PROGRESS REPORT FOR 1977

MEAGER CREEK GEOTHERMAL PROJECT

INVESTIGATIONS FOR 1977-1978

Prepared on behalf of

THE BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

Alternative Energy Studies

Stage Four of Geological and Geophysical Work toward Discovery of Geothermal Steam in the Lower Mainland of British Columbia

November 30, 1978

NEVIN | SADLIER-BROWN | GOODBRAND | LTD

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November 30, 1978

Mr. Josef Stauder, P.Eng.
Generation Planning Department
B.C. Hydro and Power Authority
24th Floor
555 West Hastings Street
Vancouver, B.C.

Dear Sir:

We are pleased to enclose a progress report on the 1977 phase of the 1977 and 1978 geothermal investigations at Meager Creek

The project met our expectations in that the multiple pole-pole resistivity method was successfully developed and tested, and that the survey indicates the presence of highly conductive rock underlying four square kilometres of the Lillooet River valley at Pebble Creek. Certain boundaries and internal features of this mass can be discerned and it is interpreted as a possible extension of the Pebble Creek hot spring reservoir about seven kilometres to the northwest.

The geophysical data developed in 1977 and summarized herein will be merged with the adjoining 1978 data and the whole analyzed in a final 1977-8 report to follow.

Thank you for the opportunity to have been of service to B.C. Hydro.

Very truly yours

NEVIN SADLIER-BROWN GOODBRAND LTD.

T.L. Sadlier-Brown

TLSB/hm

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1.0 INTRODUCTION

1.1 Terms of Reference

The 1977 geothermal investigation at Meager Creek was a continuation of an alternate energy study begun in 1973, which has employed successively more detailed mineral exploration methods to our objective of discovering commercial geothermal steam at the site. The program for 1977 called for geophysical work, bulldozing, scientific and operations support, geological work, and a minor amount of drilling. The site of this work was to be the north-eastern part of the volcanic complex, where preliminary work in 1974 and 1976 had suggested the presence of a previously unknown part of the subsurface geothermal reservoir.

1.2 Scope of this Report

We are reporting only that part of the investigation performed in 1977, of which the largest component is the electrical resistivity survey. Prior work is reviewed to the extent necessary to fit 1977's work into context. Previous reports, those submitted to B.C. Hydro by our firm, and those published by the Department of Energy, Mines and Resources, are listed in Appendix A and should be consulted for details.

Shortly after B.C. Hydro's approval in May 1978 of a draft of this report, the 1978 field work was underway and additional geophysical data were being processed in the field on a daily basis. We requested and received approval from B.C. Hydro to abridge the 1977 report, and to merge the 1977 data with that of 1978 and report on the whole in early 1979.

1.3 Review of Prior Work

1.3.1 Work Performed by British Columbia Hydro and Power Authority

The Meager Creek geothermal area is located 70 kilometres northwest of Pemberton, B.C., and includes about 400 square kilometres centred on latitude 50° 37'N and longitude 123° 30'W, on NTS map sheets 92J/11 and 12.

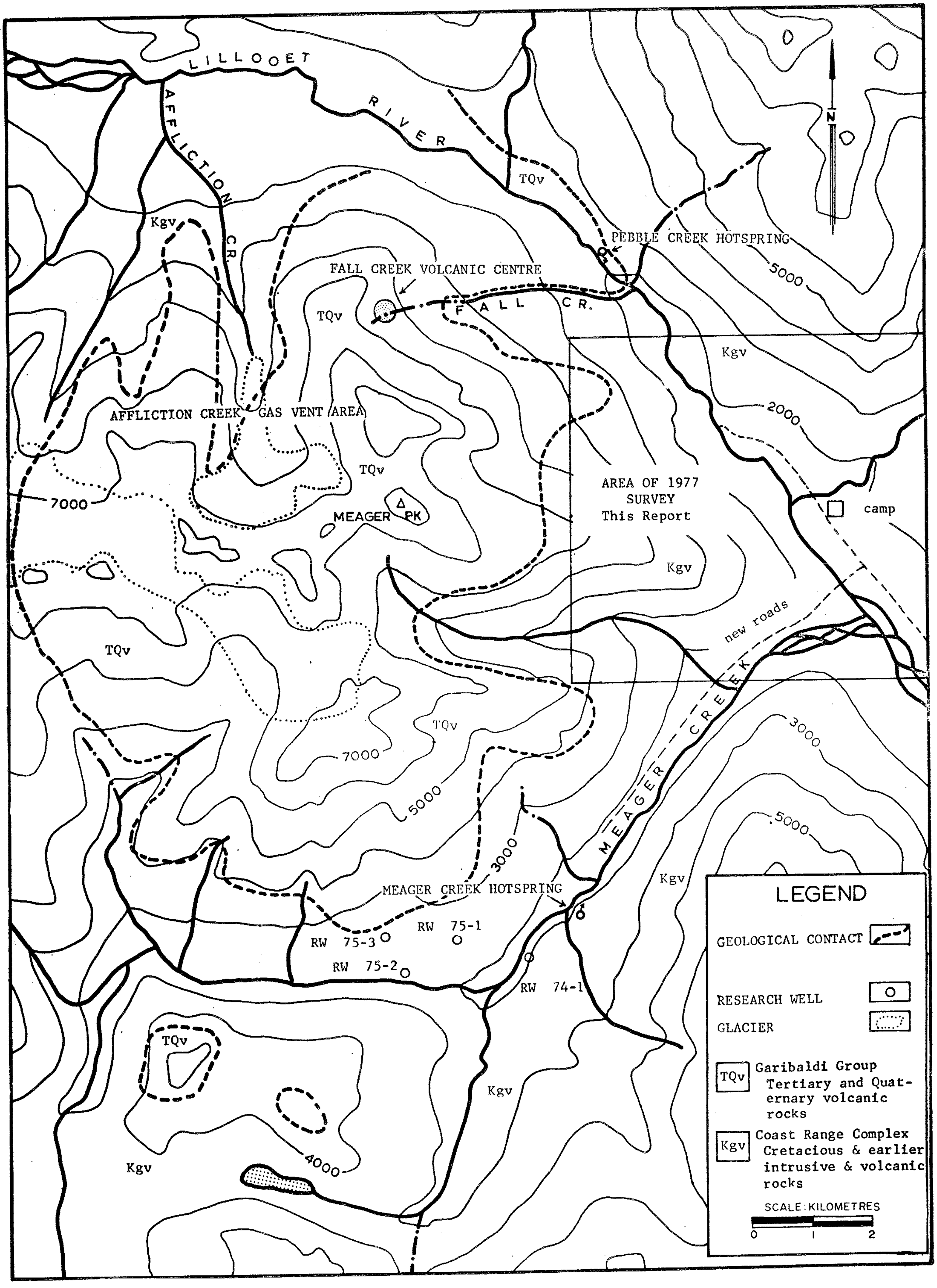
B.C. Hydro's rights to the geothermal energy were conveyed by the Geothermal Resources Act of 1973, retaining resources greater than 250°F (121°C) for the Crown; and protection from nuisance mineral and placer claimants was obtained by Order in Council 1539, approved May 1, 1975, withdrawing until 1980 a large tract of probable geothermal interest.

