
16+00E16+50 N	6.0	0.1	47.0	145.0
16+00E17+00 N	<2.0	0.1	63.0	130.0
16+00E17+50 N	<2.0	0.15	114.0	85.0
16+00E18+00 N	<2.0	0.27	61.0	119.0
16+00E18+50 N	<2.0	0.1	54.0	129.0

16+00E19+00 N	<2.0	0.18	32.0	149.0
16+00E19+50 N	<2.0	0.18	58.0	151.0
16+00E20+00 N	15.0	0.27	28.0	240.0
16+00E20+50 N	36.0	0.44	150.0	135.0
16+00E21+00 N	70.0	0.3	50.0	146.0
16+50E11+00 N	3.0	0.07	41.0	87.0
16+50E11+50 N	9.0	0.09	69.0	89.0
16+50E12+00 N	9.0	0.31	67.0	108.0
16+50E12+50 N	9.0	0.09	76.0	84.0
16+50E13+00 N	5.0	0.06	43.0	87.0
16+50E13+50 N	<2.0	0.3	131.0	89.0
16+50E14+00 N	6.0	0.53	88.0	100.0
16+50E14+50 N	7.0	0.18	65.0	72.0
16+50E15+00 N	90.0	0.24	36.0	53.0
16+50E15+50 N	<2.0	0.18	62.0	135.0
16+50E16+00 N	<2.0	0.18	47.0	150.0
16+50E16+50 N	<2.0	0.18	34.0	133.0
16+50E17+00 N	12.0	0.1	117.0	134.0
16+50E17+50 N	32.0	0.3	130.0	113.0
16+50E18+00 N	12.0	0.11	51.0	66.0
16+50E18+50 N	<2.0	0.1	95.0	74.0
16+50E19+00 N	840.0	0.45	130.0	75.0
16+50E19+50 N	12.0	0.36	142.0	139.0
16+50E20+00 N	24.0	0.33	75.0	182.0
16+50E20+50 N	22.0	0.3	87.0	155.0
17+00E11+00 N	9.0	0.15	78.0	103.0
17+00E11+50 N	16.0	0.1	62.0	80.0
17+00E12+00 N	6.0	0.08	50.0	76.0
17+00E12+50 N	6.0	0.09	66.0	80.0
17+00E13+00 N	12.0	0.39	117.0	80.0
17+00E13+50 N	9.0	0.29	75.0	91.0
17+00E14+00 N	<2.0	0.1	240.0	57.0
17+00E14+50 N	<2.0	0.74	187.0	135.0
17+00E15+00 N	<2.0	0.3	82.0	183.0
17+00E15+50 N	10.0	0.22	20.0	143.0
17+00E16+00 N	78.0	0.39	34.0	165.0
17+00E16+50 N	<2.0	0.66	38.0	260.0
17+00E17+00 N	8.0	0.12	192.0	146.0
17+00E17+50 N	MS	MS	MS	MS
17+00E18+00 N	MS	MS	MS	MS
17+00E18+50 N	60.0	0.4	138.0	145.0
17+00E19+00 N	18.0	0.42	54.0	131.0
17+00E19+50 N	6.0	0.26	90.0	137.0
17+00E20+00 N	8.0	0.1	176.0	63.0
17+00E20+50 N	15.0	0.12	84.0	132.0
17+50E11+00 N	<2.0	<0.02	15.0	78.0
17+50E11+50 N	<2.0	0.22	71.0	94.0
17+50E12+00 N	<2.0	0.44	54.0	157.0
17+50E12+50 N	7.0	0.14	73.0	81.0
17+50E13+00 N	<2.0	0.3	108.0	75.0
17+50E13+50 N	<2.0	0.2	41.0	83.0
17+50E14+00 N	<2.0	0.2	22.0	165.0
17+50E14+50 N	<2.0	0.12	44.0	65.0
17+50E15+00 N	<2.0	0.21	85.0	132.0
17+50E15+50 N	<2.0	0.2	71.0	70.0

17+50E16+00 N		<2.0	0.2	33.0	163.0
17+50E16+50 N		<2.0	0.33	104.0	117.0
17+50E17+00 N		324.0	0.36	94.0	116.0
17+50E17+50 N		<2.0	0.33	700.0	85.0
17+50E18+00 N		28.0	0.2	47.0	156.0
17+50E18+50 N		22.0	0.3	42.0	250.0
17+50E19+00 N		<2.0	0.16	42.0	150.0
17+50E19+50 N		<2.0	0.15	52.0	110.0
18+00E11+00 N		<2.0	0.3	67.0	140.0
18+00E11+50 N		<2.0	0.12	31.0	123.0
18+00E12+00 N		<2.0	0.2	28.0	113.0
18+00E12+50 N		6.0	0.1	34.0	98.0
18+00E13+00 N		<2.0	0.2	90.0	160.0
18+00E13+50 N		<2.0	0.3	111.0	116.0
18+00E14+00 N		<2.0	0.3	22.0	120.0
18+00E14+50 N		<2.0	0.2	24.0	58.0
18+00E15+00 N		<2.0	0.3	13.0	68.0
18+00E15+50 N		<2.0	0.3	18.0	77.0
18+00E16+00 N		<2.0	0.3	37.0	340.0
18+00E16+50 N		<2.0	0.09	40.0	250.0
18+00E17+00 N		30.0	0.2	21.0	118.0
18+00E17+50 N		9.0	0.2	36.0	103.0
18+00E18+00 N		<2.0	0.09	103.0	140.0
18+00E18+50 N		<2.0	0.06	27.0	128.0
18+00E19+00 N		14.0	0.18	55.0	109.0
18+00E19+50 N		<2.0	0.2	125.0	88.0
8+50E22+50 N		10.0	0.24	62.0	81.0
9+00E22+93 N		28.0	0.14	290.0	55.0
11+00E17+00 N	BL	17.0	0.09	64.0	93.0

BARRINGER MAGENTA
Laboratories (Alberta) Ltd.

4200B - 10 STREET N.E.
CALGARY, ALBERTA
T2E 6K3
PHONE: (403) 250-1901

25-NOV-85

COPY: 1 OF 3

AUTHORITY: S. SCOTT

CEDARMINE RESOURCES INC.
631 - 19 STREET N.E.
CALGARY, ALBERTA T2E 4X1

ATTN: R. COOK

PROJECT: LIKELY - ~~~~ DAVE

WORK ORDER: 8283D-85

*** FINAL REPORT ***

GEOCHEMICAL LABORATORY REPORT

SAMPLE TYPE: SOIL

SAMPLE NUMBER		FIRE ASSAY AU PPB	FIRE ASSAY AG PPM	CU PPM	ZN PPM
13+50E:17+75 N		4.0	0.12	23.0	143.0
13+50E:17+50 N	— 2nd sample	6.0	0.2	41.0	162.0
13+50E:17+25 N		2.0	0.19	28.0	145.0
16+50E:18+75 N		6.0	0.19	104.0	120.0
16+50E:19+00 N	— 2nd sample	9.0	0.51	70.0	98.0
16+50E:19+25 N		31.0	0.37	141.0	84.0
14+50E:20+25 N		5.0	0.06	88.0	91.0
14+50E:20+50 N	— 2nd sample	4.0	0.14	72.0	84.0
14+50E:20+75 N		4.0	0.04	71.0	75.0
17+50E:16+75 N		10.0	0.1	85.0	135.0
17+50E:17+00 N	— 2nd sample	70.0	0.18	112.0	100.0
17+50E:17+25 N		60.0	0.1	135.0	66.0

SIGNED: ....

C. Douglas Read,
LABORATORY MANAGER

FOOTNOTES:
P=QUESTIONABLE PRECISION: *=INTERFERENCE: TR=TRACE: ND=NOT DETECTED:
IS=INSUFFICIENT SAMPLE: NA=NOT ANALYZED: MS=MISSING SAMPLE

DAVE GRID STATISTICS (SOILS)

Correlation matrix un-transformed data Page: 1

Statistics for work orders 8263 and 8277

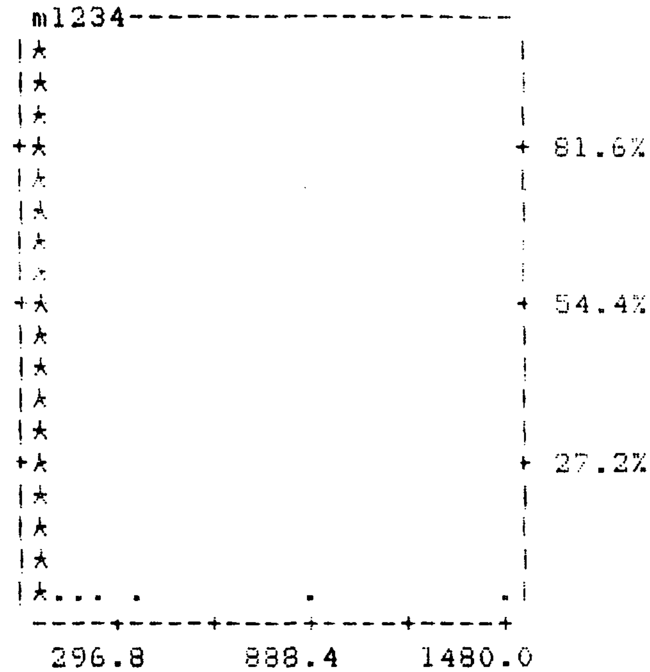
Column:		1	2	3	4
1	Gold	1.00	630.00	630.00	630.00
2	Silver	.13	1.00	630.00	630.00
3	Copper	.01	.27	1.00	630.00
4	Zinc	.03	.27	-.08	1.00

Statistics for work orders 8263 and 8277

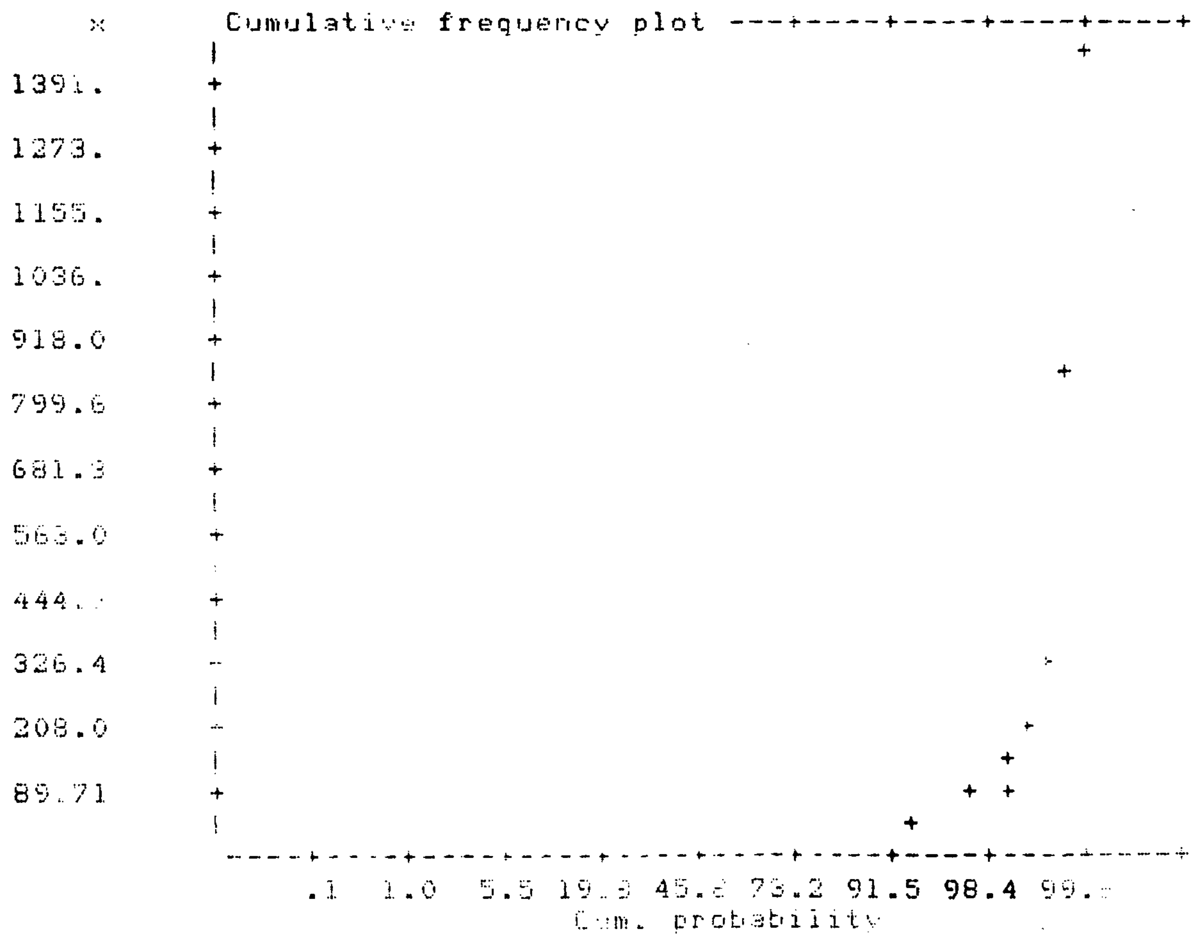
Column:		1	2	3	4
1	Gold	1.00	630.00	630.00	630.00
2	Silver	.06	1.00	630.00	630.00
3	Copper	.16	.09	1.00	630.00
4	Zinc	-.01	.36	-.05	1.00

Statistics for work orders 8263 and 8277

Total :	630.00
L.t.d. :	193.00
G.t.d. :	.00000
Minimum :	1.0000
Mean :	12.629
+ 1 s.d.:	82.794
+ 2 s.d.:	152.96
+ 3 s.d.:	223.13
+ 4 s.d.:	293.29
+ 5 s.d.:	363.46
Maximum :	1480.0
St. dev.:	70.166
Variance:	4923.2



Skewness: .0142 standard error: .0976
Kurtosis: 332.0739 standard error: .1952

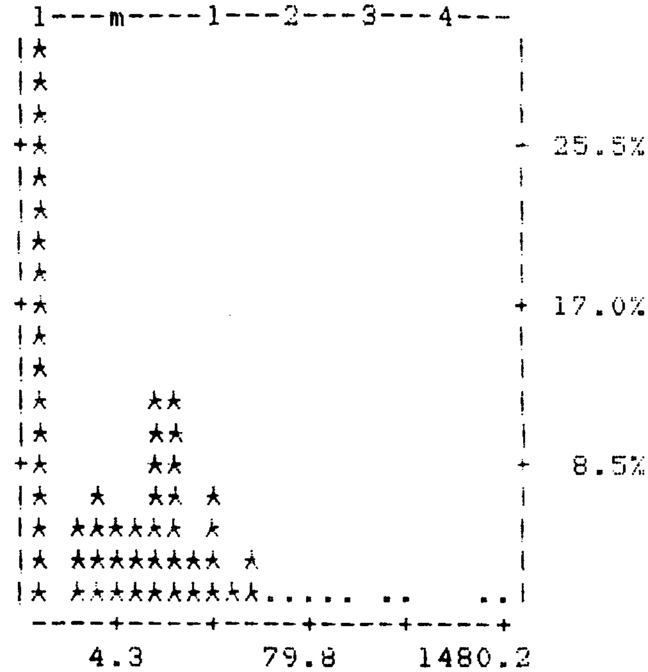


Statistics for work orders 8263 and 8277

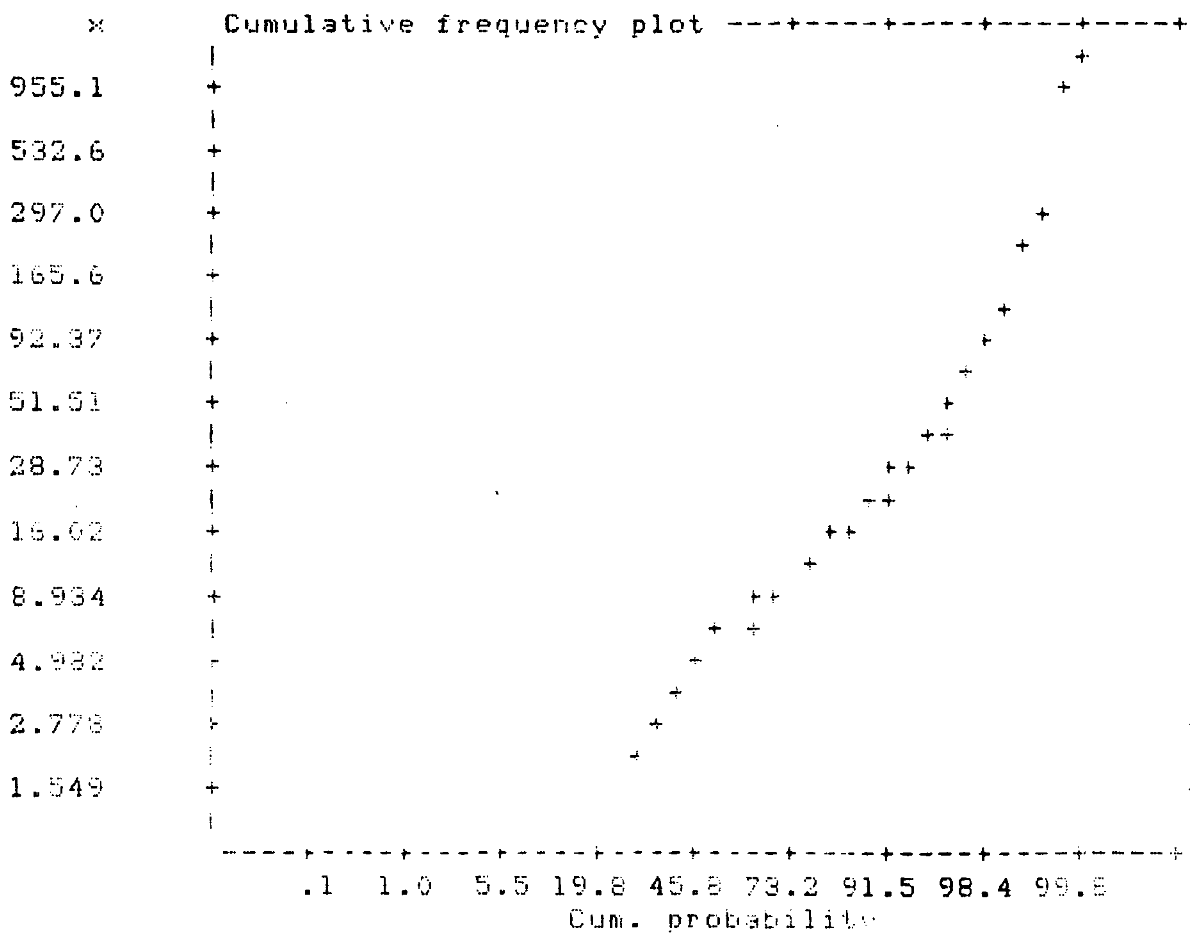
Zone	From	To	Total	Percent	Cum%
1	1.000	30.58	599	95.1	95.1
2	30.58	60.16	18	2.9	97.9
3	60.16	89.74	6	1.0	98.9
4	89.74	119.3	1	.2	99.0
5	119.3	148.9	2	.3	99.4
8	208.1	237.6	1	.2	99.5
11	296.8	326.4	1	.2	99.7
29	829.3	858.8	1	.2	99.8
50	1450.	1480.	1	.2	100.0

Statistics for work orders 8263 and 8277

Total	:	630.00
L.t.d.	:	193.00
G.t.d.	:	.00000
Minimum	:	1.0000
Mean	:	4.1765
+ 1 s.d.	:	14.158
+ 2 s.d.	:	47.994
+ 3 s.d.	:	162.69
+ 4 s.d.	:	551.51
+ 5 s.d.	:	1869.6
Maximum	:	1480.0
St. dev.	:	.53019 (log)
Variance	:	.28110 (log)



Skewness: 1.8831 standard error: .0976
Kurtosis: .6577 standard error: .1952

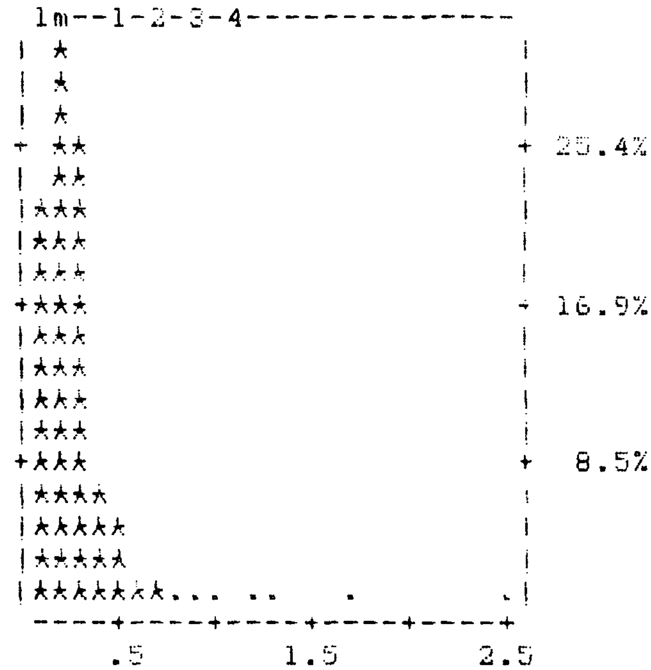


Statistics for work orders 8263 and 8277

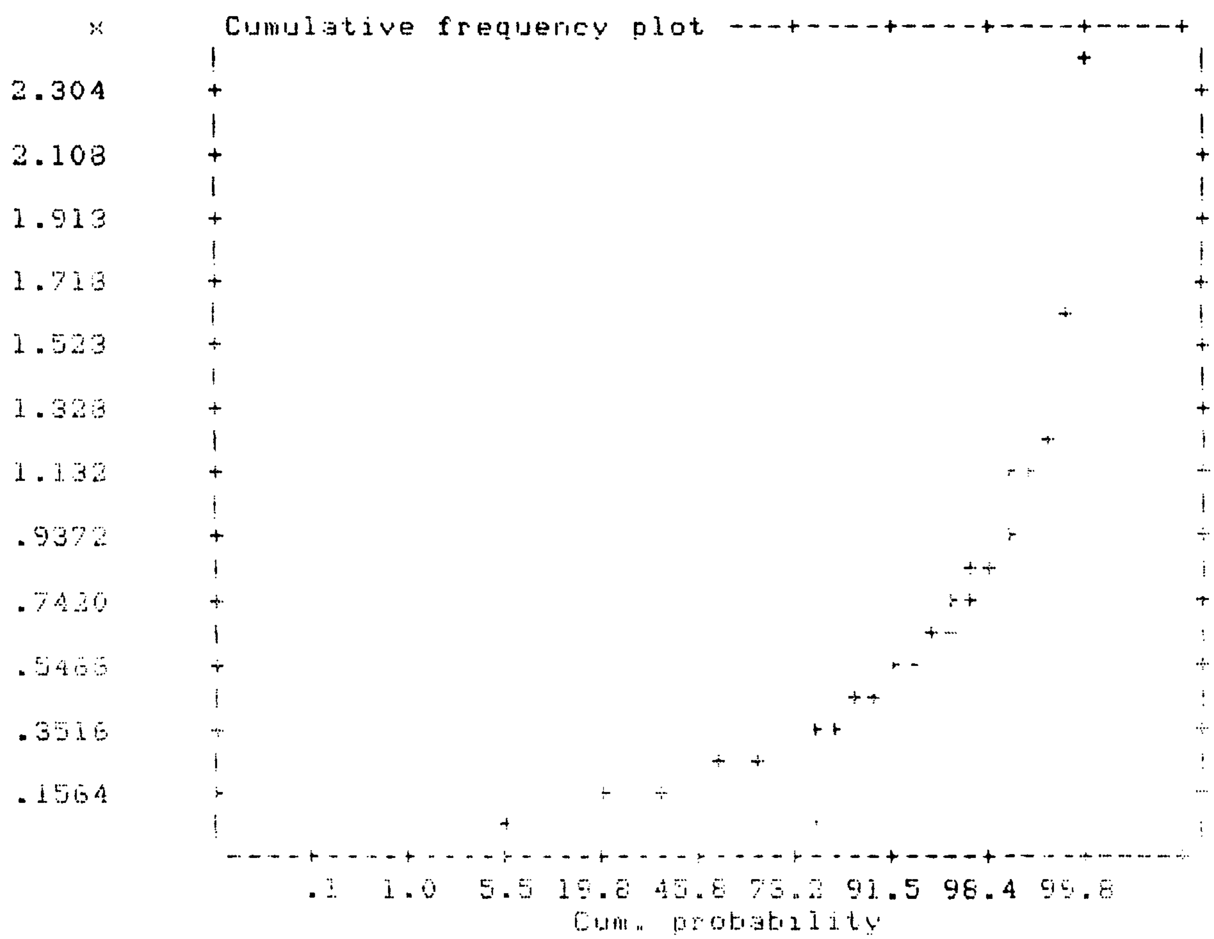
Zone	From	To	Total	Percent	Cum%
1	1.000	1.157	193	30.6	30.6
5	1.793	2.075	32	5.1	35.7
8	2.779	3.216	45	7.1	42.9
10	3.721	4.306	41	6.5	49.4
12	4.983	5.766	36	5.7	55.1
13	5.766	6.672	61	9.7	64.8
14	6.672	7.721	20	3.2	67.9
15	7.721	8.935	23	3.7	71.6
16	8.935	10.34	53	8.4	80.0
17	10.34	11.96	5	.8	80.8
18	11.96	13.85	19	3.0	83.8
19	13.85	16.02	27	4.3	88.1
20	16.02	18.54	16	2.5	90.6
21	18.54	21.46	6	1.0	91.6
22	21.46	24.83	7	1.1	92.7
23	24.83	28.73	9	1.4	94.1
24	28.73	33.25	12	1.9	96.0
25	33.25	38.47	7	1.1	97.1
26	38.47	44.52	1	.2	97.3
27	44.52	51.52	1	.2	97.5
28	51.52	59.62	2	.3	97.8
29	59.62	68.99	2	.3	98.1
30	68.99	79.84	4	.6	98.7
31	79.84	92.39	2	.3	99.0
34	123.7	143.2	2	.3	99.4
37	191.7	221.8	1	.2	99.5
40	297.1	343.8	1	.2	99.7
47	825.5	955.2	1	.2	99.8
50	1279.	1480.	1	.2	100.0

Statistics for work orders 8263 and 8277

Total :	630.00	
L.t.d. :	24.000	
G.t.d. :	.00000	
Minimum :	.10000E	-1
Mean :	.23408	
+ 1 s.d.:	.43091	
+ 2 s.d.:	.62774	
+ 3 s.d.:	.82457	
+ 4 s.d.:	1.0214	
+ 5 s.d.:	1.2182	
Maximum :	2.4500	
St. dev.:	.19683	
Variance:	.38742E	-1



Skewness:	5.0725	standard error:	.0976
Kurtosis:	30.5343	standard error:	.1952



Statistics for work orders 8263 and 8277

Zone	From	To	Total	Percent	Cum%
1	.1000E -1	.5880E -1	42	6.7	6.7
2	.5880E -1	.1076	100	15.9	22.5
3	.1076	.1564	98	15.6	38.1
4	.1564	.2052	94	14.9	53.0
5	.2052	.2540	91	14.4	67.5
6	.2540	.3028	77	12.2	79.7
7	.3028	.3516	31	4.9	84.6
8	.3516	.4004	16	2.5	87.1
9	.4004	.4492	17	2.7	89.8
10	.4492	.4980	18	2.9	92.7
11	.4980	.5468	12	1.9	94.6
12	.5468	.5956	7	1.1	95.7
13	.5956	.6444	7	1.1	96.8
14	.6444	.6932	4	.6	97.5
15	.6932	.7420	3	.5	97.9
16	.7420	.7908	1	.2	98.1
17	.7908	.8396	3	.5	98.6
18	.8396	.8884	3	.5	99.0
20	.9372	.9860	1	.2	99.2
23	1.084	1.132	1	.2	99.4
24	1.132	1.181	1	.2	99.5
25	1.181	1.230	1	.2	99.7
33	1.572	1.620	1	.2	99.8
50	2.401	2.450	1	.2	100.0

```
Column:   2  log-transformed Silver   statistics Page:   6
-----------------------------------------------------------------
Statistics for work orders 8263 and 8277
                                          -3---2---1--m---1---2---3
Total     :     630.00                   |              *          |
L.t.d.    :     24.000                   |             **          |
G.t.d.    :     .00000                   |             **          |
                                         +             **          +  12.3%
Minimum   :    .10000E  -1               |             **          |
Mean      :     .17317                   |             ***         |
                                         |           * ***         |
+ 1 s.d.:       .41306                   |           * ***         |
+ 2 s.d.:       .98527                   +           *****         +   8.2%
+ 3 s.d.:       2.3501                   |          ******         |
+ 4 s.d.:       5.6058                   |          ******         |
+ 5 s.d.:       13.371                   |         *******         |
                                         |         ********        |
Maximum :       2.4500                   +         *********       +   4.1%
                                         |*       ***********      |
St. dev.:       .37754      (log)        |*       ***********      |
Variance:       .14254      (log)        |*       ************     |
                                         |*  ..  **************.. ..|
                                          ----+----+----+----+----+
                                             .0        .3        2.5
Skewness:       2.6445 standard error:      .0976
Kurtosis:       2.6656 standard error:      .1952

      x         Cumulative frequency plot ---+----+----+----+----+
                 |                                            +    |
  1.761          +                                           +     +
                 |                                                 |
  1.134          +                                        ++       +
                 |                                       ++        |
  .7304          +                                     ++          +
                 |                                   +  +          |
  .4703          +                                 +  +            +
                 |                                +                |
  .3029          +                             +  +                +
                 |                           ++                    |
  .1950          +                        ++                       +
                 |                       +                         |
  .1256          +                     +                           +
                 |                   ++                            |
 .80888E   -1    +                 ++                              +
                 |               ++                                |
 .52098E   -1    +               +                                 +
                 |              +                                  |
 .33548E   -1    +                                                 +
                 |              +                                  |
 .21608E   -1    +             +                                   +
                 |                                                 |
 .13918E   -1    +                                                 +
                 |                                                 |
                  ----------+----+----+----+----+----+----+----+----+
                    .1  1.0  5.5 19.8 45.8 73.2 91.5 98.4 99.8
                              Cum. probabilaty
```

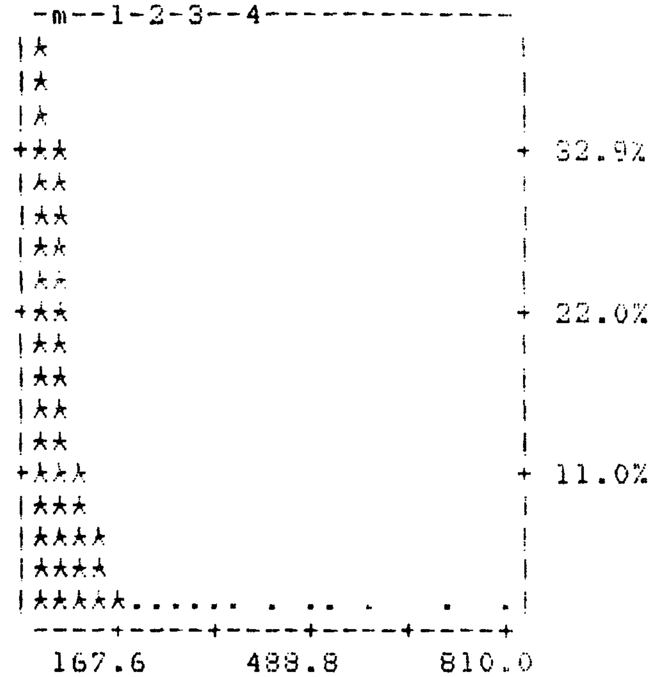
Statistics for work orders 8263 and 8277

Zone	From		To		Total	Percent	Cum%
1	.1000E	-1	.1116E	-1	24	3.8	3.8
7	.1935E	-1	.2160E	-1	3	.5	4.3
10	.2692E	-1	.3005E	-1	2	.3	4.6
13	.3745E	-1	.4180E	-1	6	1.0	5.6
15	.4666E	-1	.5209E	-1	7	1.1	6.7
17	.5815E	-1	.6491E	-1	16	2.5	9.2
18	.6491E	-1	.7246E	-1	9	1.4	10.6
19	.7246E	-1	.8089E	-1	15	2.4	13.0
20	.8089E	-1	.9030E	-1	23	3.7	16.7
21	.9030E	-1	.1008		37	5.9	22.5
22	.1008		.1125		14	2.2	24.8
23	.1125		.1256		24	3.8	28.6
24	.1256		.1402		39	6.2	34.8
25	.1402		.1565		21	3.3	38.1
26	.1565		.1747		33	5.2	43.3
27	.1747		.1951		33	5.2	48.6
28	.1951		.2178		56	8.9	57.5
29	.2178		.2431		50	7.9	65.4
30	.2431		.2713		43	6.8	72.2
31	.2713		.3029		47	7.5	79.7
32	.3029		.3381		21	3.3	83.0
33	.3381		.3775		16	2.5	85.6
34	.3775		.4214		19	3.0	88.6
35	.4214		.4704		20	3.2	91.7
36	.4704		.5251		10	1.6	93.3
37	.5251		.5862		14	2.2	95.6
38	.5862		.6543		9	1.4	97.0
39	.6543		.7304		5	.8	97.8
40	.7304		.8154		5	.8	98.6
41	.8154		.9102		3	.5	99.0
42	.9102		1.016		1	.2	99.2
43	1.016		1.134		1	.2	99.4
44	1.134		1.266		2	.3	99.7
47	1.578		1.761		1	.2	99.8
50	2.195		2.450		1	.2	100.0

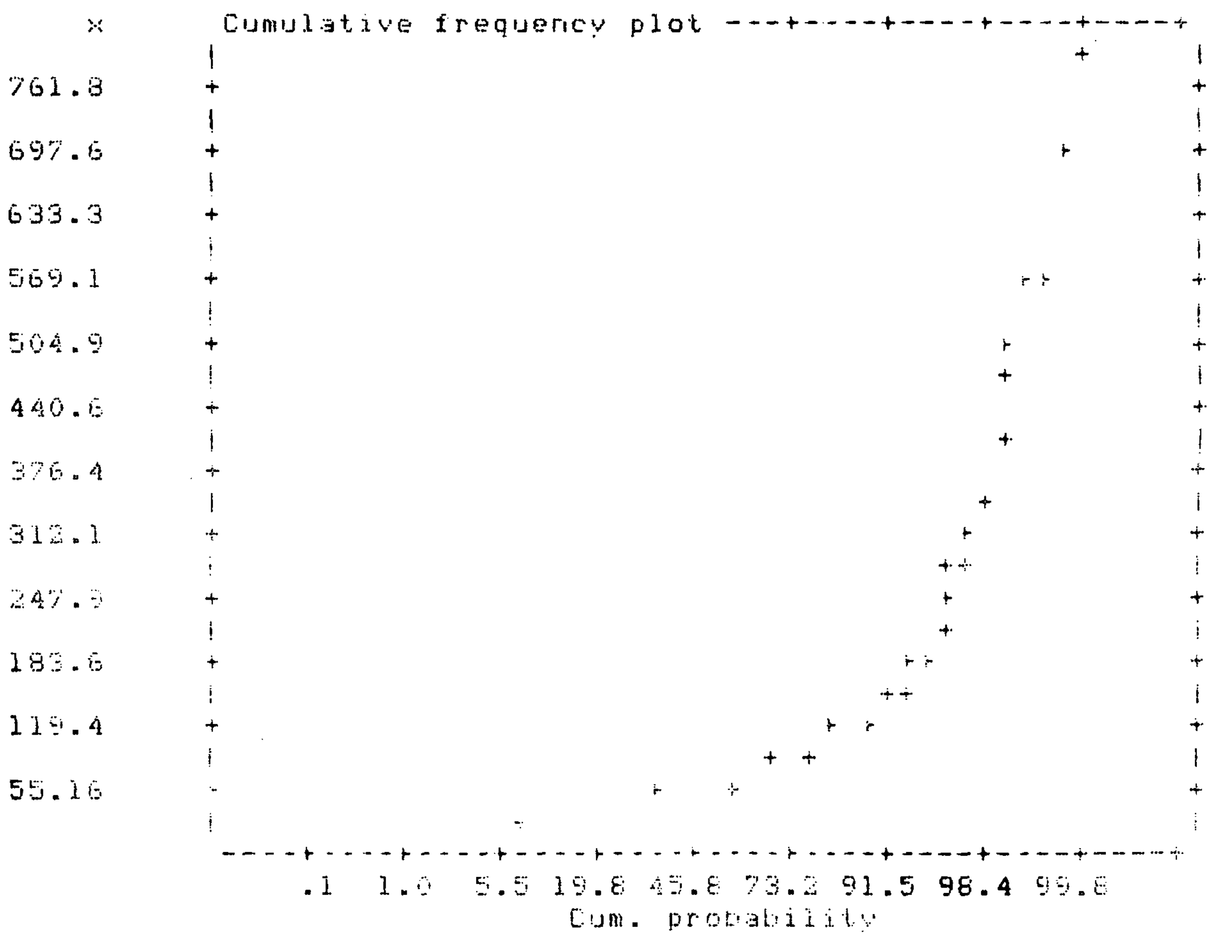
Column: 3 un-transformed Copper statistics Page: 7

Statistics for work orders 8263 and 8277

Total	:	630.00
L.t.d.	:	.00000
G.t.d.	:	.00000
Minimum	:	7.0000
Mean	:	68.421
+ 1 s.d.	:	143.16
+ 2 s.d.	:	217.91
+ 3 s.d.	:	292.65
+ 4 s.d.	:	367.40
+ 5 s.d.	:	442.14
Maximum	:	810.00
St. dev.	:	74.744
Variance	:	5586.7



Skewness: .0134 standard error: .0976
Kurtosis: 33.0339 standard error: .1952



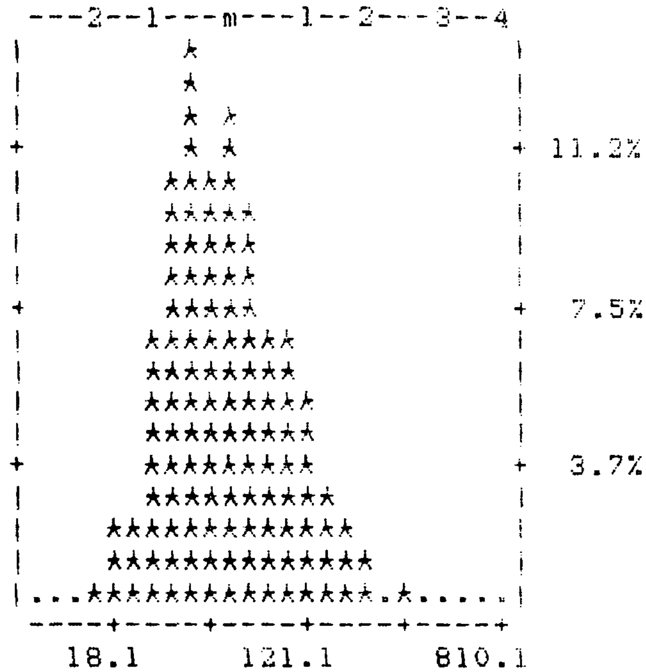
Statistics for work orders 8263 and 8277

Zone	From	To	Total	Percent	Cum%
1	7.000	23.06	57	9.0	9.0
2	23.06	39.12	192	30.5	39.5
3	39.12	55.18	124	19.7	59.2
4	55.18	71.24	86	13.7	72.9
5	71.24	87.30	42	6.7	79.5
6	87.30	103.4	36	5.7	85.2
7	103.4	119.4	26	4.1	89.4
8	119.4	135.5	17	2.7	92.1
9	135.5	151.5	10	1.6	93.7
10	151.5	167.6	9	1.4	95.1
11	167.6	183.7	4	.6	95.7
12	183.7	199.7	5	.8	96.5
13	199.7	215.8	3	.5	97.0
15	231.8	247.9	1	.2	97.1
17	264.0	280.0	3	.5	97.6
18	280.0	296.1	2	.3	97.9
19	296.1	312.1	2	.3	98.3
20	312.1	328.2	1	.2	98.4
21	328.2	344.3	1	.2	98.6
22	344.3	360.3	2	.3	98.9
26	408.5	424.6	1	.2	99.0
29	456.7	472.7	1	.2	99.2
32	504.9	520.9	1	.2	99.4
35	553.1	569.1	1	.2	99.5
36	569.1	585.2	1	.2	99.7
44	697.6	713.7	1	.2	99.8
50	794.0	810.0	1	.2	100.0

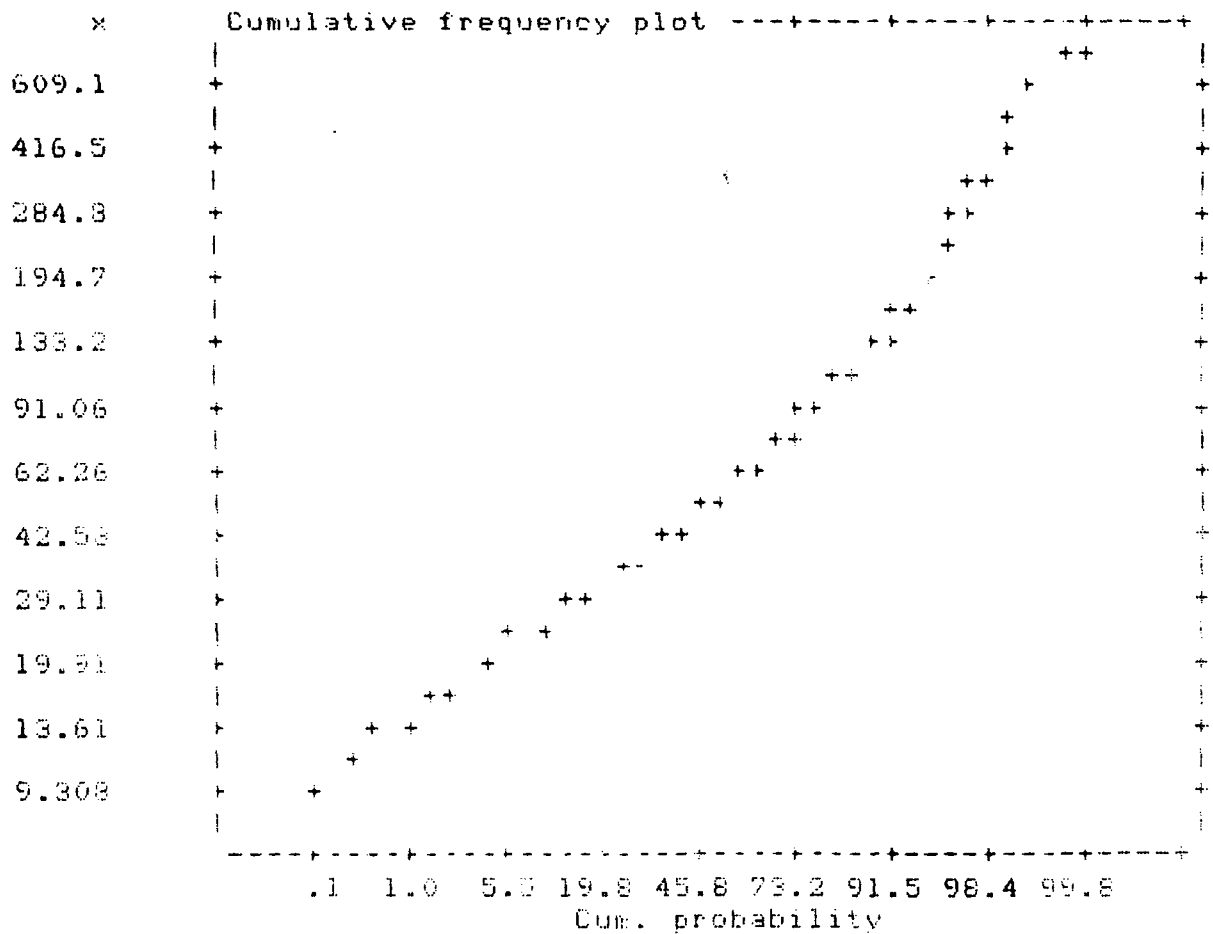
Column: 3 log-transformed Copper statistics Page: 8

Statistics for work orders 8263 and 8277

Total :	630.00
L.t.d. :	.00000
G.t.d. :	.00000
Minimum :	7.0000
Mean :	51.606
+ 1 s.d.:	102.34
+ 2 s.d.:	202.93
+ 3 s.d.:	402.41
+ 4 s.d.:	797.99
+ 5 s.d.:	1582.4
Maximum :	810.00
St. dev.:	.29732 (log)
Variance:	.88401E -1 (log)



Skewness: 3.3578 standard error: .0976
Kurtosis: 1.1080 standard error: .1952

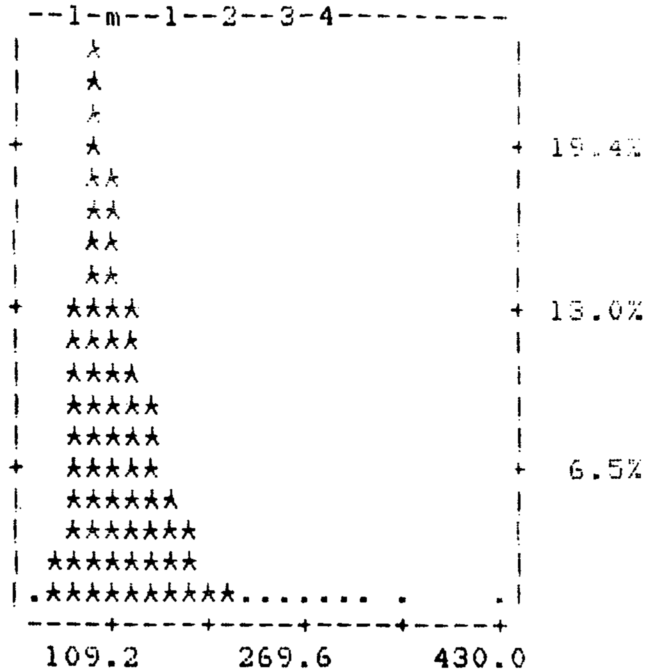


Statistics for work orders 8263 and 8277

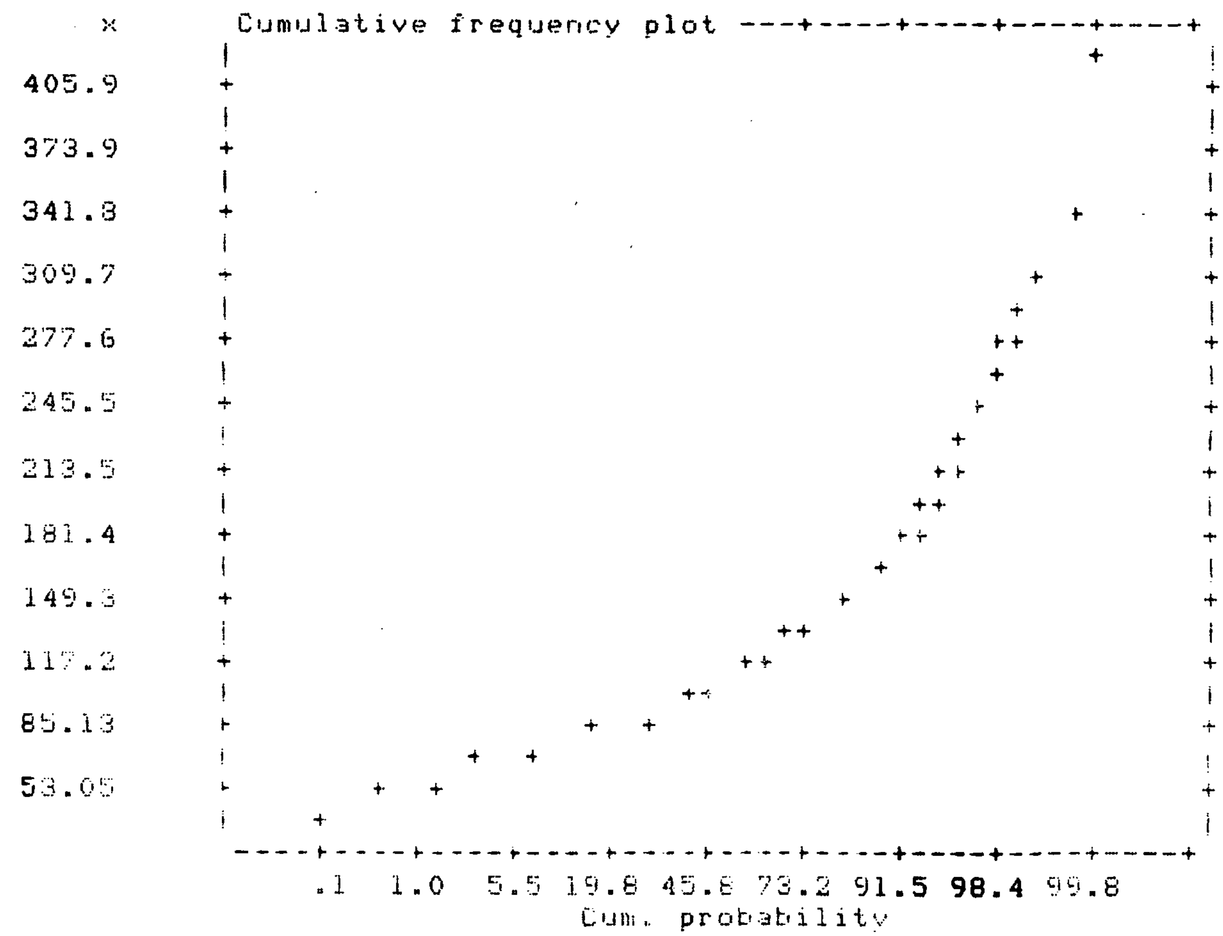
Zone	From	To	Total	Percent	Cum%
1	7.000	7.698	1	.2	.2
3	8.465	9.309	1	.2	.3
5	10.24	11.26	2	.3	.6
7	12.38	13.61	4	.6	1.3
8	13.61	14.97	1	.2	1.4
9	14.97	16.46	9	1.4	2.9
10	16.46	18.10	9	1.4	4.3
11	18.10	19.91	2	.3	4.6
12	19.91	21.89	12	1.9	6.5
13	21.89	24.08	27	4.3	10.8
14	24.08	26.48	18	2.9	13.7
15	26.48	29.12	37	5.9	19.5
16	29.12	32.02	29	4.6	24.1
17	32.02	35.21	45	7.1	31.3
18	35.21	38.72	40	6.3	37.6
19	38.72	42.58	40	6.3	44.0
20	42.58	46.82	28	4.4	48.4
21	46.82	51.49	39	6.2	54.6
22	51.49	56.62	38	6.0	60.6
23	56.62	62.27	32	5.1	65.7
24	62.27	68.48	31	4.9	70.6
25	68.48	75.30	25	4.0	74.6
26	75.30	82.81	17	2.7	77.3
27	82.81	91.06	30	4.8	82.1
28	91.06	100.1	15	2.4	84.4
29	100.1	110.1	16	2.5	87.0
30	110.1	121.1	17	2.7	89.7
31	121.1	133.2	13	2.1	91.7
32	133.2	146.5	6	1.0	92.7
33	146.5	161.1	12	1.9	94.6
34	161.1	177.1	5	.8	95.4
35	177.1	194.8	6	1.0	96.3
36	194.8	214.2	4	.6	97.0
38	235.5	259.0	1	.2	97.1
39	259.0	284.8	3	.5	97.6
40	284.8	313.2	4	.6	98.3
41	313.2	344.4	2	.3	98.6
42	344.4	378.8	2	.3	98.9
43	378.8	416.5	1	.2	99.0
45	458.1	503.7	1	.2	99.2
46	503.7	553.9	1	.2	99.4
47	553.9	609.1	2	.3	99.7
49	669.9	736.6	1	.2	99.8
50	736.6	810.1	1	.2	100.0

Statistics for work orders 8263 and 8277

Total	:	630.00
L.t.d.	:	.00000
G.t.d.	:	.00000
Minimum	:	29.000
Mean	:	111.03
+ 1 s.d.	:	154.56
+ 2 s.d.	:	198.10
+ 3 s.d.	:	241.64
+ 4 s.d.	:	285.17
+ 5 s.d.	:	328.71
Maximum	:	430.00
St. dev.	:	43.537
Variance	:	1895.5