The area centres on a large central volcano. Reconnaissance surveys in 1974 identified an area south of the volcanic complex and west of the main Meager Creek hot springs as the location of a geothermal reservoir (see location map). Subsequently, detailed resistivity surveys having deeper penetration were completed in the area and four research wells, 74-H-1, and 75-H-1, -2, and -3 were drilled to depths ranging from 60 to 350 metres. The reservoir identified appears to lie within 1000 metres of the surface and to incline downward to the north, under the Meager volcanic complex. The western, southern and eastern limits of the reservoir are known or inferred, and it is "open" to the north.

In 1976 a low resolution geophysical method, self-potential, was used in the area to the north and northeast of the volcanic complex to follow up a subtle anomaly from the 1974 survey. The 1976 work ranged some distance up and down the Lillooet River valley from the Pebble Creek hot springs. Results implied that geothermal fluids were ascending close to the surface in several places, and provided the incentive for deeper geophysical penetration.

1.3.2 Work Completed by the Dept. of Energy, Mines and Resources

The Geological Survey of Canada and the Earth Physics Branch, both agencies of the Department of Energy, Mines and Resources, have also been active in the Meager Creek area since 1973. Work compiled and previously reported by EMR personnel or contractors have included a micro-earthquake study, two scales of geological mapping, two shallow drill holes in the vicinity of the Meager Creek hot spring, magnetotelluric surveys, and some geochemical work, EMR, in its capacity as a research organization, has continued to be active during the past year, and this work is reviewed in Section 2.6.



LILLOOET RIVER
AFFLICTION CR
TQv
Kgv
PEBBLE CREEK HOTSPRING
FALL CREEK VOLCANIC CENTRE
FALL CR.
5000
2000
AFFLICTION CREEK GAS VENT AREA
7000
MEAGER PK
AREA OF 1977
SURVEY
This Report
camp
new roads
MEAGER CREEK
3000
MEAGER CREEK HOTSPRING
RW 75-1
RW 75-3
RW 75-2
RW 74-1
4000
N
LEGEND
GEOLOGICAL CONTACT
RESEARCH WELL
GLACIER
Garibaldi Group
Tertiary and Quaternary volcanic rocks
Coast Range Complex
Cretacious & earlier intrusive & volcanic rocks
SCALE: KILOMETRES
0
1
2

1.3.3 Prior Conclusions

The geologists, geophysicists and engineers familiar with the Meager Creek volcanic and geothermal system have agreed that it is an attractive target for future commercial power development. It is a system which clearly warrants several deep exploratory wells, and work has been continued with the objective of identifying the most favourable sites for exploratory drilling within the 700 square kilometre area.

1.4 Organization of this Report

The text which follows is divided into major sections. These describe the work performed in 1977 (Section 2.0), and then present two sets of conclusions, the scientific conclusions (Section 3.0), or those conclusions which relate to the physical properties of the subsurface, and exploratory conclusions (Section 4.0), which evaluate and comment upon methods used in 1977 and under consideration for future work.

The appendices include certain equipment specifications and survey procedures.

Summary resistivity information obtained in 1977 is presented as a series of drawings (Maps and Sections A through C). The Set A drawings include index maps and four plan projections of resistivity values at different depths beneath the ground, specifically to 500 metres, 500 to 1000 metres, 1000 to 2000 metres, and below 2000 metres. The convention used for indicating the magnitude of the resistivity value is a 6 pointed asterisk, drawn by a computer-controlled plotter. The size of each asterisk is inversely proportional to the value. Thus the bigger the star, the lower the resistivity value.

Sets B and C are vertical projections made along slices 500 metres wide: Set B is three pseudosections which run north-south and are indexed along their centre lines from 470500E through 471500E; and Sec C is four sections running east-west and indexed from 560800N through 5609500N. The same symbol is used in these cross sections.

The values shown are raw data, or apparent resistivities. Only a representative sketch of the method of interpretation is presented (Appendix B.4).

One of the properties measured was the anisotropy of the apparent resistivity measurements. This type of data is new and unique to this survey method. It promises several advantages over conventional surveys, but it is vexing to interpret. A summary is made in the section on scientific conclusions, however, the final interpretation will be made in the report on 1977-1978 work using methods developed for that purpose.

2.0 WORK PERFORMED IN 1977

2.1 Field Operations

As in previous years the base for field work was provided by a tent camp at the site. The camp was installed on July 26 and continuously manned and operated through October 17, when it was demobilized and all portable equipment removed. For the first time the camp had road access. Squamish Mills had extended a logging road up the northeast bank of the Lillooet River to Pebble Creek, and CRB Logging, in cooperation with others, bridged the Lillooet River, just above the confluence with Meager Creek, and extended a logging road up the north bank of Meager Creek to a point two kilometres past the hot spring. Our project extended a four-wheel drive road, about three kilometres north of Pebble Creek for geophysical access.

Seven people made up the nucleus of the field crew, with specialists or extra labour from time-to-time. The geophysical camp boarded others working in the area, including several EMR field parties and some personnel of a logging company, on a cost-recovery basis.

2.2 Resistivity Survey

Resistivity was the major component of the work, and was conducted in three stages. Deep Grid Analysis (1977) Limited provided the technical direction and equipment for this work.

2.2.1 Development and Testing of Method

The contractor undertook research and development of a multiple pole-pole array configuration designed to: a) increase survey penetration, b) permit multidirectional data acquisition for anisotropy analysis, c) permit placement of measurement arrays over a much wider area of the very steep terrain.

Research and development consisted of mathematical and laboratory three-dimensional physical modelling of geoelectric conditions typical of a geothermal area. Using the model, development and testing of instrumentation and programming suitable for Meager Creek was completed. Operational and logistical requirements and equipment were specified.