Skewness: .0229 standard error: .0976
Kurtosis: 7.8874 standard error: .1952

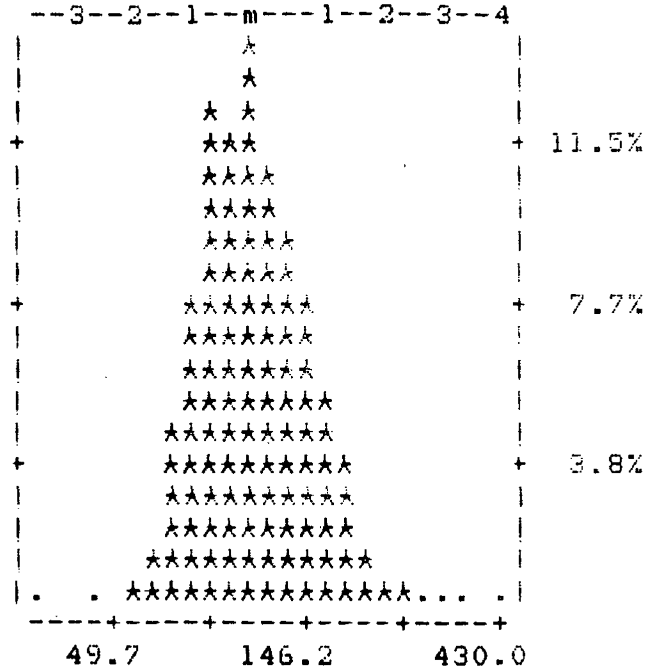


Statistics for work orders 8263 and 8277

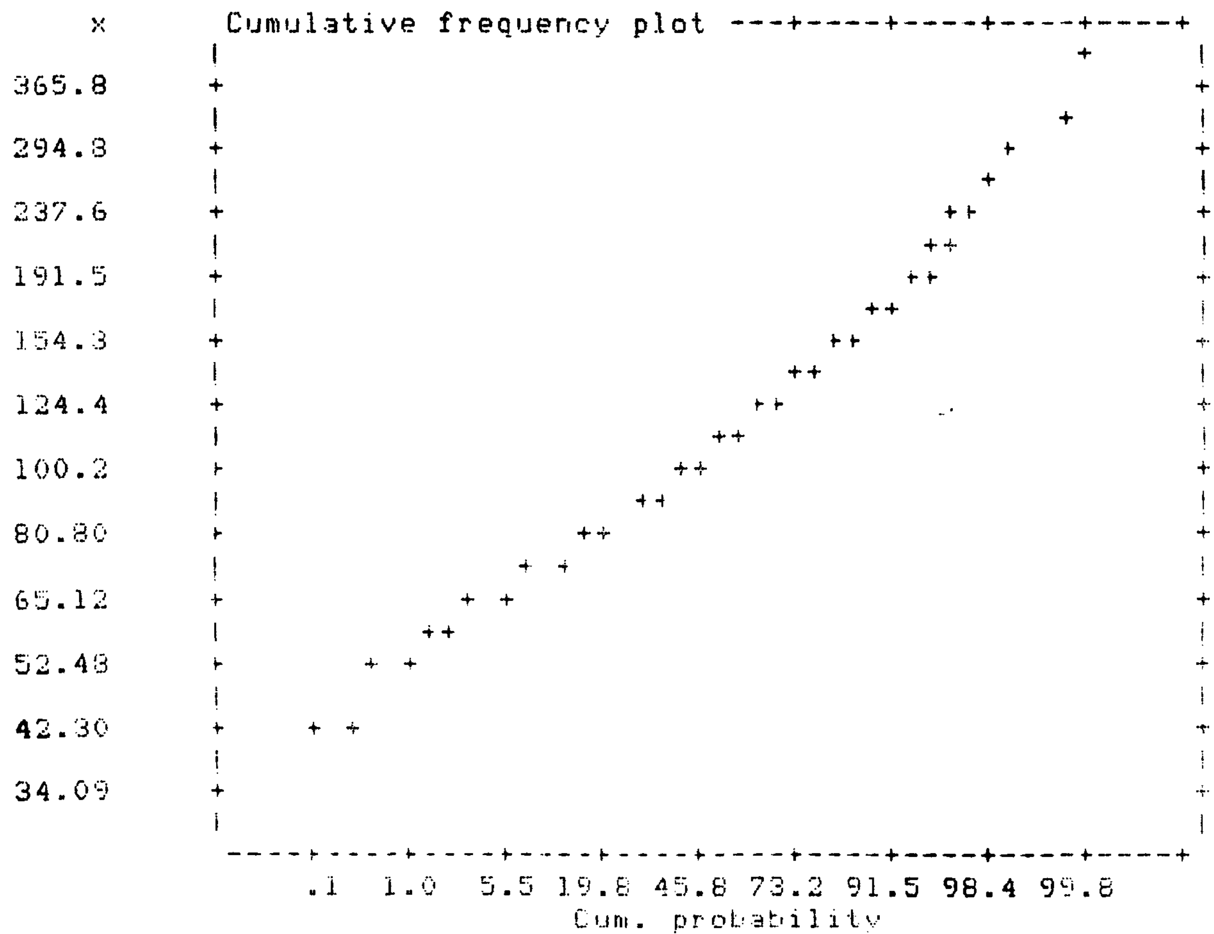
Zone	From	To	Total	Percent	Cum%
1	29.00	37.02	1	.2	.2
2	37.02	45.04	3	.5	.6
3	45.04	53.06	5	.8	1.4
4	53.06	61.08	15	2.4	3.8
5	61.08	69.10	36	5.7	9.5
6	69.10	77.12	52	8.3	17.8
7	77.12	85.14	74	11.7	29.5
8	85.14	93.16	73	11.6	41.1
9	93.16	101.2	59	9.4	50.5
10	101.2	109.2	59	9.4	59.8
11	109.2	117.2	42	6.7	66.5
12	117.2	125.2	40	6.3	72.9
13	125.2	133.3	30	4.8	77.6
14	133.3	141.3	32	5.1	82.7
15	141.3	149.3	20	3.2	85.9
16	149.3	157.3	20	3.2	89.0
17	157.3	165.3	13	2.1	91.1
18	165.3	173.4	12	1.9	93.0
19	173.4	181.4	7	1.1	94.1
20	181.4	189.4	4	.6	94.8
21	189.4	197.4	8	1.3	96.0
22	197.4	205.4	2	.3	96.3
23	205.4	213.5	4	.6	97.0
24	213.5	221.5	3	.5	97.5
26	229.5	237.5	2	.3	97.8
27	237.5	245.5	1	.2	97.9
28	245.5	253.6	4	.6	98.6
29	253.6	261.6	1	.2	98.7
31	269.6	277.6	2	.3	99.0
32	277.6	285.6	1	.2	99.2
34	293.7	301.7	1	.2	99.4
36	309.7	317.7	2	.3	99.7
39	333.8	341.8	1	.2	99.8
50	422.0	430.0	1	.2	100.0

Statistics for work orders 8263 and 8277

Total :	630.00	
L.t.d. :	.00000	
G.t.d. :	.00000	
Minimum :	29.000	
Mean :	104.33	
+ 1 s.d.:	146.92	
+ 2 s.d.:	206.90	
+ 3 s.d.:	291.36	
+ 4 s.d.:	410.29	
+ 5 s.d.:	577.78	
Maximum :	430.00	
St. dev.:	.14867	(log)
Variance:	.22102E -1	(log)



Skewness: 6.7144 standard error: .0976
Kurtosis: .8448 standard error: .1952



Statistics for work orders 8263 and 8277

Zone	From	To	Total	Percent	Cum%
1	29.00	30.61	1	.2	.2
7	40.08	42.30	1	.2	.3
8	42.30	44.65	2	.3	.6
11	49.73	52.49	2	.3	1.0
12	52.49	55.39	5	.8	1.7
13	55.39	58.46	6	1.0	2.7
14	58.46	61.70	7	1.1	3.8
15	61.70	65.12	13	2.1	5.9
16	65.12	68.73	19	3.0	8.9
17	68.73	72.54	28	4.4	13.3
18	72.54	76.56	22	3.5	16.8
19	76.56	80.80	34	5.4	22.2
20	80.80	85.28	46	7.3	29.5
21	85.28	90.00	50	7.9	37.5
22	90.00	94.99	26	4.1	41.6
23	94.99	100.3	48	7.6	49.2
24	100.3	105.8	39	6.2	55.4
25	105.8	111.7	39	6.2	61.6
26	111.7	117.9	31	4.9	66.5
27	117.9	124.4	33	5.2	71.7
28	124.4	131.3	29	4.6	76.3
29	131.3	138.6	29	4.6	81.0
30	138.6	146.2	22	3.5	84.4
31	146.2	154.3	21	3.3	87.8
32	154.3	162.9	14	2.2	90.0
33	162.9	171.9	18	2.9	92.9
34	171.9	181.4	8	1.3	94.1
35	181.4	191.5	7	1.1	95.2
36	191.5	202.1	7	1.1	96.3
37	202.1	213.3	4	.6	97.0
38	213.3	225.1	3	.5	97.5
39	225.1	237.6	2	.3	97.8
40	237.6	250.8	5	.8	98.6
41	250.8	264.7	1	.2	98.7
42	264.7	279.3	2	.3	99.0
43	279.3	294.8	1	.2	99.2
44	294.8	311.1	3	.5	99.7
46	328.4	346.6	1	.2	99.8
50	407.4	430.0	1	.2	100.0

--- End of report ---

APPENDIX B

FIELD PERSONNEL STATISTICS

FIELD PERSONNEL

PERSON	COMPANY	FUNCTION	FIELD TIME FROM	TO
B.MacDonald	Ketza Enterprises Ltd.	Linecutting/ geochem. sampling	8 Oct 85	17 Oct 85
G.Johnny	Ketza Enterprises Ltd.	" "		
L.Ladue	Ketza Enterprises Ltd.	" "		
P.Etzel	Ketza Enterprises Ltd.	" "		
J. Balfour	Hardy Associates (1978) Ltd.	Geophysics	20 Oct 85	9 Nov 85
W.Hemstock	Hardy Associates (1978) Ltd.	"		
R.Rose	Hardy Associates (1978) Ltd.	"		
C.Barclay	Hardy Associates (1978) Ltd.	"		
W.J.Scott	Hardy Associates (1978) Ltd.	"		
K.G.Murphy	Susan A. Scott	Geology	8 Oct 85	28 Oct 85
S.A.Scott	Susan A. Scott	"		

MAN-DAY EXPENDITURES

METHOD	KM	MANDAYS
Linecutting	33.2	
Geochemical soil sampling	32.65	18 (642 samples)
Magnetometer	29.65	8
Induced Polarization	6.75	
Geology		30

COST STATEMENT

LINECUTTING (KETZA ENTERPRISES LTD.) 8 OCT. 85 TO 17 OCT. 85

1.3 km baseline at $ 510./km
3 km tielines at $350./km
7 km I.P. crosslines at $350./km
21.9 km crosslines at $150./km — Subtotal: $7448.

SOIL SAMPLING (KETZA ENTERPRISES LTD.) 8 OCT. 85 TO 17 OCT. 85

28.9 km at $40./km — Subtotal: $1156.

GEOCHEMICAL ANALYSIS (BARRINGER MAGENTA LABORATORIES LTD.)

634 soil samples (Au,Ag,Cu,Zn) at $12./sample
42 rock samples (Au,Ag,Cu,Zn) at $14./sample — Subtotal: $8196.

GEOLOGICAL SURVEYS (HARDY ASSOCIATES LTD.) 8 OCT. 85 TO 28 OCT. 85

S.A.Scott	party chief, supervision, sampling, mapping	15 days at $300./day
K.G.Murphy	geologist,mapping, sampling	15 days at $200./day

Subtotal: $7500.

GEOPHYSICAL SURVEYS (HARDY ASSOCIATES LTD.) 20 OCT. 85 TO 9 NOV. 85

W.Hemstock	magnetometer operator	8 days at $280./day
J.Balfour	geophysicist,I.P. plus magnetometer supervisor	20 days at $320./day
R.Rose	I.P.labourer	20 days at $150./day
C.Barclay	I.P.labourer	20 days at $150./day
W.J.Scott	chief geophysicist, supervisor	2 days at $700./day

Subtotal: $16,040.

GENERAL EXPENSES

Magnetometer rental $95./day x 8 days - $760.
Computer rental $25./day x 20 days -$500.
I.P. System rental $225./day x 20 days- $4500.
Consumables Geological at $25./day x 15 days - $375.
Geophysical at $25./day x 20 days - $500.
Truck rental 2 trucks at $500.each - $1000.

Airfares 3 at $155.- one way - $465.
Room and board - 102 mandays at $32./day - $3264.
Report compilation - $4000.

TOTAL: $55,704.

APPENDIX C
RESUMES

CURRICULUM VITAE

SUSAN ANNE SCOTT

EDUCATION

B.Sc. (Geology) University of Toronto, 1965
Thesis: A Petrographic Study of the Cargill Lake Carbonatite, Ontario (J. Gittins)

M.Sc. (Geology) McGill University, 1969
Thesis: Trace Element Study of Ore from the Temagami Mine, Ontario (G.R. Webber)

PROFESSIONAL ASSOCIATIONS

1. Prospectors and Developer's Association, Member
2. Geological Association of Canada, Fellow
3. Mineral Deposits Division, GAC, Member
4. Canadian Institute of Mining and Metallurgy, Member
5. Calgary Mineral Exploration Group, Member
6. Association of Exploration Geochemists, Voting Member

RELEVANT EXPERIENCE

February, 1984 - Present	Mineral Exploration Consultant: Field and Office programs in exploration for gold, uranium and beryl. Field work in geological and geochemical mapping in Ontario and British Columbia.
September, 1982 - February, 1984	Minerals Division, AGIP Canada Ltd. Office Geologist (Supervisor J.A. Climie, Exploration Manager, Minerals) Responsible for literature research on uranium projects in Saskatchewan, reconnaissance precious metals ventures and concepts in Yukon, B.C.; compilation of published and unpublished data on specific projects; preparation of data, slides, maps, etc. for management presentations; ordering, processing and distribution of publications and

maps; assisting with writing, editing and production of reports; design and execution of geochemical data handling system for field projects; assisting in field work as required.

January, 1981 - March, 1982	Strategic Minerals Division, Phillips Petroleum Canada Limited Calgary, Alberta <u>Staff Minerals Geologist</u> (Supervisor W.B. Anderson, Exploration Manager) Prospect evaluation for base and precious metals in B.C., Yukon, Ontario; ordering and processing of publications, maps; in charge of library and technical files; assisted in supervision of uranium joint venture interests, Saskatchewan; field work on uranium project, Baker Lake area, N.W.T.
June, 1979 - June, 1980	Exploration Division, Eldorado Nuclear ltd. Ottawa, Ontario <u>Research Geologist</u> (Supervisor Dr. E.E.N. Smith, Senior Geologist, Exploration) Responsible for library, ordering and distribution of maps and publications; assessment work compilations, Saskatchewan uranium projects; research into uranium environments involving data gathering, compilation, interpretation.
June, 1974 - April, 1979	Lee Geo-Indicators Limited Stittsville, Ontario <u>Project Geologist</u> (3 years part-time, 2 years full-time; Supervisor Dr. H.A. Lee, President) Field work in northern Ontario precious metals projects; writing, editing, production of reports; drafting; compilation of published and assessment reports, engineering geology terrain analysis.
Winter 1970 - 1971	McGill University, Department of Geology <u>Research Assistant</u> (part-time) to Dr. V.A. Saull.
Summer 1965	Keevil Mining Group, Geophysical Engineering and Surveys Limited Field Mapping of area around Temagami Mine under T.O.H. Patrick.

Summer 1964	Keevil Mining Group, Geophysical Engineering and Surveys Limited Office Geologist (Toronto) field work, under T.O.H. Patrick and N.B. Keevil, Jr.
Summer 1963	Geological Survey of Canada, Age Determination Laboratory Research Assistant under Dr. R.K. Wanless
Summer 1962	Geophysics Division, University of Toronto Research Assistant under Dr. J. Tuzo Wilson

0.30

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CONSULTING ENGINEERING & PROFESSIONAL SERVICES

WILLIAM J. SCOTT

Associate and Chief Geophysicist, Geotechnical Division, Calgary.

EDUCATION

1972	Ph.D (Applied Geophysics). McGill University Montreal, Quebec
1965	M.A. (Physics), University of Toronto Toronto, Ontario
1962	B.A. Sc. (Engineering Physics), University of Toronto, Toronto, Ontario

Specialization: Engineering and mineral exploration geophysics, computer applications, instrumentation in electrical measurements.

PROFESSIONAL AFFILIATIONS:

Professional Geophysicist (Alberta)
Professional Engineer (Alberta, Ontario)
Geological Association of Canada
Society of Exploration Geophysicists
Canadian Society of Exploration Geophysicists
Canadian Geophysical Union

EMPLOYMENT RECORD

1980 - Present	Hardy Associates (1978) Ltd.
1971 - 1980	Geological Survey of Canada
1965 - 1971	McGill University and Loyola of Montreal
1962 - 1965	University of Toronto
1959 - 1965	Huntec Ltd.

PERTINENT EXPERIENCE

1980 - Present — Hardy Associates (1978) Ltd.

Geophysicist on exploration programs for base and precious metals. Carried out surveys for bedrock depth determination, granular materials inventory fracture-system mapping, permafrost mapping, determination of elastic moduli by dynamic measurements, electrical and electromagnetic measurements of resistivity. Responsible for geophysics in multi-disciplinary projects to evaluate fluid impoundment structures, map contaminant plumes and design mitigative measures. Developed computer programs for interactive interpretation of electrical and electromagnetic measurements. Designed and carried out experimental field studies in induced polarization and seismoelectric effects. Responsible for design, development and operation of water-borne Induced Polarization system.

1971 - 1980

Geological Survey of Canada, Resource Geophysics and Geochemistry Division. (Head, Electrical Methods Section 1979-1980).

Research geophysicist for projects involving development of airborne and ground electrical and electromagnetic techniques and their application to problems in mapping permafrost distribution, thickness and ice content. Co-cordinator of geophysics component, AECL/EMR program for geological disposal of high-level radioactive wastes (Radwaste program). Principal Investigator for electrical and electromagnetic techniques in mapping faults and shear zones in Radwaste Program. Cooperated with Geonics Ltd. in design and field testing of EM 16R VLF resistivity unit. Technical Authority for development of Huntec M4 IP receiver under DSS Unsolicited Proposal Program. Led development of water-borne system for electrical resistivity measurement. Trained Brazilian geophysicists in prospecting geophysics in the field in Brazil and in Northern Canada. Taught graduate course in electrical methods at Ecole Polytechnique de Montreal (in French) in 1975-1976.

Field experience included permafrost studies in the Yukon, Mackenzie Valley and Delta, and Arctic Islands. Prospecting geophysical studies in NWT, Saskatchewan, Ontario, Quebec, New Brunswick and Nova Scotia. Combined geological/geophysical mapping programs in Manitoba, Ontario, New Brunswick and Nova Scotia.

1965 - 1971

McGill University, Department of Mining Engineering and Applied Geophysics

In Ph.D. studies sponsored by G.S.C., developed equipment for and carried out field measurements of complex induced polarization responses of metallic sulphides.

Designed, built and operated laboratory equipment for scale modelling for geophysical studies in mineral exploration. Taught undergraduate course in exploration geophysics at Loyola of Montreal. Ran geophysical field school for Loyola and McGill, taught field procedures in gravity, magnetic, refraction seismic, electromagnetic and electrical methods.

1962 - 1965 and
1959 - 1965

University of Toronto, Dept. of Physics
Huntec Ltd.

For MA thesis made synthetic sulphide-bearing rocks, built laboratory equipment, and measured non-linear effects associated with Induced Polarization phenomena.

As operator, party chief and geophysicist for Huntec Ltd., carried out and interpreted geophysical surveys for engineering and mineral prospecting. Experienced in magnetic, gravity, refraction seismic, electrical and EM methods. Field experience in B.C., Yukon, NWT, Alberta, Manitoba, Ontario, Quebec, New Brunswick and Nova Scotia. Responsible in 1965 for major ground geophysical program to follow up airborne survey over 80 x 120 mile concession in Moose River area which resulted in discovery of Consolidated Morrison/Esso niobium-bearing carbonatite.

PUBLICATIONS

Scott, W.J., and West G.F.; Induced polarization of synthetic, high-resistivity rocks containing disseminated sulphides, Geophysics, v. 34, no. 1, pp. 87-100, 1969.

Scott, W.J., and Fraser, D.C.; Drilling of EM anomalies caused by overburden; CIM Bull., v. 66, no. 735, pp. 72-77, 1972.

Kurfurst, P.J., Isaacs, R.M., Hunter, J.A., and Scott, W.J.; Permafrost studies in the Norman Wells region, N.W.T. in Aitken, J.D. and Glass, D.J., Editors. Proc. of Sumposium on Canadian Arctic Geology, GAC, pp. 277-279, 1973.

WILLIAM J. SCOTT - Continued

Williams, D.A., Scott, W.J. and Dyck, A.V.; Cavendish Township geophysical test range, 1973 diamond drilling, Geol. Surv. Can., Paper 74-62, 1974.

Scott, W.J. and Hunter, J.A. Site Investigations: Geophysical Surveys: Sec. 5.4 in National Research Council Canada, Permafrost Engineering Manual, 1974.

Scott, W.J. and Hunter, J.A.; Seismic and electrical methods in permafrost detection, National Reserach Council, Canada, Technical Memorandum #113, p. 48-50, 1975.

Sellman, P.W., McNeill, J.D. and Scott, W.J.; Airborne E-phase resistivity surveys of permafrost. National Research Council, Canada, Technical Memorandum #113, p. 67-72, 1975.

Scott, W.J., Campbell, K.J, and Orange, A.S.; EM pulse survey method in permafrost. National Research Council, Canada, Technical Memorandum #133, p. 92-96, 1975.

Scott, W.J.; Preliminary experiments in marine resistivity near Tuktoyaktuk, District of Mackenzie: Geol. Surv. Can., Paper 75-1A, p. 141-145, 1975.

Scott, W.J.; VLF resistivity (radiohm) survey, Agricola Lake area, District of Mackenzie: Geol. Surv. Can., Paper 75-1A, p. 223-225, 1975.

McLaren, P., Scott, W.J. and Hunter, J.A.; The implications of geophysical studies on the permafrost regime and surficial geology, Melville Island and Byam Channel, N.W.T. Geol. Surv. Can., Paper 75-1B, pp. 39-45, 1975.

Annan, A.P., Davis, J.L. and Scott, W.J.; Impulse radar profiling in permafrost, Geol. Surv. Can., Paper 75-1, pp. 343-351, 1975.

Annan, A.P., Davis, J.L. and Scott, W.J.; Impulse radar wide angle reflection and refraction sounding in permafrost. Geol. Surv. Can., Paper 75-1C, pp. 335-341, 1975.

Hunter, J.A. and Scott, W.J.; Geophysical investigations of ground ice, Tuktoyaktuk Peninsula, N.W.T. Ice, v. 44, p. 7-8, 1974.

Scott, W.J.; Involuted Hill Test Site, Tuktoyaktuk, N.W.T. Ice, v. 46, 1976.

Davis, J. S., Scott, W.J., Morey,R.M. and Annan, A.P.; Impulse radar experiments on permafrost near Tuktoyaktuk, N.W.T. Can. J. Earth Sci, v. 13, n. 11, pp. 1584-1590, 1976.

WILLIAM J. SCOTT - Continued

Scott, W.J. and Hunter, J.A.; Application of geophysical techniques in permafrost regions. Can. J. Earth Sci., v. 14, n. 1, pp. 117-127, 1977.

Scott, W.J. and Mackay, J.R.; Reliability of permafrost thickness determination by DC resistivity soundings. In Nat. Res. Counc. Can. Tech. Mem. 119, p. 25-38, 1977.

Scott, W.J., Sellman, P.V. and Hunter, J.A.; Geophysics in the study of permafrost: in Proc. Third Int. Conf. on Permafrost, v. 2, p. 93-115, 1979.

Scott, W.J.; Results of resistivity studies prior to drainage: part of symposium on lake-drainage experiments in continuous permafrost near Tuktoyaktuk, N.W.T., in Nat. Res. Counc. Can. Tech. Mem. (in press).

Dyck, A.V., Scott, W.J. and Lobach, J.; Waterborne Resistivity/induced polarisation survey of Collins Bay, Wollaston Lake; in Uranium Exploration in Athabasca Basin, Saskatchewan, Canada, ed. E.M. Cameron; Geol. Surv.Can. Paper 82-11 p.281-289, 1983.

Kay A.E., Allison, A.M., Botha, W.J., and Scott, W.J.; Continuous Geophysical Investigation for mapping permafrost distribution, Mackenzie Valley, N.W.T. Canada: in Proc.VI Int.Conf.on Permafrost (in press).

Scott, W.J., Laing, J.S., and Botha, W.J.; Waterborne resistivity/induced polarisation survey in Prudhoe Bay; Proc. K83 Offshore Technology Conference, p.227-230, 1983.

Dence, M.R., and Scott, W.J.: The Use of Geophysics in the Canadian Radioactive Waste Disposal Program, with Examples for the Chalk River Research Area, Vol.6 No.4, Geoscience Canada P.190-194.

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

D. JOHN BALFOUR

Geophysicist, Geotechnical Division

EDUCATION

1982 B.A.Sc. Geological Engineering (Geophysics Option)
University of British Columbia, Vancouver.

Province of Alberta Blasting Permit

PROFESSIONAL AFFILIATIONS

Member, Association of Professional Engineers of British Columbia.

Member, Society of Exploration Geophysicists.

EMPLOYMENT RECORD

1984 - Present	Hardy Associates (1978) Ltd.
1982 - 1984	D.R. Piteau Associates Ltd.
1981 - Summer	B.C. Hydro and Power Authority
1980 - Summer	Utah Mines Ltd.

PERTINENT EXPERIENCE

Geotechnical engineering responsibilities have included geophysical investigations and soil investigations for a range of projects with emphasis on transportation corridor studies, groundwater pollution detection and monitoring, and aquifer evaluation and dewatering studies.

This work has included field supervisions, engineering, reporting and client liaison. Mr. Balfour holds a seismic and multiple series electric blasting ticket with the Workers Compensation Board of British Columbia, and a blasting permit for the Province of Alberta.

Related experience with computer systems has included Hewlett-Packard desktop computers programmed in BASIC and various mainframe computers operating in the FORTRAN language.

LIST OF RELEVANT WORK EXPERIENCE
GEOPHYSICS

DATE	JOB NAME	DESCRIPTION OF WORK
3/85	Simonette River Pipeline Re-route study, Grande Prairie, Alberta	Ran a refraction seismic survey to map bedrock at a proposed pipeline re-route. Performed data processing and report writing.
1/85-3/85	Syncrude and OSLO Tar Sands Exploration, Fort McMurray, Alberta	Ran 113 km of refraction seismic to map geologic contacts. Assisted with data processing and report writing.
12/84	Nicotta Lake Flood Control Merritt, B.C.	Ran a refraction seismic survey to determine foundation conditions for a small flood control structure.
11/84	Chilliwack Hatchery Chilliwack, B.C.	Ran a gravity survey to delineate the boundaries of a buried valley.
6/84-9/84	Coquihalla Highway Hope to Merritt, B.C.	Ran over 30 lines of refraction seismic for determining bedrock configuration near rock and soil cuts. Interpreted seismograms.
5/84	Quesnel Hatchery Quesnel, B.C.	Assisted with a refraction seismic survey to optimize the location of a large water supply well.
8/83-9/83	Haney Firefighting School Maple Ridge, B.C.	Ran a resistivity profile across a potential groundwater contamination plume to provide baseline groundwater quality data.
11/82	B.C. Railway Anzac Spur Prince George, B.C.	Ran a resistivity survey for grounding design of an electric railway.
6/81	Liard River Damsite Investigation, Fort Nelson, B.C.	Surveyed 13 boreholes with a downhole logging machine. Assisted with interpretation of logs.
7/80-8/80	Bri Coal Property Hudsons Hope, B.C.	Assisted with approximately 35 km of refraction seismic data to facilitate mine planning.

APPENDIX D
STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS: SUSAN A. SCOTT

I, Susan A. Scott, of Calgary Alberta, do hereby certify that:

1. I am a Mineral Exploration Consultant with an office at 1950-13 Street S.W., Calgary, Alberta, T2T 3P6.

2. I graduated in Geological Sciences from the University of Toronto in 1965. I obtained an M.Sc. in Geology (Geochemistry) from McGill University in 1969.

3. I have practiced my profession continuously since graduation, with the exception of the period 1971-1974.

4. I am a Fellow of the Geological Association of Canada.

5. I have no interest in Cedarmine Resources Inc. or the Likely property, nor do I expect to receive or acquire any such interest in the future.

6. I supervised the performance of this survey in person.

S.A. Scott, M.Sc., FGAC

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

STATEMENT OF QUALIFICATIONS: WILLIAM J. SCOTT

I, William J. Scott, of Calgary Alberta, do hereby certify that:

1. I am Chief Geophysicist of Hardy Associates (1978) Ltd., with an office at 221-18 Street S.E., Calgary, Alberta, T2E 6J5.

2. I graduated in Engineering Physics (Geophysics Option) from the University of Toronto in 1962. I obtained an M.A. in Geophysics from the University of Toronto in 1965, and a PhD in Applied Geophysics from McGill University in 1972.

3. I have practiced my profession continuously since graduation, and have been with Hardy Associates since 1980.

4. I am a registered Professional Engineer in Ontario and Alberta, a registered Professional Geophysicist in Alberta, and a Fellow of the Geological Association of Canada.

5. I have no interest in Cedarmine Resources Inc. or the Likely property, nor do I expect to receive or acquire any such interest in the future.

6. I supervised the performance of this survey nightly by telephone and in person by two visits to the field, in the middle and at the end of the survey.