The array configuration, instrumentation and programming were tested and evaluated on-site during the first part of the field program, and adjustments to instrumentation and programming were made in response to first field observations with the new system.

2.2.2 Operation of Resistivity Survey

The location map shows the area studied in 1977. Most measurements lie in the Lillooet River valley to the northwest of the mouth of Meager Creek. A total of 554 resistivity measurements were made, effectively covering an area of 4 square kilometres to a depth of 3000 metres below the surface with irregularly spaced data.

2.2.3 Data Analysis

A graphic data display method was selected and makes up the bulk of this report. Interpretation of data in the geological context was performed in the time-honoured subjective manner of inspecting the individual values of 'apparent resistivity' and contrasts between groups of values, and then hand contouring these in various vertical pseudosectional slices and horizontal projections.

One task not yet completed is to devise a statistically and geologically sound method to convert these unevenly-spaced data to an easy-to-read graphic display, without sacrificing detail.

2.3 River Probing

The self-potential data from the Lillooet River valley, as well as experience in geothermal exploration elsewhere in western Canada, suggested that many hot springs are undiscovered and unrecorded because they flow upwards into the bottoms of rivers or lakes. A probe was designed and constructed having a sensitive thermistor mounted in a perforated tip at the base of a 10 foot aluminum rod, with a digital readout in front of the operator. The probe was checked in a survey downstream from the hot spring in Meager Creek and then applied to a survey of parts of the bottom of the Lillooet River.

2.4 Preliminary Reservoir Model

A three dimensional plywood and fibreboard model of the volcanic complex was constructed at a scale of 1:20,000. Generalized geologic and geophysical data were posted on the model as they were developed.

2.5 Design Considerations for Exploratory Wells (1979)

Since deep drilling equipment is often scheduled a year or more in advance, and since deep drilling in general is costly, we retained Sproule Associates Ltd., Calgary, Alberta, to provide preliminary advice on design considerations for exploratory wells. Their terms of reference were to assume the year 1979 for drilling one or more 2000-metre wells and to consider both heavy oil field equipment and lighter diamond drilling equipment for this project. Mr. Douglas Bietz, P. Eng., visited the project, a local diamond drill manufacturer, and a local contractor in order to make this assessment.

2.6 EMR Work Completed 1977

Energy, Mines and Resources were active on several fronts. They tested a low frequency electromagnetic unit being developed under contract by Geoprobe Ltd., of Don Mills, Ontario, in the area. They contracted a continuing magnetotelluric survey to Mineral Exploration Research Institute of Montreal, and a shallow seismic survey to Geotronics Ltd. of Vancouver. Dr. Peter B. Read, of Geotec Consultants Ltd., Vancouver, who had begun geologic mapping in 1976 in the volcanic rocks, continued in 1977 in the prevolcanic crystalline basement rocks.

Under contract to EMR, Connors Drilling of Vancouver, drilled one 213-metre diamond drill hole immediately east of the volcanic complex in order to measure the geothermal gradient and heat flow in a dry portion of the crystalline rock. As part of their overall research program they drilled a similar hole half way between Meager Creek and Pemberton, and two more such holes 60 kilometres to the south, near the Mt. Cayley volcanic system. Mr. Fred Michael of the University of Waterloo, was contracted to study the isotope chemistry of the hot spring waters at Meager and Pebble Creek.