W.J. Scott, Ph.D., P.Eng., P.Geoph., FGAC

PROFESSIONAL GEOPHYSICIST W.J. SCOTT ALBERTA

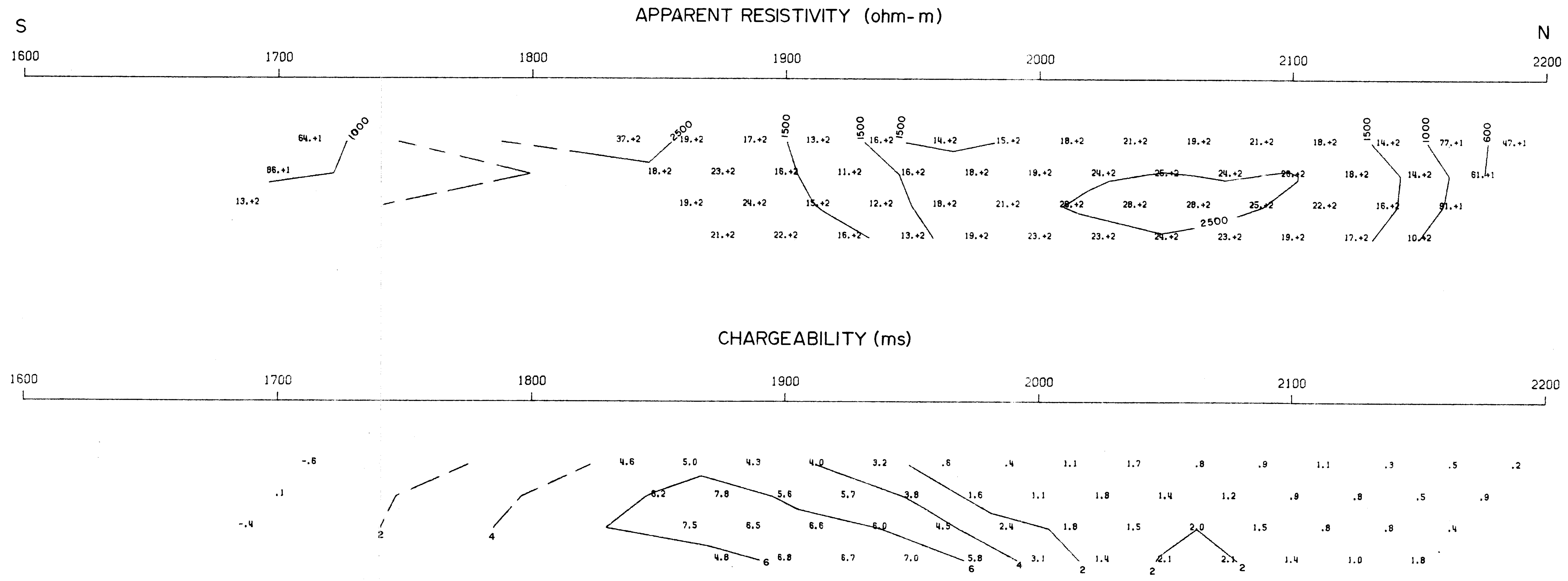
APPENDIX E
PSEUDOSECTIONS OF APPARENT RESISTIVITY AND CHARGEABILITY

Apparent resistivity values are shown in compressed exponential form:

	48.+1
means	48×10^1
or	480 ohm-metres.

Contours are spaced logarithmically.

Where a reading was not read or the value is considered unreliable, the value is replaced by "NR".



14,399

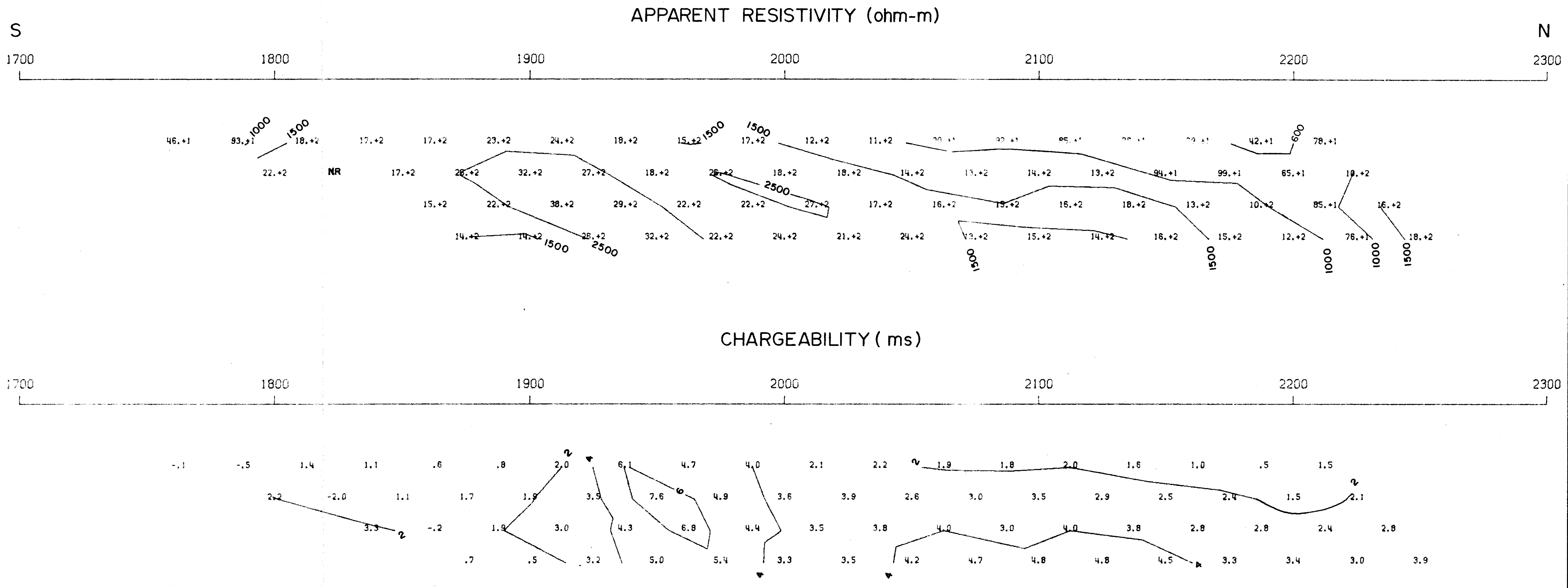
HARDY ASSOCIATES (1978) LTD.

CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 650.

_650



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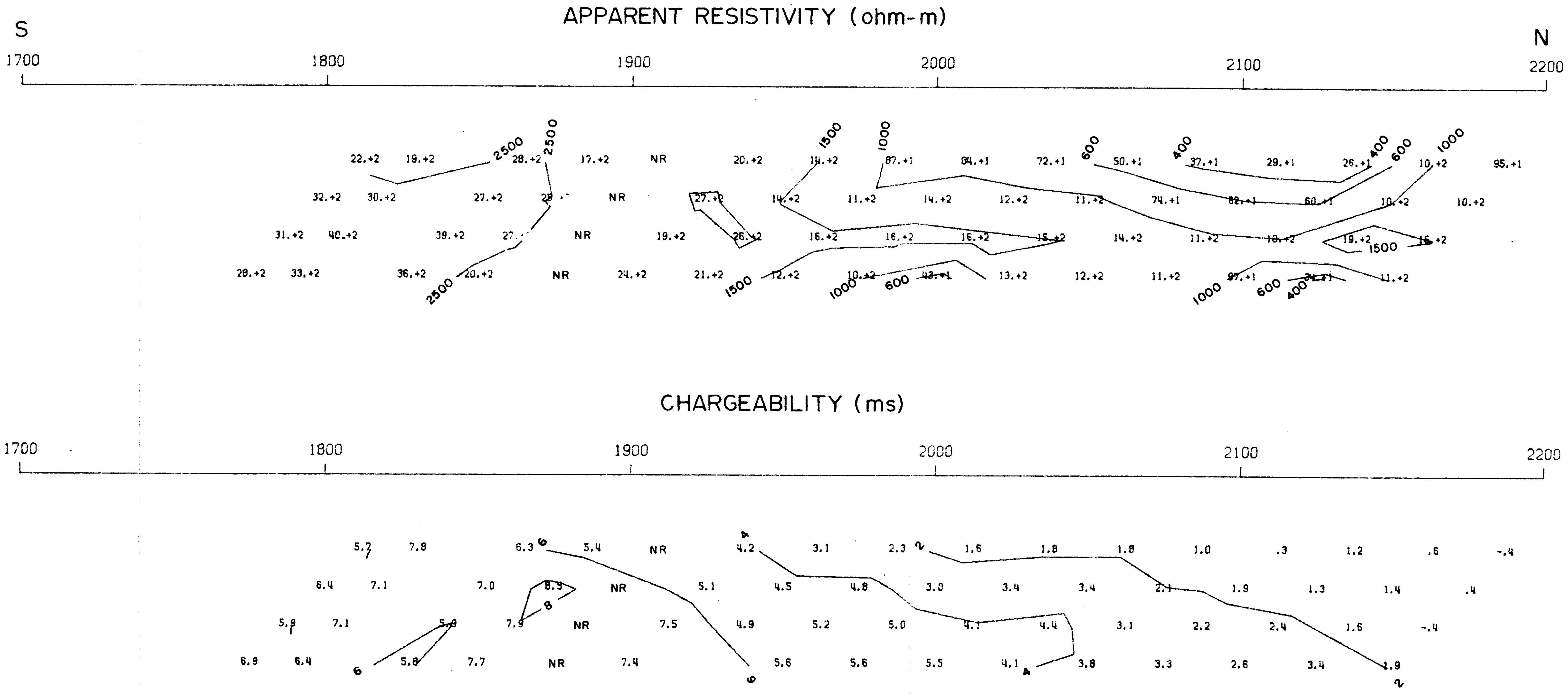
HARDY ASSOCIATES (1978) LTD.

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 700.

L700



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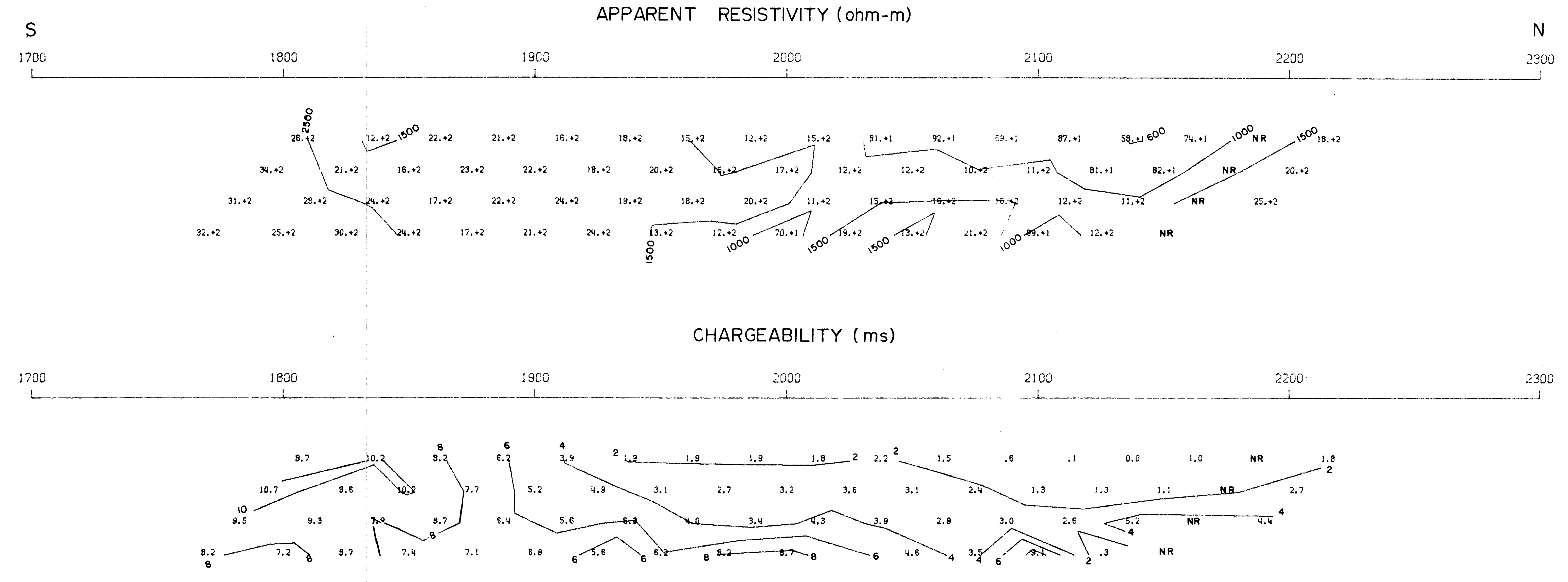
HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 800.

L800



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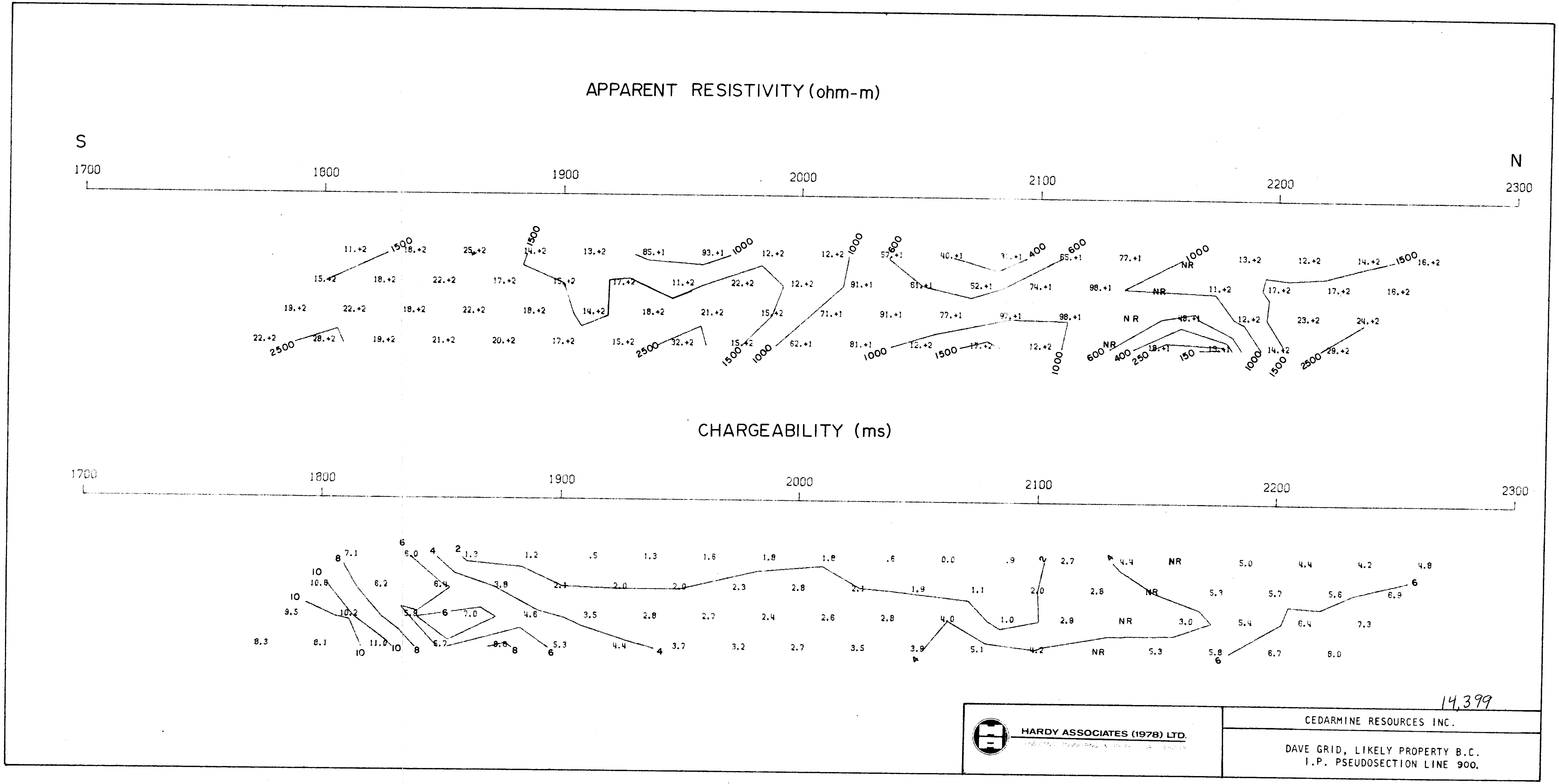
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

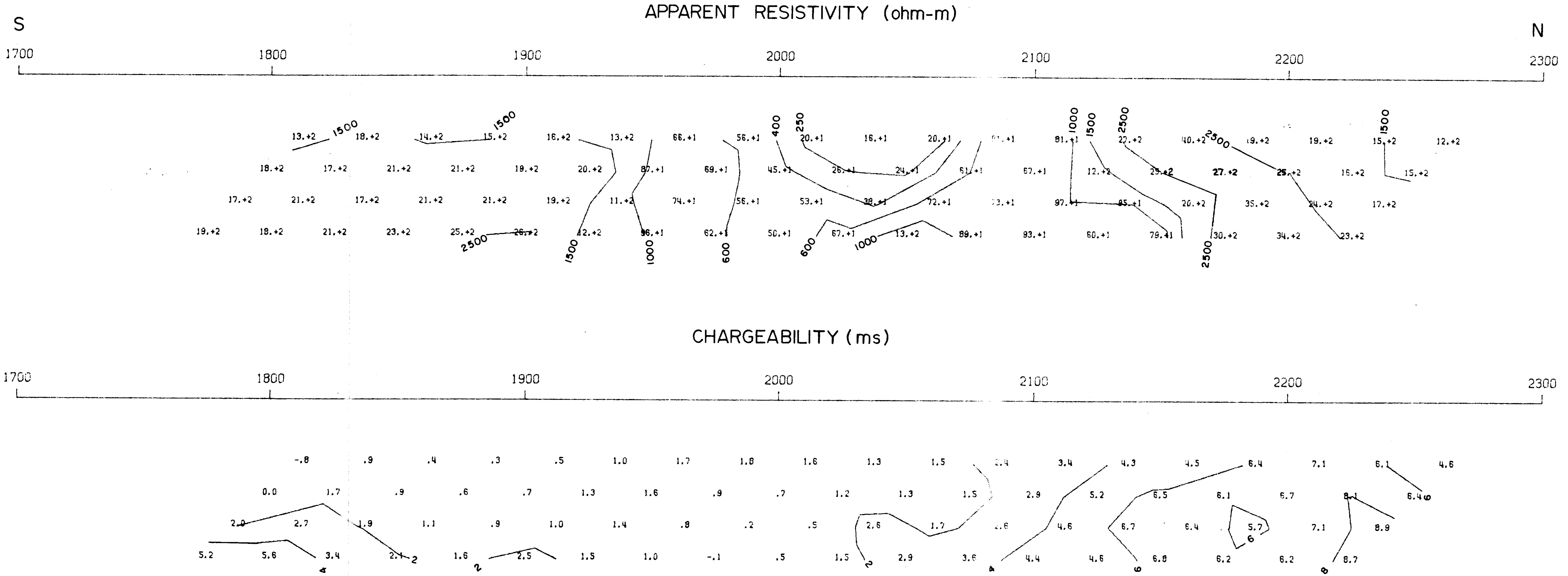
DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 850.

L850



APPARENT RESISTIVITY (ohm-m)
S
N
1700
1800
1900
2000
2100
2200
2300
CHARGEABILITY (ms)
1700
1800
1900
2000
2100
2200
2300
14,399
HARDY ASSOCIATES (1978) LTD.
CEDARMINE RESOURCES INC.
DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 900.

L900



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HARDY ASSOCIATES (1978) LTD.

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 950.

L950

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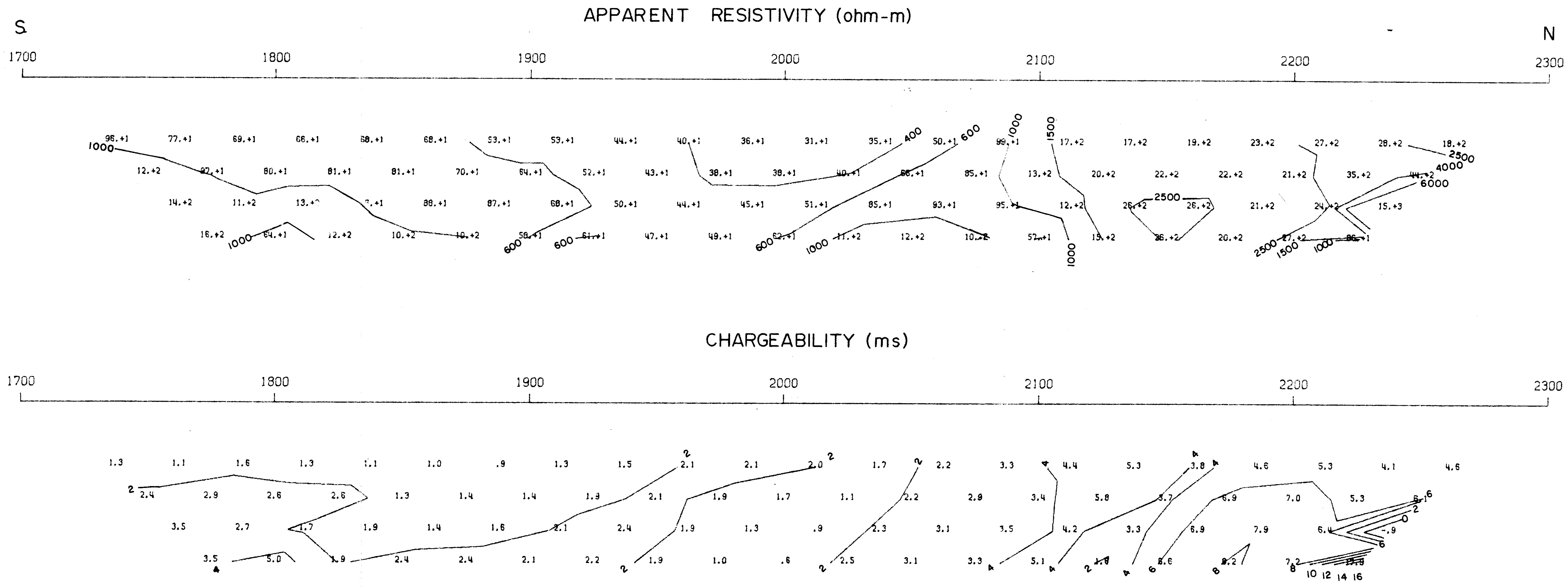
HARDY ASSOCIATES (1978) LTD.

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 1000.



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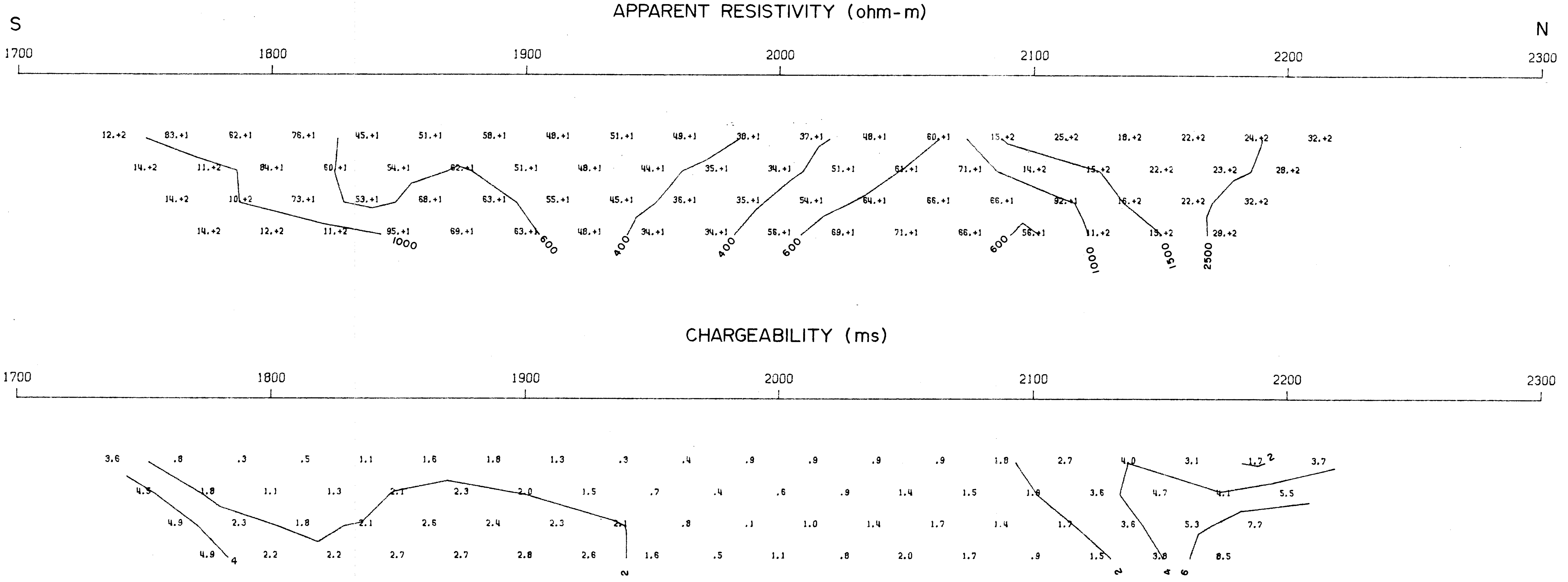
HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 1050.

L1050



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HARDY ASSOCIATES (1978) LTD.