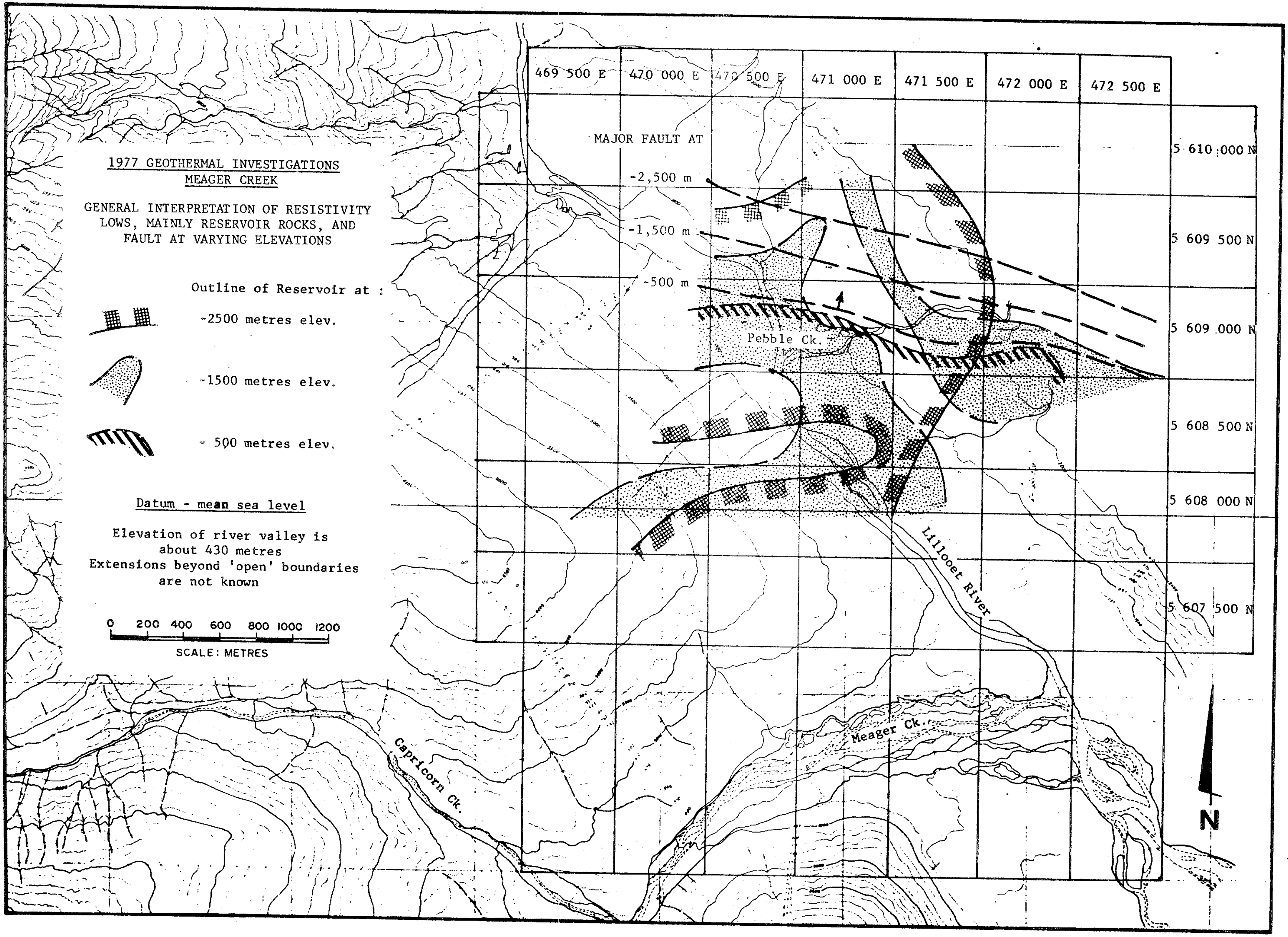
3.0 SCIENTIFIC CONCLUSIONS

3.1 Reservoir Configuration

3.1.1 New Resistivity Lows

At the start of the 1977 work the only available information on the northeast flank of the volcanic complex was the scattered 1974 resistivity data, the 1976 self-potential data, and the results of seven shallow Schumberger depth soundings. These data permitted, but did not clearly indicate nor define a subsurface geothermal reservoir. Two of the mitigating features were the presence of low resistivity river gravels and the scattered occurrence of pyrite, a conductive mineral where disseminated in small quantities throughout a rock body, in some of the adjacent outcrops. These factors are still present, but the systematically accumulated data of 1977 permit the positive distinction between those resisitivity lows which derive from water-saturated, near-surface gravel and clay deposits, and those which derive from the deeper geothermal reservoir. Similarly, although not as positively, intrepretation is able to discount certain parts of the anomalously low resisitivity response which may derive from disseminated pyrite.

The composite resitivity anomaly drawing which follows shows the newly interpreted boundaries of the geothermal reservoir at three elevations: 500, 1500, and 2500 metres below sea level. Since the surface at the river valley is about 430 metres in elevation, the respective depths are about 1000, 2000, and 3000 metres, which is consistent with the precision of the method. At the uppermost selected elevation only the northern boundary of the geothermal reservoir is known. It coincides with the projected trace of a large and persistent fault. The fault strikes northwest at an azimuth of about 340 degrees and is inferred to dip steeply, say 70°, to the north. This fault has been interpreted from the resistivity data, where it appeared as a persistent discontinuity between high resistivity values to the north and lower resistivity values to the south. The data points at -500 metres elevation do not continue much more than


1977 GEOTHERMAL INVESTIGATIONS
MEAGER CREEK
GENERAL INTERPRETATION OF RESISTIVITY LOWS, MAINLY RESERVOIR ROCKS, AND FAULT AT VARYING ELEVATIONS
Outline of Reservoir at :
-2500 metres elev.
-1500 metres elev.
- 500 metres elev.
Datum - mean sea level
Elevation of river valley is about 430 metres
Extensions beyond 'open' boundaries are not known
0 200 400 600 800 1000 1200
SCALE: METRES
469 500 E
470 000 E
470 500 E
471 000 E
471 500 E
472 000 E
472 500 E
5 610 000 N
5 609 500 N
5 609 000 N
5 608 500 N
5 608 000 N
5 607 500 N
MAJOR FAULT AT
-2,500 m
-1,500 m
-500 m
Pebble Ck.
Lillooet River
Meager Ck.
Capricorn Ck.
N

one kilometre to the south, and our interpretation is that the possible reservoir persists to that point. Similarly it is open to the east and to the west.

The second elevation, -1500 metres, contains two recognizable low resistivity bodies separated by a consistent high resistivity zone. Two arms, one from each zone, extend northward across the discontinuity which limits the north edge of the possible reservoir at higher elevations. In general however, the fault appears to limit the reservoir on its north side for much of its length. Each zone is open at two ends, with the longest open boundaries being on the southeast, south and the west.

The values for apparent resistivity which define the southernmost known extent of the reservoir at this elevation are to be regarded with suspicion until confirmed by future work. It is at this elevation and location where the data are derived from one particular set of electrodes which were inadvertently placed in extraordinarily conductive overburden. We suspect that this extremely high conductivity may have influenced the readings far beyond the normal influence of conductive overburden. In addition, the path of the current lies through an area of known pyrite disseminations in the rock. Therefore, while the data are not discounted entirely, they are viewed with skepticism in this part of the interpreted reservoir.

The deepest level interpreted, 2500 metres below sea level or about 3000 metres below the surface, is based on data which have less intrinsic resolution, owing to the physics inherent in the method. As penetration becomes deeper the measurements are averaged through a greater volume of surrounding rock. The reservoir at this level is interpreted to be one large area, with a distinct boundary on the east, a fragment of a boundary to the northwest, more or less coinciding with the projected fault at that elevation, and a re-entrant boundary in the southwestern portion, which coincides with a re-entrant at the higher elevation. As with the 1500 metre level, we tend to discount slightly the extreme southwestern portion of the deeper interpreted reservoir.

3.1.2 Interconnections Between Reservoirs

Since a geothermal reservoir of unknown size and shape is known to produce the hot spring at Pebble Creek, five kilometres northwest of the resistivity data described here, the open western edge of all three levels of the reservoir is of interest. A reinterpretation of the 1974 and 1976 geophysical data in light of the new information suggests that the reservoir may extend from the present survey area a distance of about five kilometres up the Lillooet River, with periodic cupolas along the zone reaching up to within 500 metres of the surface. It appears at this time that the possible reservoir partially outlined by this work may be connected with the Pebble Creek hot spring reservoir.

At one point we suspected that the Pebble Creek and the Meager Creek reservoirs were interconnected. Two recent studies sponsored by the Geological Survey of Canada, provide evidence that the two systems are distinct and are not interconnected. The first of these, a study of chemical equilibria among the dissolved constituents in the thermal waters, by Hammerstrom and Brown, concluded that it would be incompatible with the known chemistry for the Meager Creek waters, which are dilute sodium chloride brines, and the sodium-bicarbonate Pebble Creek waters to have originated from the same source. The second study, which is currently in progress by Mr. Michael, of the University of Waterloo, is based upon the isotopes of carbon, oxygen, hydrogen, and sulphur. Pending conclusion of this work Mr. Michael believes that the two systems carry very distinct isotopic fingerprints, which are incompatible with a common source. A tentative conclusion is that one volcanic system is providing the heat to drive two independent ground water convection cells, one on the north flank and the other on the south flank.

3.2 Geological Causes and Controls

3.2.1 Northward Progression of Volcanism

Geological work conducted in 1976 by Dr. Read established that the initial volcanic eruptions took place in the vicinity of what is now the southern border of the volcanic pile, not far from the 1975 research wells, and progressed in four main stages northward a distance of about 8 kilometres, the last eruptions occurring from the mountain slope facing the Pebble Creek hot spring. More recent follow-up work by Dr. Read, which is unpublished to date, indicates that the bulk of the volcanism took place less than one million years ago. It has been known for some time that the volcanism was continuing as recently as 2000 years ago. The northward progression of ages of volcanism implies that the strongest thermal source, a cooling lava pipe, may lie under the north edge of the volcanic complex, that is, closely subjacent of the Pebble Creek hot spring.

3.2.2 Regional Thermal Regime

The Geological Survey research diamond drill hole, numbered 303-1 was located about 1 kilometre east of the camp site on Pebble Creek. This hole was collared in dry crystalline rock purposely, to obtain a temperature gradient away from the influence of circulating water, either cold or hot. The gradient measured in that hole, to a total depth of 213 metres, is about twice the normal world mean gradient of 25°C per kilometre. Similarly three other wells, one located 19 kilometres farther down the Lillooet River and two about 6 kilometres west of Mt. Cayley, a central volcano west of Squamish, all produced gradients in the same range. The commercial significance of this is that this region is now identified as overlying a broad thermal area in the earth's crust or subcrust, and deeply penetrating faults, as well as the flanks of recent volcanoes, may host prospective commercial geothermal systems.

3.2.3 Permeabilities in Fracture Reservoir System

Previous reports have been concerned with the size and shape of parts of the reservoir, and we have not discussed the possible inner "plumbing" of the reservoir at length. Porosity is the amount of void space within a rock, suitable for occupation by water, gas, oil, or steam. Permeability is the measure of flow through a rock body, a property determined by porosity and the degree of interconnection of pore spaces.

Some geothermal fields produce from subhorizontal beds having inherent and somewhat uniform porosities and permeabilities. A growing proportion are found to produce from fracture reservoirs in rocks of very low inherent porosity.

There is a certain geological order in the distribution of fracture and fault systems. All are internal strain effects owing their origins to the mechanical properties of the rocks and the stresses imposed since emplacement of the rocks. For practical exploration purposes, however, the most permeable zones are interconnected open conduits in the fracture systems; and the distribution of these conduits might look like a large, disordered heat exchanger, designed by Rube Goldberg.

The rocks in the subsurface of the 1977 work area are septa of older metamorphics -- argillite and greenstone -- and a late Mesozoic granitic rock -- a quartz diorite. The distribution of these rocks, as mapped by Dr. Read, is shown on the drawing following, along with our interpretation of the orientations of some faults in the region.

The 1977 resistivity method was designed to provide information on the orientations of subsurface fracture systems, following an earlier method tried by George Risk on the Broadlands geothermal field in New Zealand. Each reading (which measures a volume of rock in the subsurface) is made by shooting and receiving the current at a given compass orientation through the mass. If the rock mass is homogenous, the apparent resistivities from different current orientations will be the same; if the mass is not, the conductivity will be higher in one or more directions, a property called anisotropy. Generally, the higher conductivity (lower resistivity) will be aligned parallel to the orientation of fluid-filled fractures, and will serve to identify these directions.

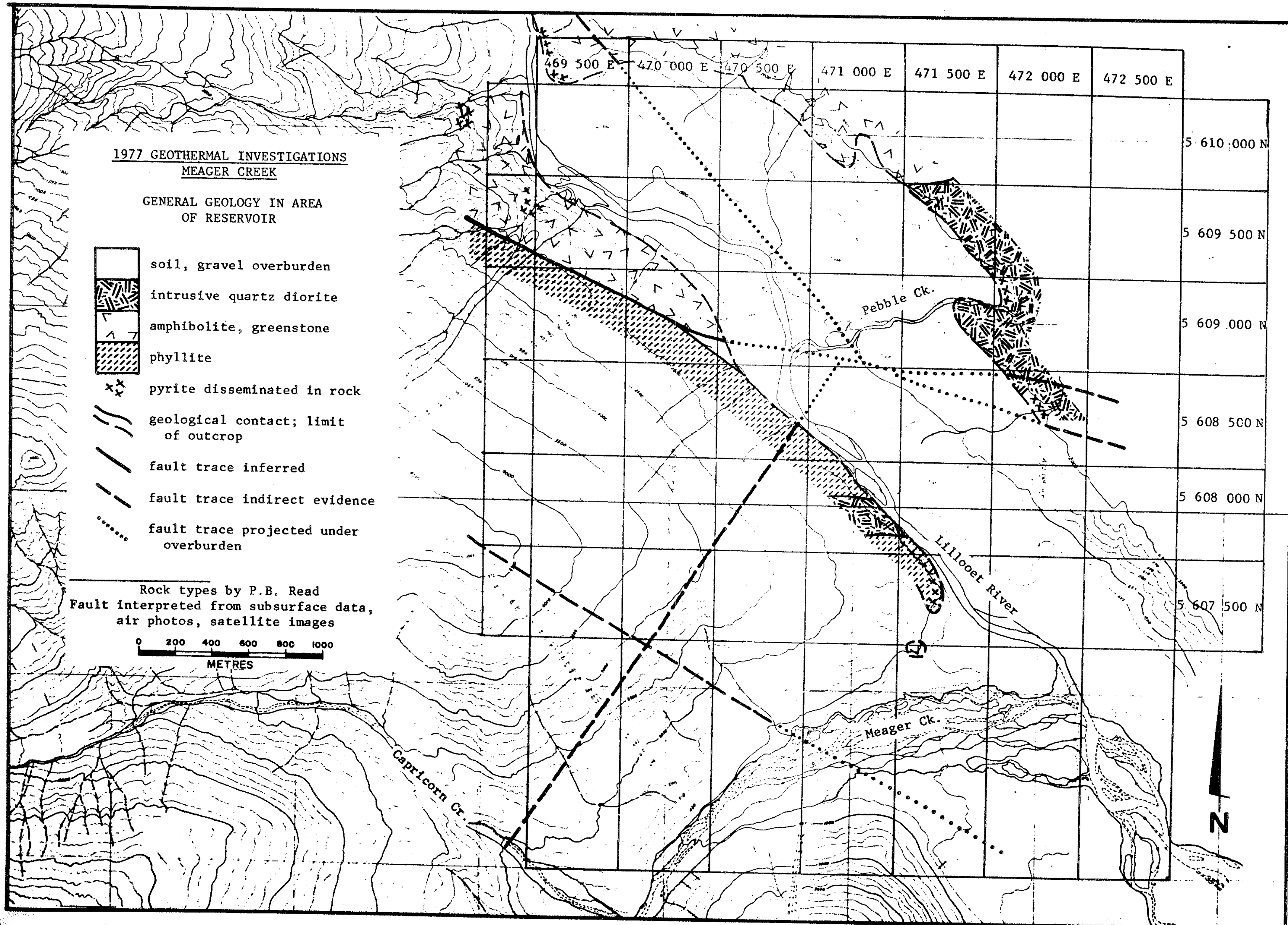
The second following drawing shows a subjective analysis of the dominant current direction (direction of highest conductivity), where coincident data from several directions were obtained. The compass was arbitrarily divided into four "half quadrants" (0-045, 045-090, 090-135, and 135-180; and their opposites 180-225, etc.), and each was compared to its right-angle counterpart, and then all others.