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
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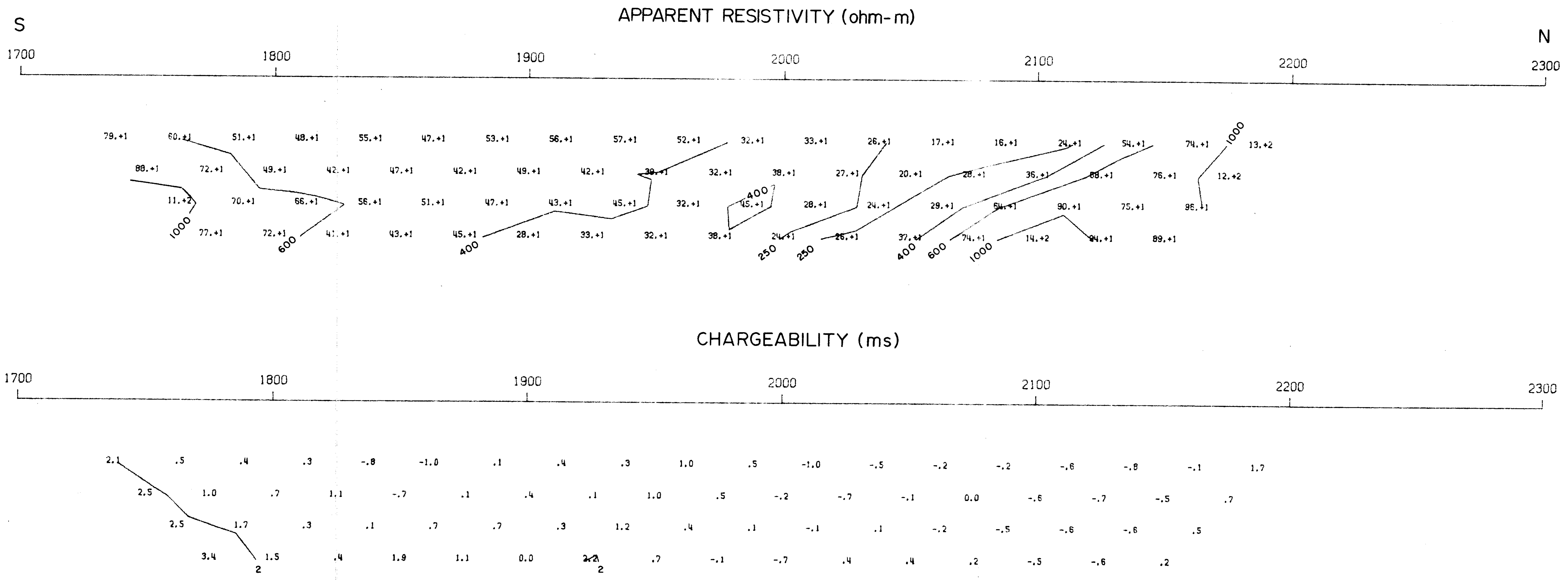
L1100



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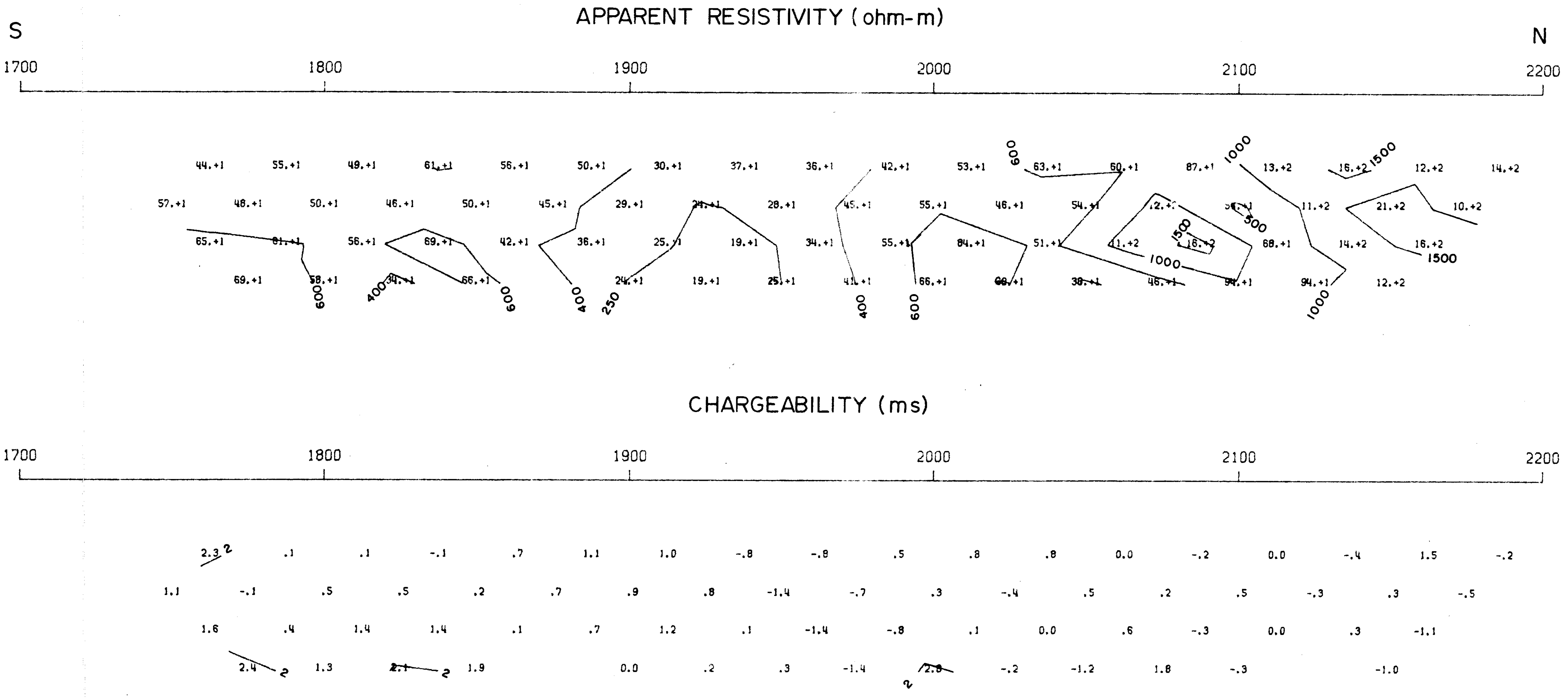
HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 1150.

L1150



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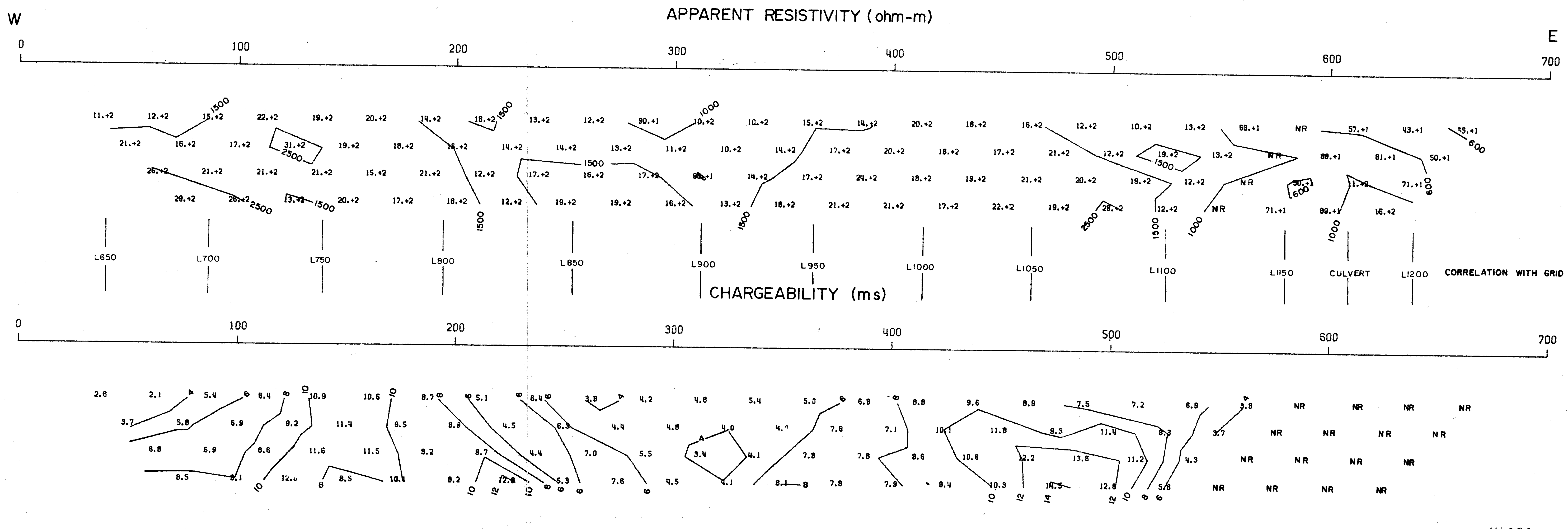
HARDY ASSOCIATES (1978) LTD.

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 1200.

L1200



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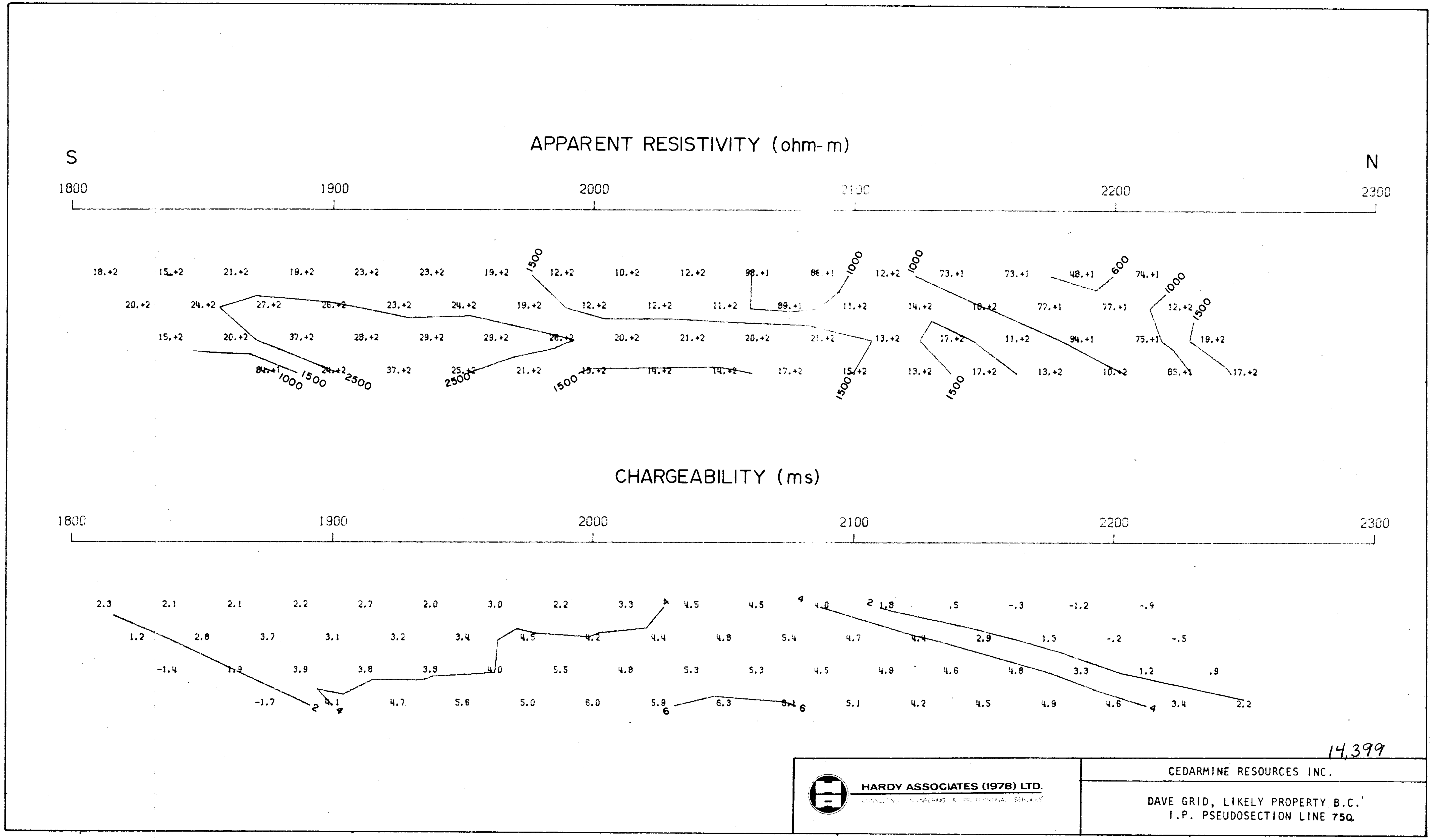
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CEDARMINE RESOURCES INC.

DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION ALONG ROAD

L999


APPARENT RESISTIVITY (ohm-m)
S
N
1800
1900
2000
2100
2200
2300
CHARGEABILITY (ms)
1800
1900
2000
2100
2200
2300
14,399
HARDY ASSOCIATES (1978) LTD.
CEDARMINE RESOURCES INC.
DAVE GRID, LIKELY PROPERTY B.C.
I.P. PSEUDOSECTION LINE 750

750

APPENDIX F
DETAILED GEOLOGY: HORSEFLY ROAD/SLUM GULCH

DAVE GROUP - HORSEFLY ROAD/SLUM GULCH DETAILED GEOLOGY

The outcrop occurs along the north side of the Horsefly Road, intersecting tieline 11 north at 12+65 east. The exposure consists of outcrop with intermittent talus slopes obscuring the exposure. Chainage values listed below move southwest from the north end of the section.

2.5 to 22.9 m (5 m high).

- Basaltic Andesite, contains finely disseminated magnetite and disseminated pyrite (% increasing from north to south). Good hornblende development with crystals up to 1 cm. Epidote alteration increases north to south.

22.9 to 25.0 m.

- Agglomerate, with syenite and more mafic fragments, rounded in an epidote-rich weathered matrix. The agglomerate contacts the basaltic andesite AZ015/60^{o}E, and is heavily sheared parallel to the contact.

25.0 to 36.9 m.

- Basaltic andesite as above contacts syenite dyke AZ140/60^{o}E.

36.9 to 38.4 m (about 7 m high).

- Syenite dyke, pink, fine grained with blocky fracturing. Finely disseminated magnetite occurs throughout. Texture is uniform, and contacts are sharp, trending AZ080/70^{o}E and AZ140/60^{o}E.

38.4 to 77.0 m.

- Basaltic andesite; disseminated pyrite increases S.W. to approx 5-10%. Trace chalcopyrite noted, and again increases S.W. The andesite is magnetic in the north, and grades to very magnetic in the south, the andesite is heavily shot with carbonate, very weathered, rusty, and crumbly, sheared AZ150/70°E. Contact with the syenite dyke is sharp, with some bleaching of the volcanics. Shearing parallels the contact at AZ080/70E. The contact with epidote hornfels is inferred at 77.0 m.

77.0 to 99.5 m.

- Highly epidotized hornfels, light green, deeply weathered. Good hornblende crystal development locally, between 1-5 mm. Some disseminated pyrite, locally concentrated (1-2%) with hematite halo (non magnetic). Epidote hornfels contacts basaltic andesite at the top of ridge AZ107/90°. Top of outcrop roughly 9 m high.

99.5 to 102 m.

- Syenite dyke, pink, carbonated, with disseminated magnetite.

102.0 to 106.0 m.

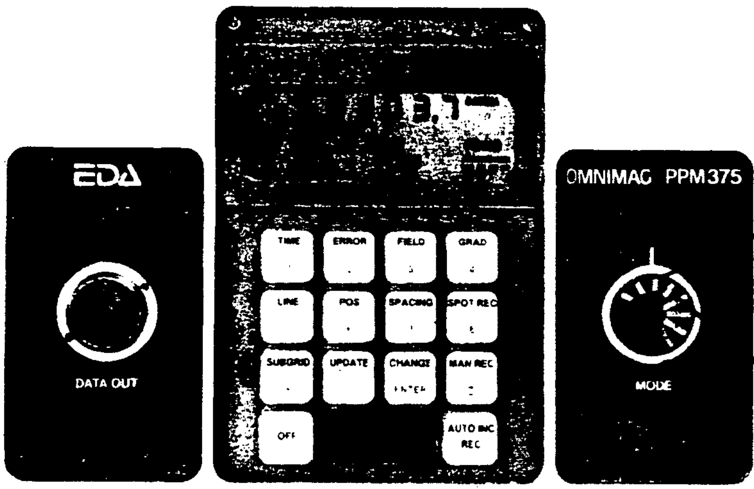
- Epidote hornfels as above, contacting sulphide rich andesite. Deeply weathered.

106.0 to end.

- Basaltic andesite, deeply weathered with massive pyrite locally to 30-40%. Some syenite noted, possibly a small vein. The contact trends AZ190 with dip not discernable. Outcrop roughly 3 m high and disappears under talus and vegetation. Sampled DR-85-1.

APPENDIX G
GEOPHYSICAL EQUIPMENT

OMNIMAG® PPM-375
Portable/Base Station Magnetometer

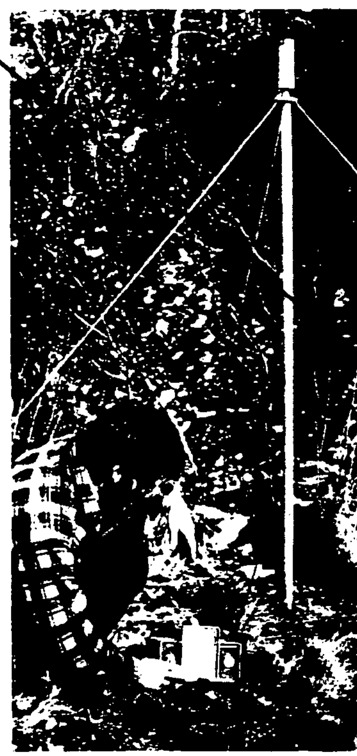


The PPM-375 is the most recent addition to EDA's OMNIMAG series of magnetometers and gradiometers. It combines features of EDA's PPM-350 Total Field Magnetometer and PPM-400 Base Station Magnetometer in one dual-purpose unit. This user oriented approach exemplifies EDA's pioneering efforts in the development of advanced geophysical systems.

This approach is another reason why EDA has shipped more microprocessor-based proton precession ground magnetometers in the highly competitive Canadian market than any other company in recent years.

As a portable field unit...

- Faster Surveys
- Simplified Fieldwork
- Highly Repeatable Data
- Easier Data Interpretation
- Computer Compatible



As a base station...

- Automatic Diurnal Corrections
- Programmable Base Field
- Automatic Base Field Calculations
- Calculates Differential Field Variations
- Programmable Cycling Interval
- Computer Compatible

OMNIMAG® PPM-375
Portable/Base Station Magnetometer

As a portable field unit...

the PPM-375 OMNIMAG is a portable proton precession survey magnetometer that measures and records in memory the earth's magnetic field at the touch of a key. It identifies and records the location, time of each measurement, computes the statistical error of the reading and records the decay and strength of the signal being measured.

Features

Packaged in a compact, lightweight rugged housing, the PPM-375 provides:

- A visual readout and storage of the following information in an absolutely secure memory that prevents data loss or tampering:
  - total field magnitude
  - time of measurement
  - grid coordinates for every reading
  - direction of travel along grid lines
  - statistical error of the total field reading
  - signal strength and decay measurement
- Users have a choice of three data storage modes:
  - manual record
  - spot record
  - automatic update record
- Each reading is automatically assigned a record number which can also be used to identify readings measured off the grid. This also serves to recall data, simply by entering the record number.
- More than one reading can be taken at one point without updating the current station number.
- Sub-grid coordinates and position update are given, permitting more detailed study within the main grid, without altering main grid data.

Major Benefits

Faster Surveys

Survey productivity is significantly increased with the PPM-375 because:

- a reading can be taken and stored in only 4 seconds
- a second reading is normally not required because the data is so repeatable
- the statistical error is calculated for each reading providing an indication of whether an additional reading may be required.

Using the PPM-375, operators have covered as much as 15km per day in ideal conditions.

Simplified Fieldwork

The PPM-375 solid state memory makes surveys easier to conduct because:

- the need to write down results is eliminated. Time, field reading, grid co-ordinates, etc., are simultaneously stored.
- diurnal corrections can be done automatically with the use of another PPM-375 or PPM-400 to eliminate 2-3 hours of tedious calculations.

Highly Repeatable Data

The PPM-375 provides users with repeatable data that significantly reduces the requirement for multiple station readings. Typical tie-line accuracies of ± 0.5 gammas are obtained.

This data quality is due to:

- a patented* Signal Processing Technique
- Constant Energy Polarization that maintains equal energy to the sensor
- processing sensitivity to ± 0.02 gamma
- Automatic Fine Tuning which uses the previous reading as the base for the next.

*the signal processing technique utilized in the OMNIMAG series is protected by patents granted in various countries.

Easier Data Interpretation

The PPM-375 makes geophysical interpretation easier because:

- more information such as statistical error, the signal strength and decay rate measurement is displayed and stored with every reading
- line profiles can be obtained immediately with portable field computers such as the HP-85 through available software.

Computer Compatible

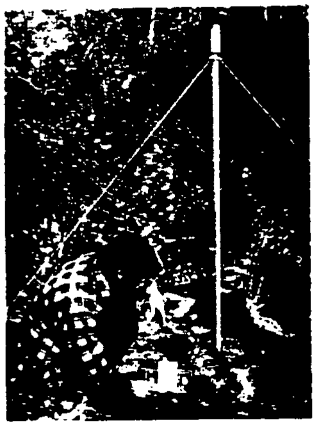
All EDA OMNIMAG systems can be interfaced with many commercial computers which are compatible with RS-232C. This enables the operator to:

- obtain contour or other maps, immediately after the end of survey
- store permanently in the DCU-200 or field computer cassettes the data for further analysis.

Other Benefits

- **Error Analysis**
  This unique feature is a great time saver because the calculation of the statistical error of each reading lets the operator make an on-the-spot decision whether that reading should be stored or not.
- **Higher Gradient Tolerance**
  Higher tolerance to local gradients is possible due to a patented signal processing method and to a miniature sensor design utilizing a highly optimized sensor geometry.
- **Complete Data Protection**
  Field data stored in memory is totally protected for 4 years by the lithium backup battery. This battery also provides power to the real-time clock.
- **Data Recall**
  Daily readings can be recalled either by record number or in sequence.
- **Power Supply Versatility**
  Users can choose from non-magnetic rechargeable sealed lead-acid battery cartridges or belts and disposable "C" cell battery cartridges or belts.
- **Decimal Spacing**
  Intermediate readings can be stored every 12.5 units, while using the usual 25-unit station interval.

As a base station . . .



the PPM-375 OMNIMAG measures and stores in its memory the daily fluctuations of the earth's magnetic field. Used with other OMNIMAG units, the PPM-375 base station corrects automatically, in just a few minutes, total field data for diurnal variations.

Features

The PPM-375 OMNIMAG in the base station mode:

- Automatically corrects magnetic field data for diurnal variations and base field values.
- Records each base station value in the following format:
  - time of measurement
  - magnitude of total field
  - difference from the base field value
  - difference from the previous reading
  - sequential record number
- Stores 2550 sets of readings, the equivalent to 10.6 hours of continuous unattended monitoring at 15-second sample interval.
- Simultaneously outputs data to a choice of data collection units as it is being stored in memory.
- Outputs data in a choice of three (3) formats:
  - corrected total field data
  - uncorrected total field data
  - base station data only

Major Benefits

Automatic Diurnal Corrections

The PPM-375 OMNIMAG Base Station corrects automatically the field data for diurnal variations when used with another PPM-375, with a PPM-350 or with a PPM-500 Vertical Gradiometer. A linear interpolation algorithm is used for corrections.

Programmable Base Field

Once the operator has identified the ideal base field value at the end of the first day, he can reprogram the base field and the PPM-375 will recalculate all stored readings with reference to the new base field.

Automatic Base Field Calculations

The PPM-375 calculates automatically for each reading the difference between the measured earth's field and the base field value previously entered in by the operator.

Calculates Differential Field Variations

The PPM-375 calculates automatically the difference between the current reading and the previous one, to 0.1 gamma.

Programmable Cycling Interval

The operator can have the PPM-375 cycle at any interval, in one second increments, from a minimum of 5 seconds to a maximum of 60 minutes.

Computer Compatible

All EDA OMNIMAG systems can be interfaced with many commercial computers which are compatible with RS-232C.

Other Benefits

- **Stores & Prints Data Simultaneously**
  The PPM-375 can record and print out data simultaneously. Printed data can still be retained in memory.
- **Three Data Output Capabilities**
  Linked with another OMNIMAG the PPM-375 provides a choice of 3 data formats as shown below.
- **Power Supply Flexibility**
  The PPM-375 Base Station can be operated from:
  — a 12 volt DC car battery
  — rechargeable sealed lead-acid battery cartridge or belt
  — disposable "C" cell battery cartridge or belt
- **Versatile Charging Options**
  The sealed lead-acid batteries can be recharged with:
  — a 12 volt DC car battery, through the DCU-400 Thermal Printer, or
  — any other AC power source
- **Expanded Memory Capability**
  The PPM-375 memory capability of 2550 sets of readings can be expanded to 11,475 readings when used with the DCU-200 Digital Magnetic Recorder.
- **Internal Real Time Clock**
  Real time clocks can be synchronized to the nearest second when using the PPM-375 with any other OMNIMAG unit.
- **Environmental Dependability**
  PPM-375 operates in temperature extremes of -40°C to +55°C. At -25°C, a heater is automatically activated to ensure LCD performance.

```
PPM300   #30027 B=75
03 04 15:00:33
OP    #7
15:00:35 57506.4 .10                      #1    88
15:00:43 57506.7 .08                      #2    88
15:00:47 57505.0 .08                      #3    88
                          G 5400   3250   #4
15:00:51 57501.9 .10      G 5400   3250H  88
15:00:56 57504.1 .08      G 5400   3300H  88
15:01:00 57507.1 .07      G 5400   3350H  88
15:01:05 57511.1 .07      G 5400   3400H  88
15:01:09 57514.9 .05      G 5400   3450H  88
15:01:17 57511.1 .08      G 5400   3500H  88
```

PPM-375 Uncorrected Data

```
PPM400 #330072 B=73
09 04 14:54:14
OP    #2
         57500.0                  0       0
15:00:33 57517.8           0.4     17.8   77
15:00:38 57508.6          -9.2      8.6   78
15:00:43 57511.7           3.1     11.7   79
15:00:48 57510.5          -1.2     10.5   80
15:00:53 57518.0           7.5     18.0   81
15:00:58 57525.9           7.9     25.9   82
15:01:03 57514.8         -11.1     14.8   83
15:01:08 57508.4          -6.4      8.4   84
15:01:13 57512.9           4.5     12.9   85
15:01:18 57512.7          -0.2     12.7   86
```

PPM-375 Data In Base Station Mode

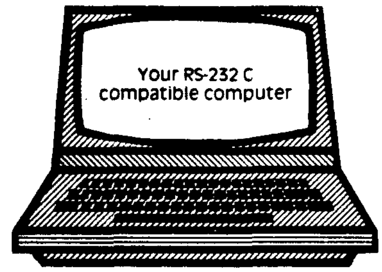
```
PPM300   #30023 B=75
09 04 15:00:39
OP    #7
              0.0                0       0
 57514.1     -5.7  .10                 #1     88
 57511.7     -5.4  .08                 #2     88
 57510.7     -5.7  .08                 #7     88
                          5400   3250  #4
 57515.0    -13.1  .10    5400   3250H  88
 57522.7    -18.6  .08    5400   3300H  88
 57521.5    -18.4  .07    5400   3350H  88
 57512.2     -1.1  .07    5400   3400H  88
 57509.7      5.6  .09    5400   3450H  88
 57512.7     -1.6  .08    5400   3500H  88
```

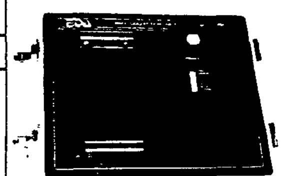
Corrected Data Output Format: Corrected total field reading; applied drift direction; statistical error; line & position numbers; recording mode; normalized decay rate and amplitude of sensor signal.

Specifications

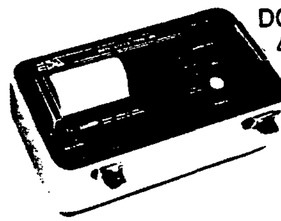
Dynamic Range	18,000 to 103,000 gammas
Capture Range	±25% relative to ambient field strength of last stored value
Tuning Method	Tuning value is calculated accurately utilizing a specially developed tuning algorithm.
Display Resolution	0.1 gamma.
Processing Sensitivity	±0.02 gamma.
Mathematical Truncation Error	±0.02 gamma.
Statistical Error Resolution	0.01 gamma.
Absolute Accuracy	±15 ppm at 23°C, 50 ppm over the operating temperature range.
Standard Memory Capacity	2550 data blocks or readings
Display	Custom-designed, ruggedized liquid crystal display with an operating temperature range from -40°C to +55°C. The display contains six numeric digits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.
Gradient Tolerance	5,000 gammas per meter (typical).
Test Mode	A) Diagnostic testing (data and programmable memory) B) Self Test (hardware)
Sensor	Optimized miniature design. Magnetic cleaniness is consistent with the specified absolute accuracy.
Sensor Cable	Remains flexible in temperature range specified; includes strain-relief connector.
Cycling Time (Base Station Mode)	Programmable from 5 seconds up to 60 minutes in 1 second increments
Operating Environmental Range	-40°C to +55°C; 0-100% relative humidity; weatherproof.
Power Supply	Non-magnetic rechargeable sealed lead-acid battery cartridge or belt; or Disposable "C" cell battery cartridge or belt; or 12V DC power source option for base station operation.
Battery Cartridge/Belt Life	2,000 to 5,000 readings, depending upon ambient temperature and rate of readings.
Weight and Dimensions Instrument Console only Lead-Acid Battery Cartridge Sensor	 3.4kg, 238 × 150 × 250mm 1.9kg, 235 × 105 × 90mm 1.2kg, 56mm diameter × 200mm
System Complement	Instrument console; sensor; 3-meter cable, 30-meter cable for base station (for sales only), aluminum sectional sensor staff, power supply, harness assembly, operations manual.

The OMNIMAG PPM-375 interfaces with a variety of data collection units, including . . .

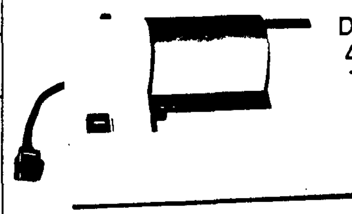




DCU-200 Digital Magnetic Recorder, AC and internal DC operation.