The net fabric seems to be about 157/337* in the deeper parts of the reservoir (-2500 metres elevation), with a very strong orientation in that band at 8500N, between 471000E and 472300E. In the middle of that zone is a small, but strong, resistivity high for 090/270 currents.

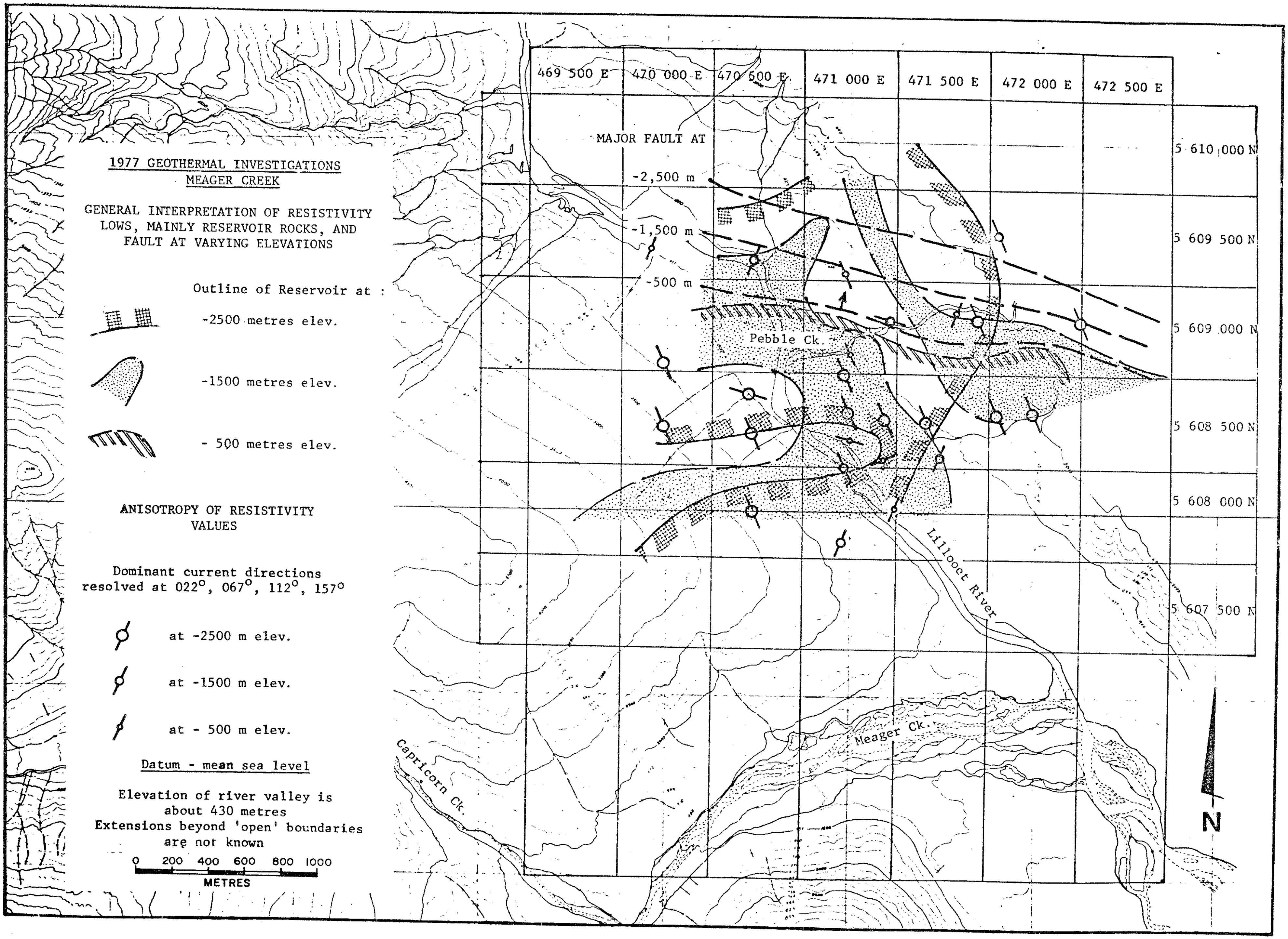
At -1500 metres elevation, some dominant current directions follow the above-noted NNW trend, but others trend NNE, the net effect being north. One value, in the inferred fault zone, trends WNW, parallel to the fault.

The values at -500 metres elevation trend north near the inferred fault, and have scattered orientations south of the fault.

* The centre-orientation of 0-045 is 022 or NNE; of 045-90 is 067 or ENE; etc. Each vector is equivalent in the opposite direction as well, so 022 implies 202 (NNE/SSW), 067 implies 247 (ENE/WSW), etc.



1977 GEOTHERMAL INVESTIGATIONS
MEAGER CREEK
GENERAL GEOLOGY IN AREA OF RESERVOIR
soil, gravel overburden
intrusive quartz diorite
amphibolite, greenstone
phyllite
pyrite disseminated in rock
geological contact; limit of outcrop
fault trace inferred
fault trace indirect evidence
fault trace projected under overburden
Rock types by P.B. Read
Fault interpreted from subsurface data, air photos, satellite images
0 200 400 600 800 1000
METRES
469 500 E
470 000 E
470 500 E
471 000 E
471 500 E
472 000 E
472 500 E
5 610 000 N
5 609 500 N
5 609 000 N
5 608 500 N
5 608 000 N
5 607 500 N
Pebble Ck.
Lillooet River
Meager Ck.
Capricorn Cr.
N


1977 GEOTHERMAL INVESTIGATIONS
MEAGER CREEK
GENERAL INTERPRETATION OF RESISTIVITY LOWS, MAINLY RESERVOIR ROCKS, AND FAULT AT VARYING ELEVATIONS
Outline of Reservoir at :
-2500 metres elev.
-1500 metres elev.
- 500 metres elev.
ANISOTROPY OF RESISTIVITY VALUES
Dominant current directions resolved at 022°, 067°, 112°, 157°
at -2500 m elev.
at -1500 m elev.
at - 500 m elev.
Datum - mean sea level
Elevation of river valley is about 430 metres
Extensions beyond 'open' boundaries are not known
0 200 400 600 800 1000
METRES
MAJOR FAULT AT
-2,500 m
-1,500 m
-500 m
Pebble Ck.
Lillooet River
Meager Ck.
Capricorn Ck.
469 500 E
470 000 E
470 500 E
471 000 E
471 500 E
472 000 E
472 500 E
5 610 000 N
5 609 500 N
5 609 000 N
5 608 500 N
5 608 000 N
5 607 500 N
N

The preliminary interpretation of these data imply that south of the fault, the possible reservoir is dominated by sets of NNW-striking fractures; and that for an unknown reason, the conductivity across the inferred north boundary fault exceeds the conductivity along the fault. South of the fault the rock type is inferred to be argillite; and the geophysical data suggest it is brittle and laced with NNW-trending fractures constituting a principle component of the possible reservoir.

4.0 Exploratory Conclusions

4.1 Tentative Well Target Zones

It would be premature to drill for discovery without further and more definitive information. The zones of current interest for potential discovery well sites have two locations. The first is on the south slope of the Meager Mountain volcanic complex in the vicinity of the 1975 surveys. The second zone of interest lies in the Lillooet River valley at Pebble Creek as described in this study, and extending as much as 12 kilometres up the river.

4.2 Design Considerations for Well(s)

As noted in Section 3.2 the Meager Creek geothermal system appears to occupy reservoirs controlled by fractures in crystalline rock. The granite and associated metamorphic rocks are among the most difficult to penetrate using oil field equipment. Rates of drilling are extraordinarily slow, and could be expected to be in the range of 15-30 metres per 24- hour day in this area. The anticipated slow rate of penetration, the high level of equipment utilization at present, and the great distance from the oil fields, suggest that drilling contractors would be reluctant to make any promises of performance and that the owner of the project would have to take all of the drilling risks. The pricing of a drilling project with oil field tools would be done on an hourly or daily basis. With heavy oil field tools a camp of about 75 people would be required for one well. A period of about 4 months would be needed. The final cost of an unsuccessful plugged well to a depth of 2000-2500 metres would be in the range of $800,000 to $1.5-million, and the cost of a successful completed well would be about $200,000 more.

The discovery well, if successful, and if completed with appropriate strings of casing, wellhead valves, and testing equipment, would be ultimately suitable for production purposes. The diameter in the productive zone might be about 20 cm. This is sufficient to allow an adequate mass flow into and up the well bore.

Some geothermal operators have used a "slim hole" for exploratory purposes. A slim hole is less expensive for exploration purposes than a larger bore, however, for production purposes it has to be replaced. Diamond drilling equipment is now rated for deeper penetration than it has been in the past; 1500 metres on a routine basis, 2000 metres with special modification, and 2500 metres in some instances in North America. Such equipment is available locally and could penetrate to 2000 metres using standard bits of 9.6 cm, 7.6 cm, and 6.0 cm diameter. Our tentative estimate of the cost of such a well would be $300,000 for an unsuccessful well, and about $375,000 for a successful well, rigged up for future testing.

The diamond drill is a lighter machine, and would involve a camp of about 20 people. The expected rate of penetration would be slightly faster than that of a rotary drill, and it would be more efficient in terms of energy, man-power, and bit cost. The diamond drill would also offer some advantages in temperature and pressure logging during the drilling operation. The logging tools can be lowered through the drill string and through the face of the bit in a rather simple operation. With a rotary drill, the entire string has to be pulled in order to get a proper bottom hole temperature and pressure reading.

4.3 Areas Needing Geophysical Definition

The 1977 survey has partially defined a reservoir with two principal open ends, to the northwest and to the southwest. It is possible that the northwestern open end extends discontinually at the higher elevations and continuously at the lower elevations a distance of several kilometres to the vicinity of the Pebble Creek hot springs. The extent of the southwestern open end is not known. It may terminate against the inferred fault shown on the geological map or it may continue further up stream along Meager Creek. In any event, the spurious readings (as described in Section 3.1.1.) at the southwestern limit require checking.

The other areas needing further definition are the northward and downward extensions of the main Meager Creek reservoir, the site of the geophysical work in 1974 and 1975.

The type of definition required for these three locations is to obtain closure on the reservoir at the modest depth of 2000 metres and to identify, if possible, vertical extensions or cupolas, extending upward from the reservoir with sufficient resolution to collar an exploratory well with confidence.

4.4 Pole-Pole Multi-Electrode Resistivity Method

The new method devised by Mr. Greg Shore, of Deep Grid Analysis (1977) Limited consisted of adapting a standard pole-pole array to a layout having three new features: (1) unequal and irregular electrode spacings, (2) dozens of electrodes installed at once, and (3) the use of a Hewlett Packard 9825A computer in the field to switch and control the survey, and accept, store and process the data (as described in detail in Appendix B). The method worked well in several respects.

The strong points of the method, over standard resistivity systems in use, are its ability to penetrate deeply from a relatively short local electrode spread, its ability to accumulate a high density of information rapidly, and its acquisition of data oriented in several directions.

The method has some disadvantages, compared to conventional surveys. Some of these are peculiar to the method, and some derive simply from the newness of the method. Leading problems are:

(1) Operation is rapid, but has to be preceded by several man-days of labour in laying out electrodes and wires;

(2) It requires a very large wire inventory, not all of which is recoverable in servicable condition;

(3) Wires are often broken by logging operations;

(4) Data are unevenly spaced, and often clustered too much, while large blanks exist in the survey area;

(5) Field operations require several sophisticated electronic components, all performing in series, and when one requires servicing, the survey shuts down;

(6) Electronic data processing has not caught up to the complexity of the data, with respect to succinct displays of the five variables of each data point (x, y, z co-ordinates, apparent resistivity value, and orientation of value), or comparison of different orientations, or modelling of true resistivities from the apparent resistivities.