DCU-400 40-Character Thermal Printer, AC and internal/external DC operation.



DCU-040 40-Character Thermal Printer, AC operation only.

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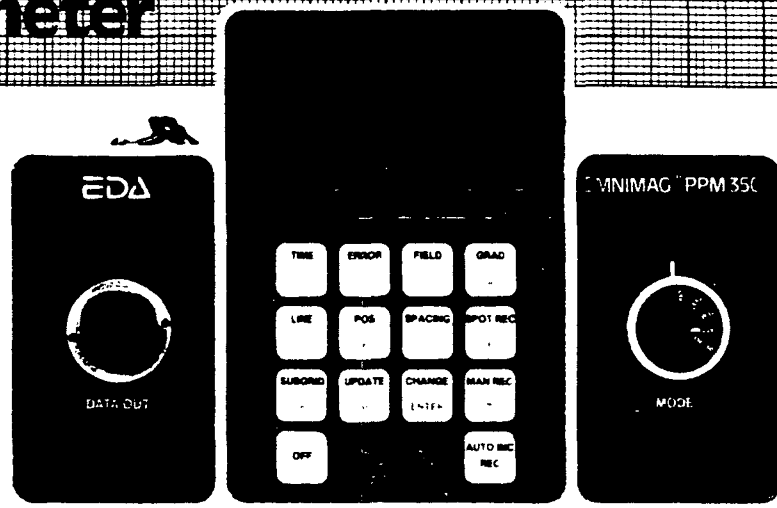
Printed in Canada

OMNIMAG PPM-350 Total Field Magnetometer



The PPM-350 is the latest addition to EDA's OMNIMAG*™ series of magnetometers and gradiometers. It is engineered to provide users with the latest state-of-the-art advances in microprocessor technology, including many features that are unique in the field.

Major benefits and features include:

- Significant increase in productivity
- Lowered survey costs
- Automatic diurnal correction
- Programmable grid coordinates
- Highly reproduceable data
- Ergonomic design
- Simplified fieldwork
- Computer-compatible

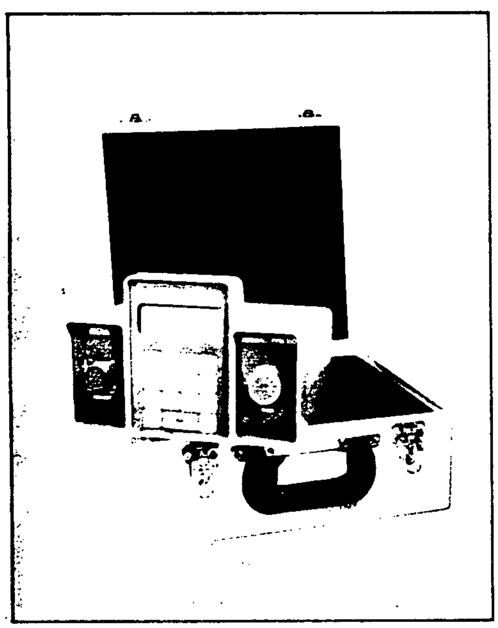
OMNIMAG PPM-350
Total Field Magnetometer

Description

The EDA OMNIMAG PPM-350 is a high-technology, proton precession total field magnetometer that measures and records the earth's magnetic field at the simple touch of a key. It identifies and records the location, time of each measurement, computes the statistical error, and records the decay and strength of the signal being measured.

The PPM-350 is a microprocessor-based system and employs a memory magnetometer concept pioneered by EDA.

Packaged in a compact, lightweight, rugged housing, the PPM-350 incorporates ergonomic-design features that provide maximum comfort and ease-of-operation in the field. It is used in a chest-mounted mode with a shoulder-harness. It has a large Liquid Crystal Display for easy reading, even in direct sunlight, and its oversized touch-sensitive keyboard permits cold-weather operation without having to remove gloves.



Functions

In a typical field survey operation, the PPM-350 can perform all of the following functions:

- A visual readout and storage of the following information ***in an absolutely secure memory that prevents data loss or tampering:***
  - total magnetic field magnitude
  - time of measurement
  - grid coordinates for every reading
  - statistical error of total field reading
  - signal strength and decay measurement
- Users have a choice of three ***input***, or data storage, modes:
  - manual record
  - spot record
  - automatic update record
- Users also have a choice of three ***output*** modes:
  - to a DCU-200 magnetic cassette recorder
  - to a DCU-040 or DCU-400 thermal printer
  - to any RS-232C-compatible microcomputer
- Each reading is automatically assigned a record number which can also be used to identify locations of measurements taken off the grid. This also serves to recall data, as well, simply by keying in the record number.
- Sub-grid coordinates and position up-date are given, permitting more detailed study within the main grid, without altering main grid data.
- Many readings can be taken at one point to verify a reading, without updating the position.

Features and Benefits

Productivity Up, Costs Down

Users of the OMNIMAG PPM-350 can enjoy increases in survey productivity by as much as 50% because of the solid-state features that are designed into it. This increase in productivity, with resultant lower survey costs, is made possible because it enables the operator to take measurements faster and with greater accuracy than conventional techniques permit. This, in turn, allows the survey operator to spend more time in the field surveying significantly more area than would be otherwise possible.

Automatic Diurnal Correction

Diurnal variations are corrected automatically and in just a few minutes, instead of the two or three hours required in manual operation. The raw total field data collected and stored in the PPM-350 is corrected by the PPM-400 Base Station Magnetometer through a single cable link. Using the linear interpolation method, corrected data is produced faster and more accurately, because the possibility of human error is reduced.

Programmable Grid Coordinates

Measurements are also made faster and more accurately because the location of each reading is taken automatically on an incremental basis, and recorded along with the time of that measurement. An additional benefit of this feature is that it can provide the basis for computer plotting to obtain survey profiles.

Highly Reproduceable Data

The PPM-350 provides users with the highest confidence level in the

Industry. Its highly reproduceable data is a result of four leading-edge design features that eliminate the need for taking multiple readings:

- An exclusive Signal Processing Technique*
- Constant Energy Polarization that maintains equal energy to the sensor even when the main battery supply decreases
- Sensitivity to ±0.02 gamma that ensures repeatability of readings
- Automatic Fine-Tuning that takes the previous reading as the base for the next

Ergonomic Design

Operator comfort and efficiency were prime considerations in the design of the new PPM-350. It is lightweight and is encased in a rugged housing that permits operation in a wide variety of field conditions. The oversize keyboard enables the operator to take measurements without removing gloves. Large LCD's make reading much easier, even in bright sunlight.

Fieldwork Simplified

Since each reading is automatically stored in a non-volatile memory, the need to make handwritten notebook entries on total field magnitude, time of reading, line and station numbers, etc. is eliminated. This reduces the need for notebook usage by the operator, thereby improving productivity. Also, it allows field surveys to be made under all weather conditions.

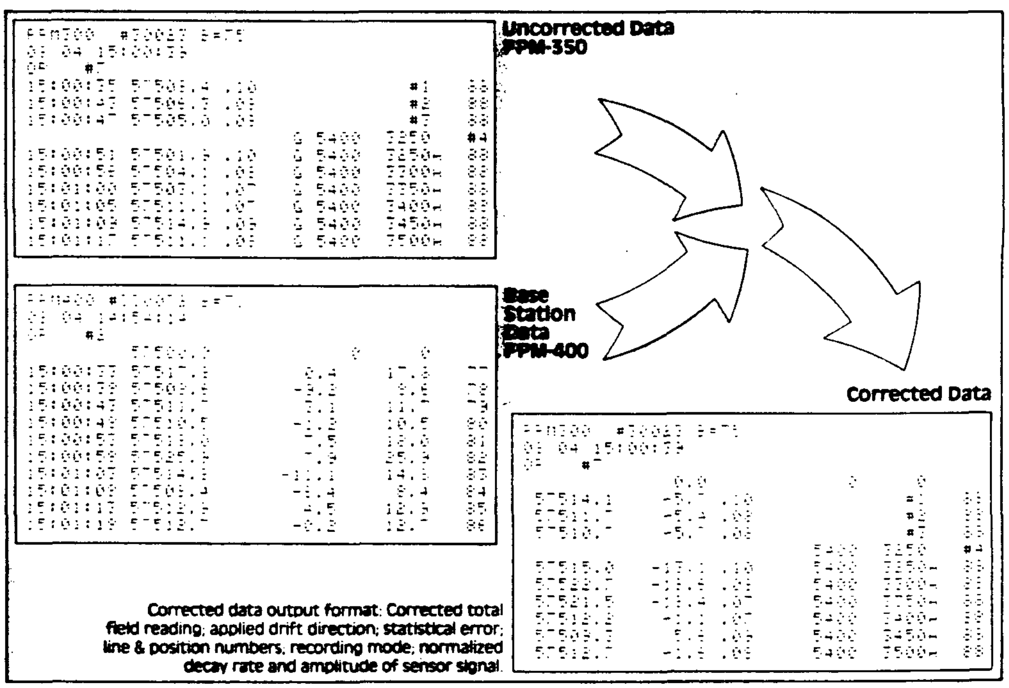
Computer Compatible

All EDA OMNIMAG systems can interface with any computer using RS-232C standard. This enables generation of profiles, contour maps, etc.

*Patent Pending

Other Features

- *Data Recall.* Daily readings can be recalled either by record number or in sequence.
- *Non-Volatile Memory.* A lithium battery with a life-expectancy of 4 years provides total protection of data stored in memory and of the real-time clock in case the primary battery runs down or is removed.
- *Environmental Dependability.* PPM-350 operates in temperature extremes of −35°C to 55°C. At −25°C, a heater automatically activates to ensure LCD performance. Environmental sealing allows operation in very high humidity and in driving rain.
- *Higher Gradient Tolerance.* More accurate readings are obtained because the PPM-350's optimized sensor geometry and reduced size result in higher tolerances to local gradients.
- *Power Supply Versatility.* Users can choose from a variety of power packages:
  - rechargeable sealed lead acid battery belt or cartridge
  - disposable alkaline "C" cell battery belt or cartridge.
- *Error Analysis.* This unique feature is a great time saver because the calculation of the statistical error of each reading lets the operator make an on-the-spot decision whether that reading should be stored or not.
- *Memory Upgrade.* The standard memory of 1383 readings is optionally expandable up to 2555 readings.
- *Decimal Spacing.* Intermediate readings can be stored every 12.5 units, while using the usual 25-unit station interval.
- *Internal Real-Time Clock.* More accurate and reliable measurements can be made and stored because time is taken to the nearest second. Also, the operator need not wear a wristwatch, which is a common and often overlooked source of magnetic interference.



Corrected data output format: Corrected total field reading; applied drift direction; statistical error; line & position numbers; recording mode; normalized decay rate and amplitude of sensor signal.

EDA

Specifications

Dynamic Range	18,000 to 93,000 gammas
Sensitivity	±0.02 gamma
Statistical Error Resolution	0.01 gamma
Standard Memory Capacity	1383 data blocks or readings
Absolute Accuracy	±15 ppm at 23°C, 50 ppm over the operating temperature range
Display Resolution	0.1 gamma
Capture Range	±25% relative to ambient field strength of last stored value
Display	Custom-designed, ruggedized liquid crystal display with an operating temperature range from −35°C to +55°C
Gradient Tolerance	5,000 gammas per meter
Sensor	Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy
Sensor Cable	Remains flexible in temperature range; includes low strain connector
Operating Environmental Range	−35°C to +55°C; 0–100% relative humidity; weather-proof
Power Supply	Non-magnetic rechargeable sealed lead acid battery cartridge or belt; or, Disposable "C" cell battery cartridge or belt
Battery Cartridge Life	2,000 to 5,000 readings, depending upon ambient temperature and rate of readings
Weight and Dimensions	
Instrument Console only	3.4 kg, 238 x 150 x 250 mm
Lead Acid Battery Cartridge	1.9 kg
Sensor	1.2 kg, 56 mm diameter x 200 mm
System Complement	Electronics console; sensor with 3-meter cable; sensor staff; power supply; harness assembly; operation manual.

EDA is a pioneer in the development of advanced geophysical systems and has created many innovations that increase field productivity and lower survey costs.

EDA's OMNIMAG series consists of the PPM-350 Total Field Magnetometer, PPM-400 Base Station Magnetometer, and the PPM-500 Vertical Gradiometer. Contact us ***now*** for details.

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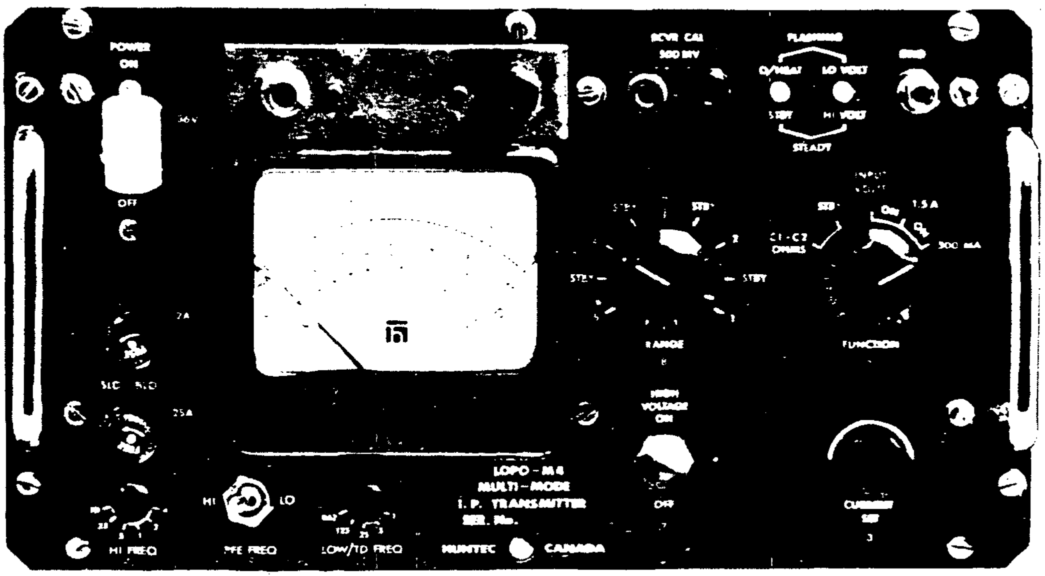
M-4 "LOPO"

Induced Polarization / Resistivity 160W Transmitter



DESCRIPTION

The Huntec M-4 LOPO is designed for induced polarization measurements using time domain, frequency domain, or complex resistivity techniques, and for resistivity measurements. It is battery operated, and weighs 18.2 kg with battery pack. It delivers over 160 W of dc power into loads from 100 Ω to 6000 Ω. It will operate at reduced power into any load from short circuit to open circuit.

It may be used with any receiver. Special timing options are available if the seven standard frequencies are insufficient.

Output current is automatically controlled to within 1% of a current set point chosen by the operator, and is affected neither by battery voltage, nor by load variations.

The battery pack is detachable and rechargeable. Typically, when used with the companion M-4 Receiver, a full day's operation may be obtained between charges.

The high sensitivity and noise immunity of the Huntec I.P. Receiver make the Huntec M-4 System, comprising the LOPO and Receiver together, a highly portable, rapid field system, comparable in performance to other systems of several times the weight and power.

FEATURES

- One man portable: operates from rechargeable battery pack.
- Automatic regulation of output current eliminates errors due to changing polarization potential, battery voltage and load resistance.
- Adjustable timing cycle to suit all geologic conditions.
- Precision control of timing by crystal clock.
- Precision calibrated signal output for receiver testing.
- Operates into a short circuit without damage at 1.5 A maximum.
- Maximum of 1800 V output for high resistivity areas.
- Delivers full power in both arctic and tropical regions.

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M-4 "LOPO"

SPECIFICATIONS

OUTPUT

Maximum Current: 1.5 A dc
Maximum Voltage: 1,800 V dc
Load Range: Zero to infinity in five ranges
Maximum dc Load Power: In excess of 160 W at 75% efficiency into following load resistances
Range 1 = 100 to 230 Ω
Range 2 = 230 to 520 Ω
Range 3 = 520 to 1200 Ω
Range 4 = 1200 to 2700 Ω
Range 5 = 2700 to 6100 Ω
Load Current: Continuously adjustable
Max. Current/Min. Current = 15/1
When the transmitter is operated at half its available output current, it will hold this current constant to within 1% while the load resistance changes by ±100% or when the input voltage changes by ±20% of its original value.
Turn on Time: Less than 10^{-3}s
Turn Off Time: Less than 10^{-3}s
Frequency: Time domain: 0.0625, 0.125, 0.25, 0.5 or 1 Hz
Frequency domain and complex resistivity: 0.0625, 0.125, 0.25, 0.5, 1, 2 or 4 Hz
Duty Cycle: ***$T_{on}/(T_{on} + T_{off})$*** Time domain: 0.5 to 0.9375 in increments of 0.0625 Frequency domain/complex resistivity: 0.9375
Timing Accuracy: 0.005%, −25°C to + 50°C

INPUT REQUIREMENTS

Voltages: 24 and 36 V dc
Maximum Current: 12 A
Batteries: Six GC-680-1 lead-acid Gel/Cel 7.5 Ah
The input power source can be batteries or any unregulated dc source between 30-40 V supplying 10 A to 15 A and 24 V at 2 A.

FRONT PANEL

Switches and Controls:
- Load resistance selector switch
- Current adjustment continuous control
- Function switch; (a) $C_1 - C_2$ Ω, (b) STBY, (c) dc input V, (d) 1.5 A, (e) 0.5 A
- Battery ON/OFF master switch (magnetically tripped circuit breaker)
- High voltage ON/OFF (standby/Operate) switch
- Fuses: one 25 A Slo-Blo for control circuits

Connections:
- Output terminals to current stakes
- Receiver calibration signal Output: V_p = 500 mV
  V_s/V_p = 20%, 2%
- Panel grounding terminal

Indicators:
- Standby/Overheat light: Steady green when set is on Standby (High Voltage off). Flashing green when maximum temperature being approached.
- Low-Volt/Hi-Volt: Steady amber when input voltage greater than 40 V and flashing amber when input voltage drops below 30 V. Normally off

ENVIRONMENTAL

Ambient Temperature: −25°C to +50°C
Altitude: −9150 to +6100 m Note: If the upper limit is exceeded, high voltage breakdown during operation may occur.
Humidity: The set may be operated in saturated air, and in rain without damage or risk of malfunction.

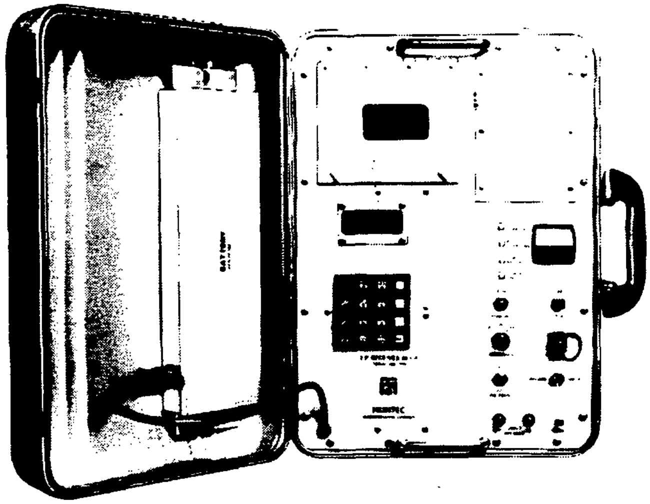
MECHANICAL

Instrument Package: 31.8 cm x 17.8 cm x 17.8 cm, 6.8 kg
Battery Package: 31.8 cm x 17.8 cm x 17.8 cm, 11.4 kg
Total Package: 31.8 cm x 17.8 cm x 30.5 cm, 18.2 kg

OUTPUT CHARACTERISTICS

		Min.	*Max.*
1	0	0.100	1.50
	50	.08	1.20
	100	.068	1.02
	100	.068	1.02
	160	.063	0.95
	220	.05	.75
	220	.05	.75
	370	.04	.60
	520	.033	.50
	520	.033	.50
	835	.026	.40
	1150	.022	.33
	1150	.022	.33
	1925	.016	.24
	2700	.015	.22
	2700	.015	.22
	4450	.011	.16
	6200	.009	.14
5	10,000	.008	.100
	20,000	.007	.055
	40,000	.003	.030
	80,000	.002	.017

M-4 Induced Polarization Receiver



DESCRIPTION

The Huntec M-4 is a microprocessor based receiver for time and frequency domain IP and complex resistivity measurement. It is

Easy to operate. One switch starts a measurement, of up to 29 quantities simultaneously. The optional Cassette DataLogger records them all in seconds. Calibration, gain setting and SP buckout are all automatic.

Reliable. Using advanced digital signal processing techniques, the M-4 delivers consistently accurate data even in noisy, highly conductive areas. For mechanical reliability it is packaged in a rugged aluminum case for backpack or hand carrying.

Versatile. The operator may adjust delay and integration times, operating frequency and other measurement parameters, to adapt to a wide range of survey conditions and requirements. An independent reference channel facilitates drillhole and underground work, and guarantees transmitter-receiver synchronization in high-noise conditions.

Highly accurate. With a frequency bandwidth of 100 Hz and noise-cancelling digital signal stacking, the M-4 delivers very precise results. The details are summarized in a table overleaf.

Sensitive. The same features that make the M-4 accurate allow detection of very weak signals. The Huntec receiver requires lower transmitter power than any other, for a given set of operating conditions. Automatic correction for drifts in self-potential and gain allow long stacking times for significant signal-to-noise improvements.

Intelligent. Under the control of a powerful 16-bit microprocessor, the M-4 calibrates and tests itself between measurements. Coded error messages, flashed onto the display, inform the operator of any malfunction.

The M-4 Receiver is complemented by Huntec's new M-4 transmitters, which offer precisely timed constant-current output and both time and frequency domain waveforms, compatible with the receiver's accuracy and multi-mode measurement capabilities. The RL-2 Reference Isolator connects any IP transmitter to the receiver's reference channel. The GeoPort field computer reads, stores and processes data from M-4 cassettes.

Contact Huntec for more information on the benefits offered by the M-4 product line.

FEATURES

- Time and Frequency domain IP and Complex Resistivity operation
- Simultaneous Time domain and Complex Resistivity measurement
- Automatic calibration
  - gain setting
  - SP cancellation
  - fault diagnosis
  - filter tuning
- Independent reference channel for drillhole and underground work
- 33 quantities, displayable on large 3½ digit low-temperature liquid-crystal readout
- Analogue meter for source resistance measurement
- 10^9 ohms differential input resistance
- 8 hours continuous operation with replaceable, rechargeable nickel-cadmium battery pack (2 supplied)
- Optional Cassette DataLogger fits inside case, has read-after-write error checking. Up to 350 stations per tape.
- Conveniently packaged for backpacking or hand carrying
- 100 Hz bandwidth, fine time-resolution
- Advanced digital signal stacking
- Delivers reliable, accurate data in noisy, highly conductive areas.

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SPECIFICATIONS

Inputs

Signal Channel

Range:	5 x 10^{-5} to 10 volts. Automatic ranging. Overload indication
Resistance:	Greater than 10^9 ohms differential
Bandwidth:	100 Hz
SP Cancellation:	−5 to +5 volts (automatic)
Protection:	Low-leakage diode clamps, gas discharge surge arrestors, replaceable fuses.

Reference Channel

Level:	500 mV minimum, 10 volts peak maximum, overload indication
Resistance:	2 x 10^5 ohms differential

Controls and Functions

Operating Controls

Keypad:	16 keys, calculator format, function associated with each key.
Reference Registers:	Keypad may be used to store up to ten 3½ digit numeric values with floating decimal point, to represent station number, line number, operator, time, date, weather, transmitter current, etc. for recording on cassette.

Programming Controls

Sub-panel:	All programming controls are on a covered sub-panel, not accessible during normal operation.
Thumbwheel Switches:	Select delay time t_D in milliseconds, chargeability window t_p in milliseconds; operating frequency; PFE frequency ratio.

Displayable Quantities

Time domain:	Primary voltage; self-potential; chargeability (total or each of 10 windows of equal width); phases of odd harmonics 3 to 15; amplitudes of odd harmonics 1 to 15; cycle count; repeating display of polarization potential and total chargeability.
Freq.domain:	Primary amplitude; Percent Frequency Effect; self-potential; cycle count.
Complex Resistivity:	Phases of odd harmonics 3 to 15; amplitudes of odd harmonics 1 to 15; fundamental phase (with ref. input); cycle count.
Any mode:	Battery voltage, Frequency error.

Outputs

Displays

Digital Display:	3½ digit, low-temperature liquid crystal display. Indicates measurement results and diagnostic error messages.
Analogue Meter:	Ohms scale for source resistance; also gives qualitative indication of signal-to-noise ratio.

Cassette DataLogger (Optional)

Description:	Accommodated within M-4 chassis. If not acquired with receiver, may be retrofitted by user at any time. Two recording modes:
Partial:	All sub-panel settings, measurement results, and contents of reference registers are recorded (2 seconds recording time).
Full:	As in partial mode, but also recorded is one cycle of averaged signal waveform (28 seconds recording time). If external reference is used, one cycle of reference waveform is also recorded (60 seconds recording time). Extra memory and software available to average and store the reference waveform for advanced offline resistivity computation.
Format:	ANSI/ECMA/ISO standard for saturation recording: 80 bytes/record, all data recorded in ASCII code.
Verification:	Read-after-write data verification (automatic)

Mechanical

M-4 Receiver with battery pack:	45 cm x 33 cm x 14 cm, 10.0 kg
M-4 Receiver with battery pack and Cassette DataLogger:	Dimensions as above, 11.0 kg
Replaceable Battery pack:	33 cm x 11 cm x 4.5 cm, 3 kg

Environmental

Temperature:	Operation: −20°C to +55°C Storage: −40°C to +70°C
Humidity:	Moisture-proof, operable in light drizzle.
Altitude:	−1,525 m to +4,775 m
Shock,Vibration:	Suitable for transport in bush vehicles.

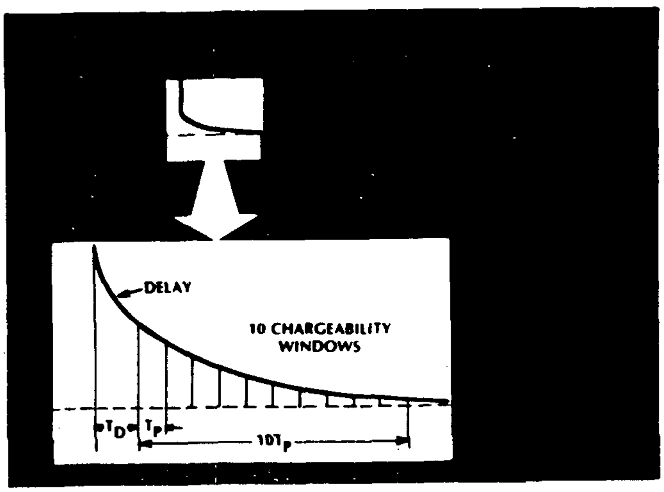
OUTPUT ACCURACY AND SENSITIVITY

	milliradians	volts	volts	volts	seconds	%
	2 milliradians(1)	1% 40Hz 2% to 80Hz	±1%	±1%	0.1%(2)	0.1%(3) full scale
	0.01 milliradians	10^{-6} volts	10^{-6} volts	10^{-3} volts	10^{-3} seconds	0.001% full scale

1) Frequency domain mode: at harmonic frequencies up to 15 Hz, increases to not more than 5 milliradians at 80 Hz.
Time domain mode: at harmonic frequencies up to 7.5 Hz, increases to not more than 5 milliradians at 30 Hz.
2) of total OFF time
3) Full scale defined as 100% PFE.

Cassette Data: recorded in ASCII, 9 digits with decimal point fixed for four decimal digits.
Display Data: 3½ digits, floating decimal point
Resolution of averaged waveform limited by A/D converter to one part or 4096 x (square root of cycle count).
Resolution of reference waveform (not averaged) limited by available memory to one part in 256. Additional memory and averaging software available as option.

CHARGEABILITY WINDOWS



1.0 ELECTRODE ARRAYS

Figure 1 shows the resistivity/IP electrode configuration for a gradient array. This arrangement permits exploration on parallel lines from a fixed position of the current electrodes, by movement of the potential electrodes. Note that useful measurements with a gradient array can be made in a square with sides one third the separation of the current electrodes.

Figure 2 shows the electrode configuration for a multiple-dipole survey. In this array all the electrodes are in a straight line, and the spacing between adjacent electrodes is constant. Data from multiple-dipole surveys are usually displayed as pseudo-sections. Figure 2 shows how a pseudo-section is constructed. The apparent resistivity or chargeability value obtained with the transmitter (Tx) and first receiver (R_1) dipole is plotted at position 1 on the intersection of lines projected downward from the centres of the Tx and R_1 dipoles. Similarly, the value of apparent resistivity or chargeability from the Tx and R2 is plotted in position 2, and so on. The process is repeated for a series of positions of the array and the result is a plot of apparent resistivities and/or chargeabilities which gives some indication of vertical and lateral variations.

Lateral exploration by resistivity measurements is best suited to detection of vertical contacts such as faults, dykes, shear zones and steeply dipping veins, and to a lesser extent to detection of massive sulphides of anomalous conductivity.
Most sulphides, such as chalcopyrite, bornite, chalcolite, pyrite, pyrrhotite, arsenopyrite and molybdenite, as well as

graphite and certain of the clay minerals, produce IP effects, even when only present as disseminations.

2.0 DATA ACQUISITION AND REDUCTION

Induced polarization effects are produced by interrupting the current abruptly. The voltage across the potential electrodes generally does not drop to zero instantaneously, but decays rather slowly, after an initial large decrease from the original steady state value. A typical waveform for IP measurements would have a four second period and 50% duty cycle, so that the current was on for 1 second, off for 1 second, on again in the opposite direction for 1 second and off for 1 second (Figure 3 a).

a) Apparent Resistivity

The peak voltage, Vp, is obtained by choosing a resistivity "window" on the measured waveform, illustrated in Figure 2(b). This allows one to avoid the turn-on transient, thus yielding a more accurate value of the peak voltage.

Resistivities are calculated from the formula:

$$\rho a = G \frac{Vp}{I}$$

where ρa = apparent resistivity

Vp = voltage measured across the potential electrodes P_1 and P_2

I = current injected through the current electrodes C_1 and C_2

$$G = \frac{2\pi}{\left(\frac{1}{r_1} - \frac{1}{r_2}\right) - \left(\frac{1}{r_3} - \frac{1}{r_4}\right)}$$

where r_1, r_2, r_3 and r_4 are the distances between each potential electrode and the current electrodes

For the gradient array, this formula becomes approximately

$$\rho_a \simeq \frac{Vp}{I} \cdot \frac{L^2/_4 - x^2/_4}{x} \cdot \pi$$

where L is the distance between current electrodes, and
x is the distance between potential electrodes

In processing gradient array data, we prefer to use the more exact general formula.

For the multiple-dipole array, the formula is

$$\rho_a = \frac{Vp}{I} . \pi (n)(n+1)(n+2)x$$

where x = the dipole size

and n = the number of dipole lengths between the nearest transmitter and receiver electrodes.

b) Chargeability

In the time-domain IP method, a measure of the IP effect can be obtained by calculating a chargeability M from the measured data. The chargeability is obtained by choosing a chargeability "window" or windows on the decay curve, illustrated in Figure 2(c). A typical measuring programme would integrate the area under the decay curve in 3 slices, with a delay time set at 65 milliseconds. The first chargeability M_{31} would be integrated from 65 to 325 milliseconds, the second chargeability M_{32} from 325 to 585 milliseconds and the third chargeability from 585 to 845 milliseconds.

A chargeability reading is defined by the formula:

$$Ma = \frac{1}{Vp}\int_{t1}^{t2} V_s(t)\,dt$$

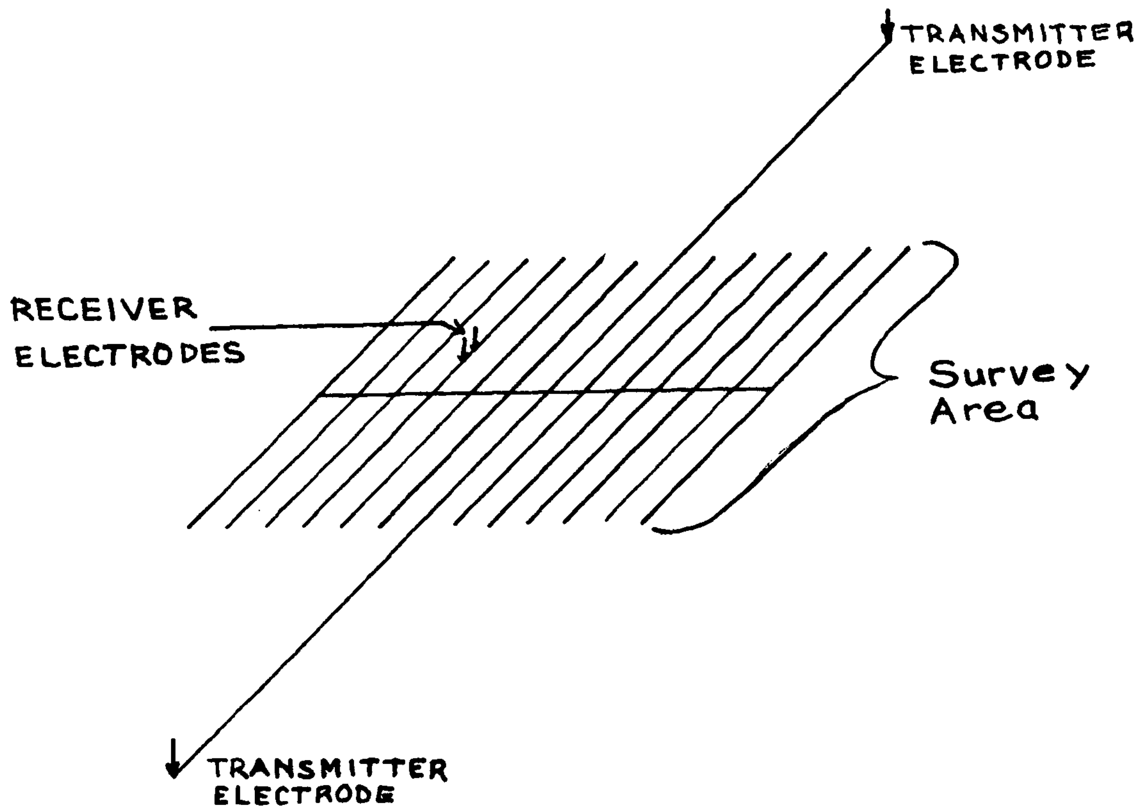
where Ma = apparent chargeability in millivolt seconds/volt or milliseconds

Vs(t) = the transient voltage observed after interruption of current

t_1 = time at beginning of slice

t_2 = time at end of slice

V_p = primary voltage



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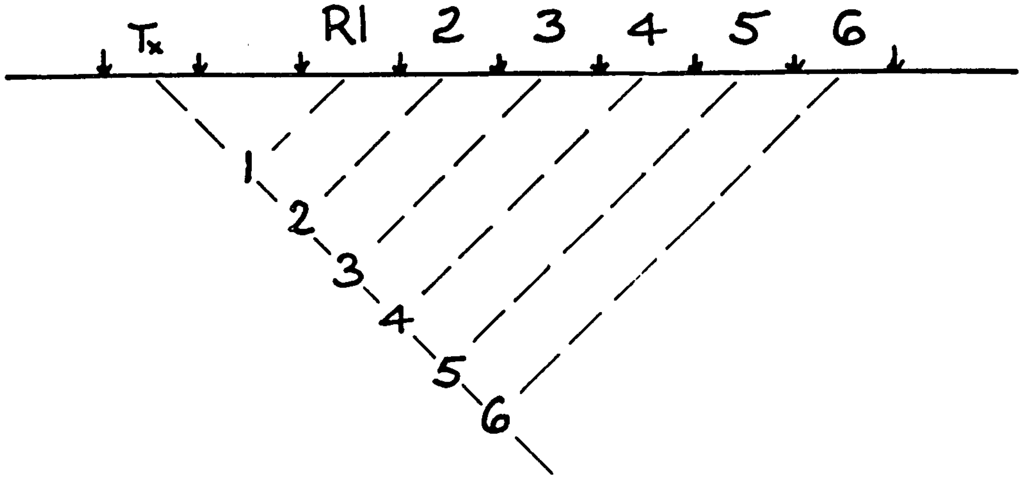
RESISTIVITY/IP ELECTRODE CONFIGURATION
GRADIENT ARRAY

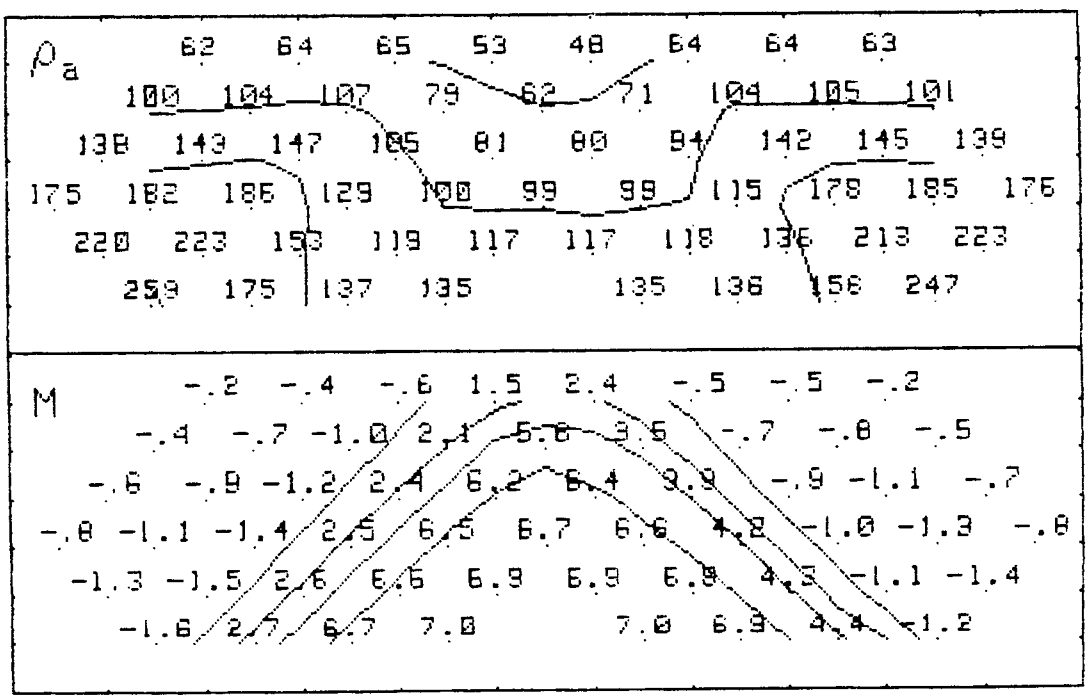
FIGURE I

HT84-82/03



PSEUDO-SECTION

MODEL: M3



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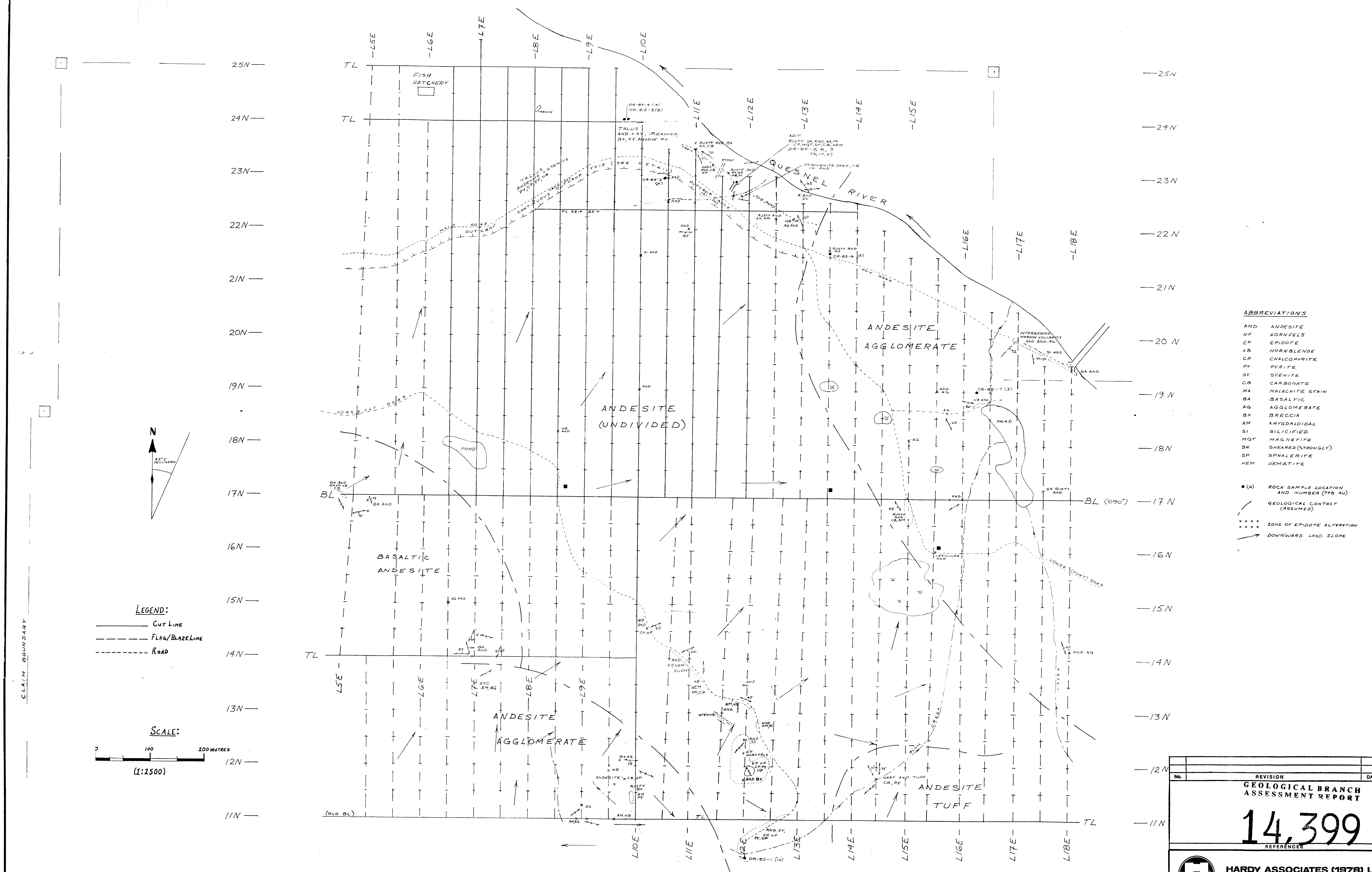
PSEUDO SECTIONS GENERATED FROM MULTIPLE DIPOLE MEASUREMENTS

FIGURE 2

HT09 · 79/05



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GEOLOGY

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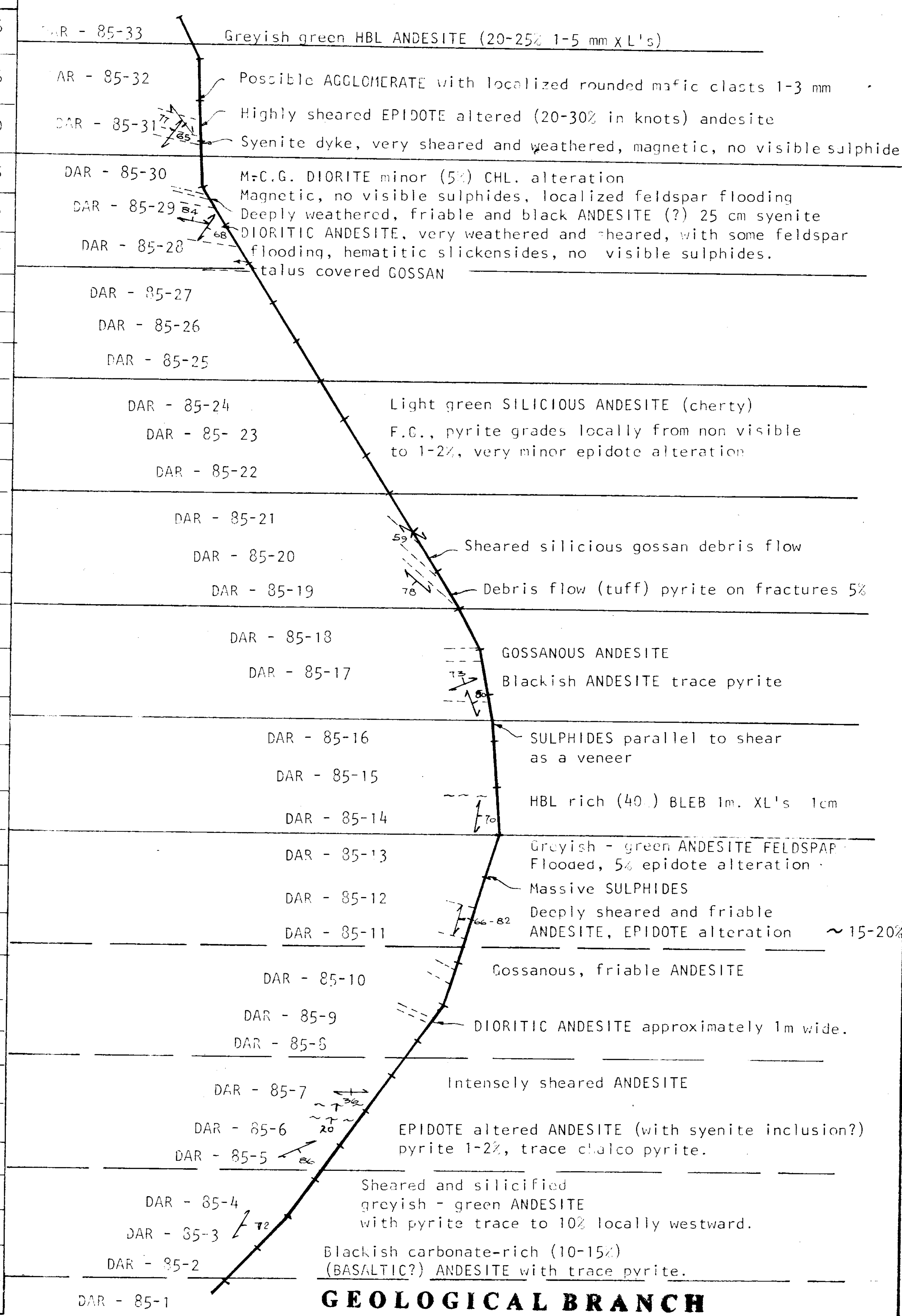
No. CG12080 PLATE 1 REV.

HT27 - 79/06

L6 + 00E

Zn (ppm)	Cu (ppm)	Line	Ag (ppb)	Au (ppb)	Sample
46	93	L6 + 50E	0	6	DAR - 85-33
40	68		0	6	DAR - 85-32
33	40	L7 + 00E	110	10	DAR - 85-31
28	128		60	25	DAR - 85-30
30	192		0	3	DAR - 85-29
19	159	L7 + 50E	70	3	DAR - 85-28
13	330		90	5	DAR - 85-27
20	270		0	6	DAR - 85-26
18	280	L8 + 00E	50	4	DAR - 85-25
32	330		100	12	DAR - 85-24
36	270		70	8	DAR - 85- 23
20	440	L8 + 50E	60	11	DAR - 85-22
20	320		90	10	DAR - 85-21
37	190		0	4	DAR - 85-20
34	290	L9 + 00E	40	8	DAR - 85-19
34	111		0	2	DAR - 85-18
100	100		30	3	DAR - 85-17
37	230	L9 + 50E	90	4	DAR - 85-16
35	610		50	6	DAR - 85-15
40	192	L10 + 00E	0	3	DAR - 85-14
46	720		310	11	DAR - 85-13
44	119		30	3	DAR - 85-12
46	152	L10 + 50E	30	4	DAR - 85-11
36	145		140	5	DAR - 85-10
34	97		0	0	DAR - 85-9
28	126	L11 + 00E	30	4	DAR - 85-8
36	86		90	4	DAR - 85-7
43	98		80	5	DAR - 85-6
29	180	L11 + 50E	70	6	DAR - 85-5
55	120		170	3	DAR - 85-4
78	58		100	3	DAR - 85-3
92	66	L12 + 00E	150	2	DAR - 85-2
78	62		60	3	DAR - 85-1



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Scale: (m) 0 — 50 — 100 m

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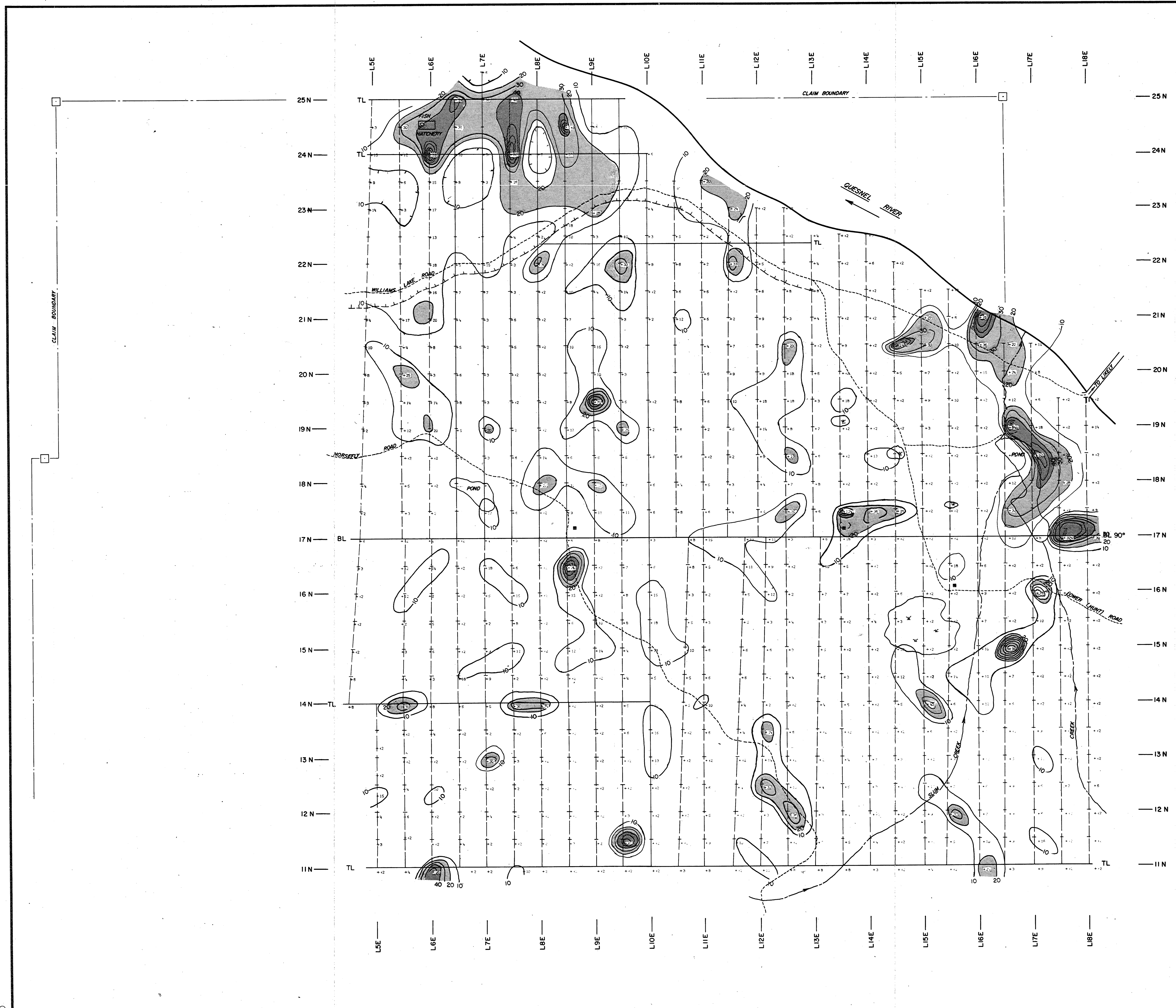
MAIN ROAD OUTCROP DETAIL

CG12080

PLATE 2

SCALE	DATE 12/85	MADE KM	CHKD.	JOB: CG12080	FIG.



CONTOUR INTERVAL 10 PPB

LEGEND

——	CUTLINE
— — —	FLAG/BLAZELINE
- - - -	ROAD
≺	ADIT
■	BUILDING
⊥⊥	TOP OF SCARP

100 75 50 25 0 50 100 150 200 METRES

SCALE : (1:2500)

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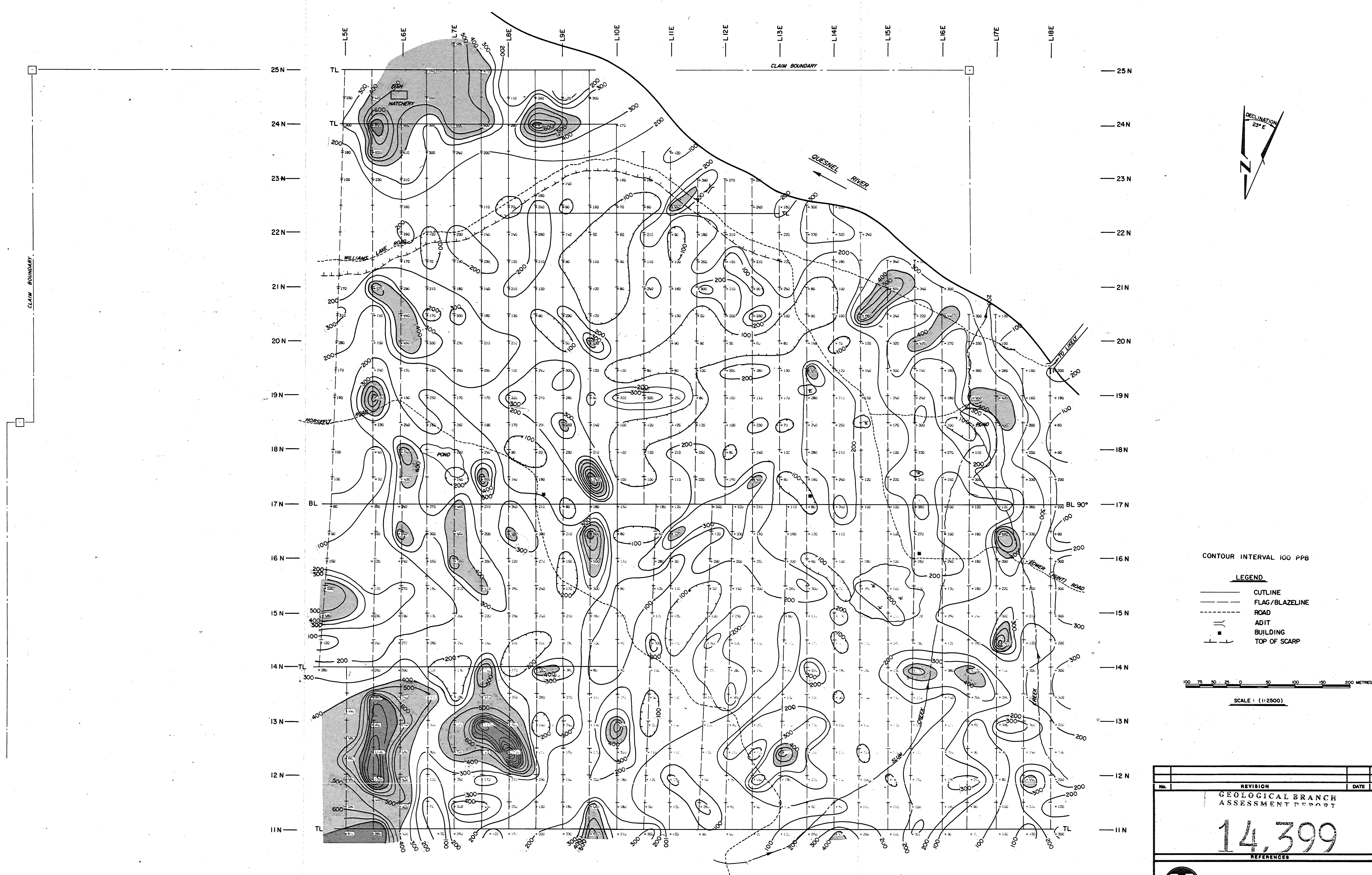
SOIL GEOCHEMISTRY : GOLD (PPB)

SCALE .... DATE 12/85 MADE X CHKD .... APPD. X

No. CG 12080 PLATE 3A REV.

HT27 - 79/06



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SOIL GEOCHEMISTRY : SILVER (PPB)

SCALE ______ DATE 12/85 MADE ______ CHKD ______ APPD ______

No. CG 12080 PLATE 3B REV.

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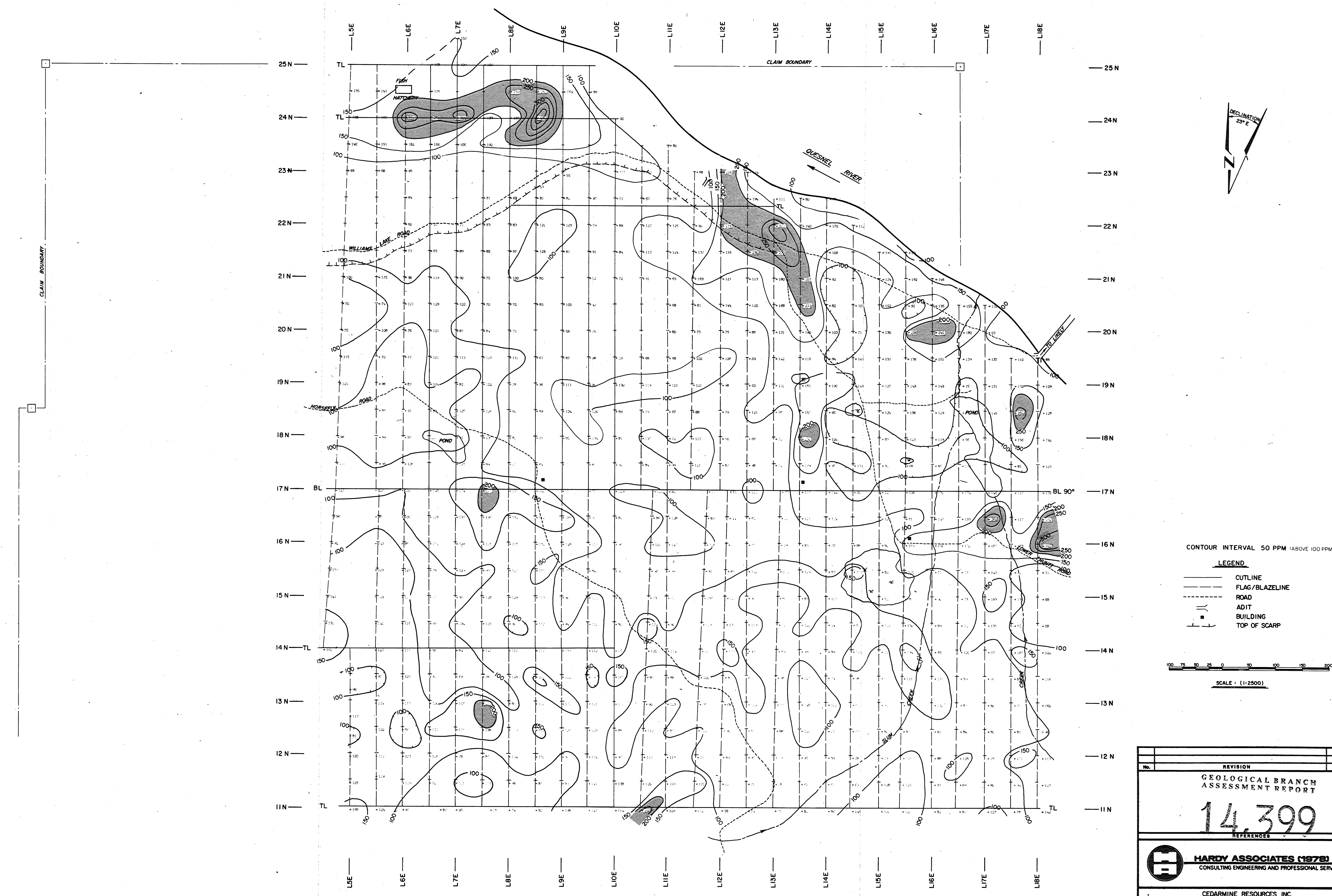

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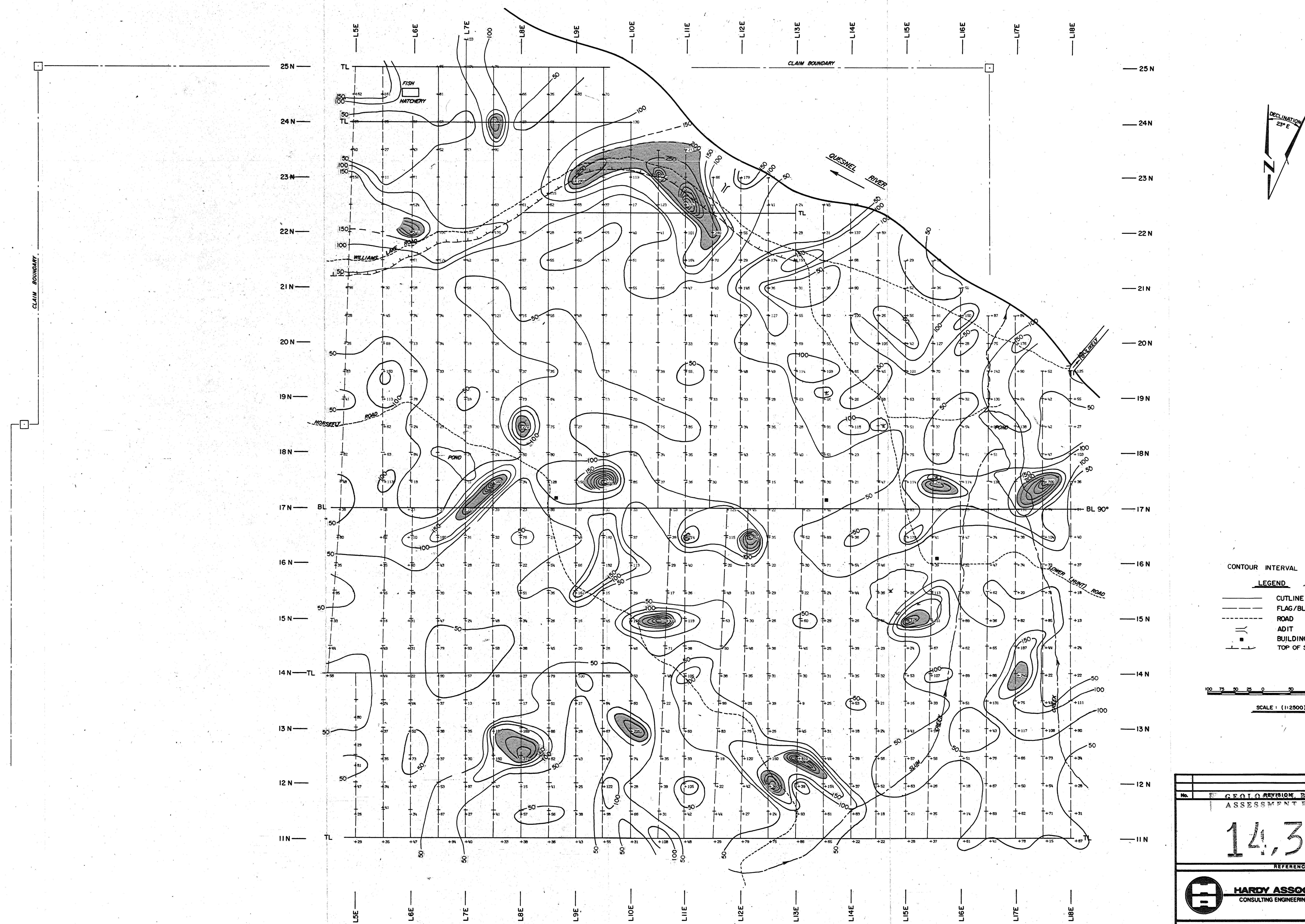
SOIL GEOCHEMISTRY : ZINC (PPM)

SCALE ______ DATE 12/85 MADE SS CHKD ______ APPD. SS

No. CG 12080 PLATE 3C REV.

HT27 - 79/06



CONTOUR INTERVAL 50 PPM

LEGEND

————	CUTLINE
— — —	FLAG/BLAZELINE
- - - - - -	ROAD
(symbol)	ADIT
■	BUILDING
(symbol)	TOP OF SCARP

100 75 50 25 0 50 100 150 200 METRES

SCALE : (1:2500)

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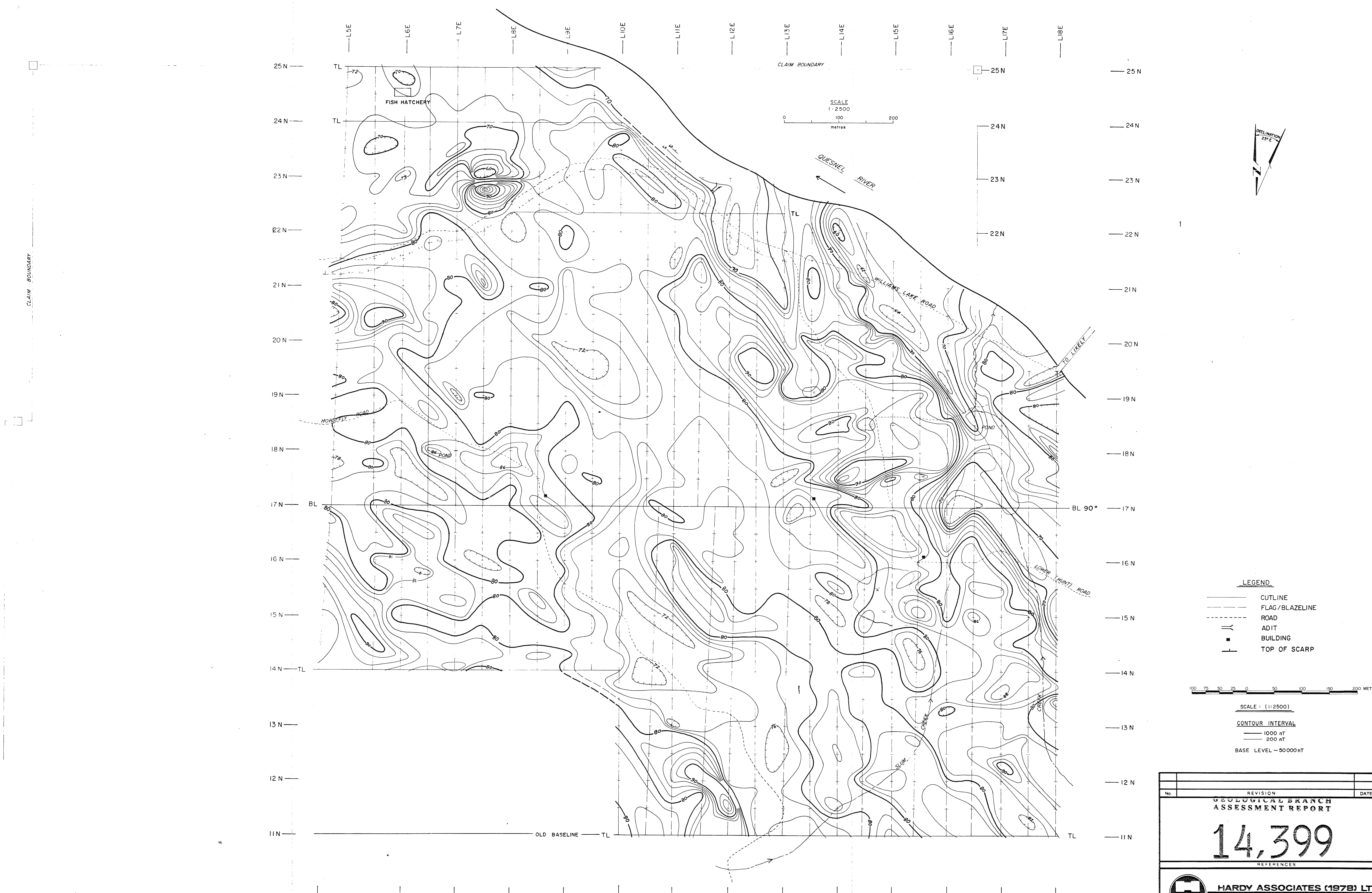
SOIL GEOCHEMISTRY : COPPER (PPM)

SCALE ______ DATE 12/85 MADE ______ CHKD ______ APPD. ______

No. CG 12080 PLATE 3D REV.

HT27 - 79/06



LEGEND

- CUTLINE
- FLAG/BLAZELINE
- ROAD
- ADIT
- BUILDING
- TOP OF SCARP

100 75 50 25 0 50 100 150 200 METRES

SCALE 1:2500

CONTOUR INTERVAL
1000 nT
200 nT

BASE LEVEL — 50000nT

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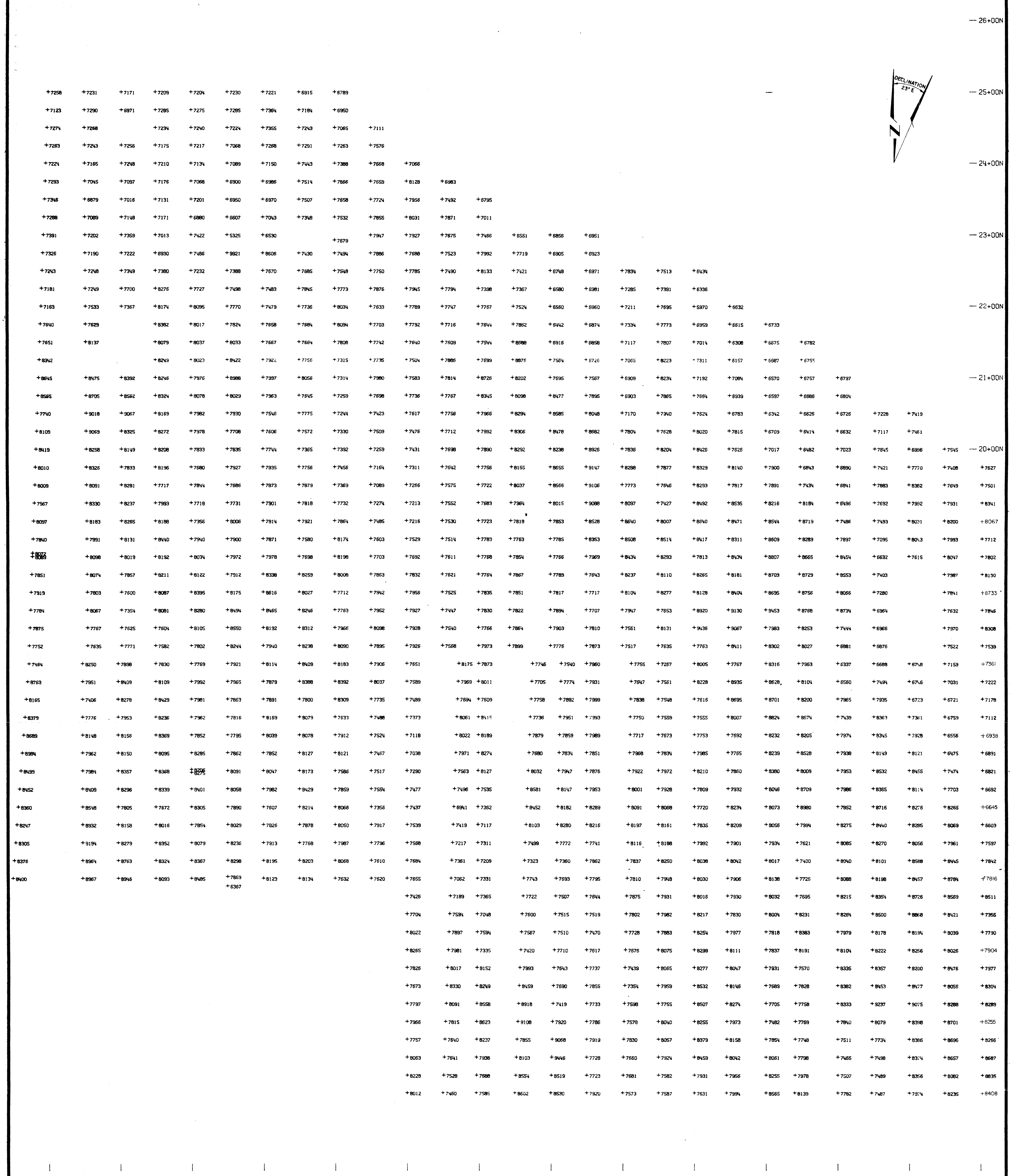
TOTAL MAGNETIC FIELD

SCALE DATE MADE CHKD APPD

No. CG 12080 PLATE 4. REV.



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DAVE GRID

TOTAL MAGNETIC FIELD DATA (nT)

SCALE : (1:2500)

100 75 50 25 0 50 100 150 200 METRES

SCALE ______ DATE 12/85 MADE WJS CHKD ______ APPD WJS

No. CG 12080 PLATE 4B REV.

LEGEND

- CUTLINE
- FLAG/BLAZELINE
- ROAD
- ADIT
- BUILDING
- TOP OF SCARP
- 1.2 CHARGEABILITY ms

100 75 50 25 0 50 100 150 200 METRES

SCALE 1 : (1:2500)

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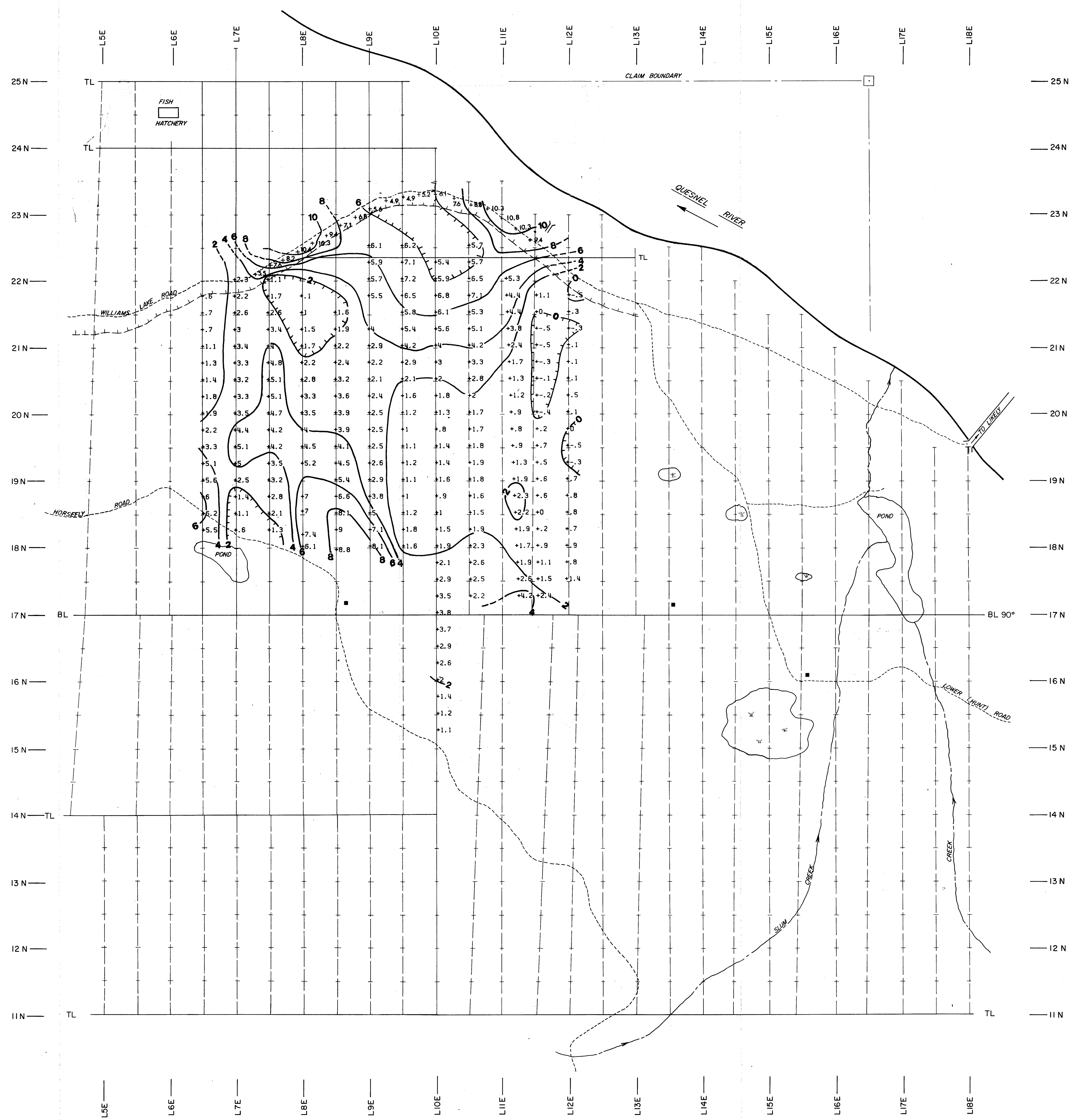
DAVE GRID
INDUCED POLARIZATION - FILTERED APPARENT RESISTIVITY

SCALE | DATE 12/85 | MADE | CHKD | APPD

No. CG 12080 | PLATE 5a | REV.



LEGEND

- CUTLINE
- FLAG/BLAZELINE
- ROAD
- ADIT
- BUILDING
- TOP OF SCARP
- 1.2 CHARGEABILITY ms

100 75 50 25 0 50 100 150 200 METRES

SCALE: (1:2500)

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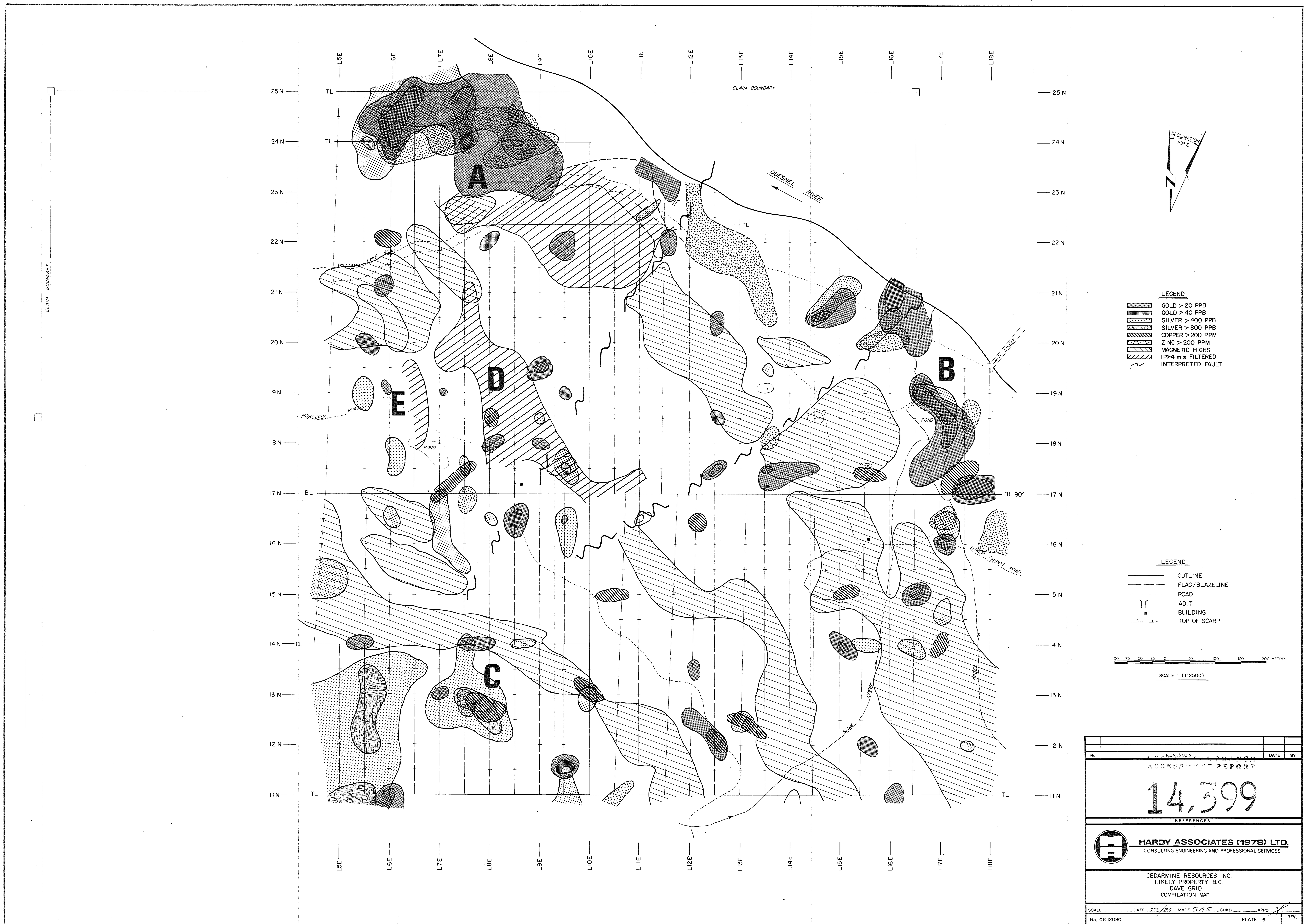
DAVE GRID
INDUCED POLARIZATION : FILTERED APPARENT CHARGEABILITY

SCALE ____ DATE 12/85 MADE ____ CHKD ____ APPD. L.T.S.

No. CG 12080 PLATE 5b REV.


L5E L6E L7E L8E L9E L10E L11E L12E L13E L14E L15E L16E L17E L18E
25 N
24 N
23 N
22 N
21 N
20 N
19 N
18 N
17 N
16 N
15 N
14 N
13 N
12 N
11 N
TL
BL
BL 90°
CLAIM BOUNDARY
QUESNEL RIVER
DECLINATION 23° E
N
WILLIAMS LAKE ROAD
HORSEFLY ROAD
LOWER (HUNT) ROAD
TO LIKELY
POND
SLIM CREEK
CREEK
A
B
C
D
E
LEGEND
GOLD > 20 PPB
GOLD > 40 PPB
SILVER > 400 PPB
SILVER > 800 PPB
COPPER > 200 PPM
ZINC > 200 PPM
MAGNETIC HIGHS
IP>4 m s FILTERED
INTERPRETED FAULT
LEGEND
CUTLINE
FLAG/BLAZELINE
ROAD
ADIT
BUILDING
TOP OF SCARP
100 75 50 25 0 50 100 150 200 METRES
SCALE : (1:2500)
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DAVE GRID
COMPILATION MAP
SCALE
DATE 12/85
MADE SAS
CHKD
APPD.
No. CG 12080
PLATE 6
REV.