A modified form of the method would be considered as candidate for future geothermal exploration. Modifications would tend toward development of "ideal" placement of the multiple electrodes to result in more evenly spaced data; streamlining the wire laying and recovery; discontinuing field use of certain electronic components; and devising better interpretation programs.

4.5 River Probing Method

The river probing, to locate thermal spring discharges into the river bed, is an attractive method in concept, but did not meet expectations. The river waters, even immediately down stream from known thermal water inflows, are too cold and too turbulent to allow identification of mixed discharges on a reasonably spaced sampling grid.

4.6 Road and Site Building

Road building by the logging companies has reached the point where the area is opened up to traffic by vehicles. The southern reservoir, or the Meager Creek reservoir, is now accessible by truck with about 1 mile of road required for any forseeable drill sites. The Pebble Creek resefvoir in the Lillooet River valley is accessible at its southern extreme by good dirt road, which carried on three kilometres as a four-wheel drive trail. Approximately eight kilometres of additional road would be needed to have vehicular access to the entire reservoir area. One large bridge would be needed if the B.C. Forest Service realizes their desire to have trunk access limited to one Firest Development Road to be constructed on the southwest bank of the river.

Respectfully submitted,

NEVIN SADLIER-BROWN GOODBRAND LTD.

APPENDIX A - REFERENCES

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Nevin Sadlier-Brown Goodbrand Ltd.
1974: Report on Investigation of Geothermal Resources in Southwestern British Columbia; prepared on behalf of B.C. Hydro and Power Authority, June, Vol. 1, 70 pp., Vol. II Appendices, Vol. III Maps.

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Nevin Sadlier-Brown Goodbrand Ltd.
1977: Report on 1976 Geothermal Investigation at Meager Creek; prepared on behalf of B.C. Hydro and Power Authority, February 7, 10 pp., Appendices.

Peter B. Read
1977: Meager Creek Volcanic Complex, Southwestern British Columbia; Geol. Surv. Canada, Rept. Activities, Paper 77-1A, pp. 277-281.

George F. Risk
1976: Detection of Buried Zones of Fissured Rock in Geothermal Fields Using Resistivity Anisotropy Measurements; Proc., Second U.N. Symposium on the Development and Use of Geothermal Resources, San Francisco, 1975; U.S. Govt. Printing Office, Washington, pp. 1191 - 1198.

APPENDIX B: RESISTIVITY SURVEY

B.1 Description of Equipment

B.1.1. Survey Instrumentation

The basic resistivity instrument used at Meager Creek in 1977 consisted of a Deep Grid Analysis 40 kilowatt resistivity transmitter, and a suite of Hewlett Packard data acquisition instrumentation functioning as a programmable receiver.

The 40 kilowatt transmitter has stepless manual current control over 100% of each output voltage range, permitting maintenance of stable current levels throughout a measurement cycle.

The receiver system consisted of a Hewlett Packard (HP) 9825A computer controlling on a common interface bus the following instruments:

1. HP 3495A Scanner, through which program instructions were interfaced with the transmitter, and up to 30 input potential wires were sequentially interfaced to the system voltmeters,

2. HP 3455A Digital Voltmeter, 100 megohms input impedance, one microvolt DC resolution microprocessor programmable, self-calibrating, the main signal analyser,

3. HP 3437A System Voltmeter, less resolution, very high speed microprocessor programmable, a backup and system double-check instrument.

B.1.2 Support Instrumentation

In anticipation of telluric current variations over the 5-mile long measurement dipoles, due to summer sun-spot activity and resultant magnetic field disturbances, a Geometrics G-816 1-gamma proton precession magnetometer was set up to monitor magnetic activity and a HP 7155B chart recording voltmeter was used to provide a permanent record of telluric disturbances. These instruments were particularly important in this first field season with the computerized system since they quantitatively defined a very powerful, random variable for which accommodating programming had to be written.

B.1.3. Data Storage and Plotting Instruments

Incoming data were processed in the 9825A programming and transferred in blocks to magnetic tape cassette for storage. In-progress data quality indicators were presented continuously on the 9825A's one-line LED alphanumerics and 16 character internal thermal printer. 23-column data records were printed out in triplicate on a HP 9871A impact printer-plotter for hard-copy data security, as well as operator observation, and a continuously updated summary plot of the five components of each measurement was plotted on an HP 9872A programmable X-Y plotter under program control. This plotter was also used to draw plan and section representations of data.

B.2 Rationale for Electrode Array

Conventional dipole-dipole survey arrays, utilized widely in the relatively flat basin terrain of many western United States geothermal prospects, are of limited usefulness at Meager Creek because of their low ratios of penetration (Ze) to length (L), typically $Ze/L = 0.14$ to 0.21. Effective exploration penetration of 1 km will require a linear array length of at least 4 km, requiring placement and orientation of these and deeper arrays along lower slopes parallel to the valley floor.

The 2-pole array adapted for use at Meager provide a four-fold improvement in penetration/length ratio ($Ze/L = .87$). This reduces substantially the array orientation and positioning restraints imposed by the steep terrain, allowing effective probing to depths almost equal to array length. Some loss of vertical resolution is typical of the 2-pole array, an aspect offset by increased vertical sampling density. Incremental rotation of array orientation through 180 degrees provides data for analysis of resistivity anisotropy as a guide to interpretation of regional structures and, within a reservoir, microstructural aspects such as dominant orientation of fracturing or fissures.

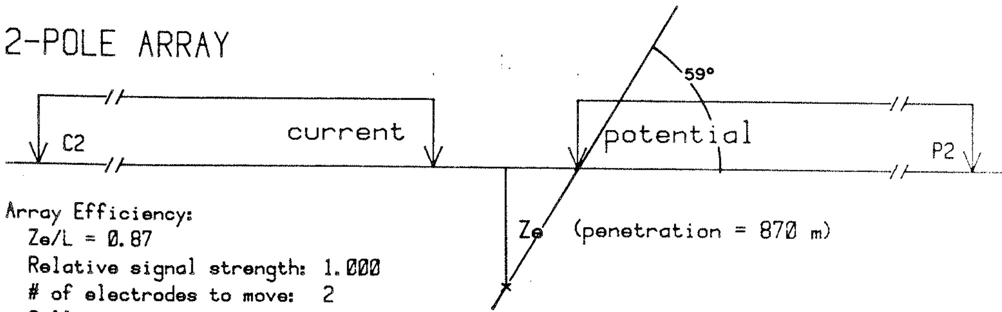
B.3 Operation of Survey

The area selected for study was pre-wired with up to 38 potential electrodes, each connected to the data system at the centrally-located main camp. A roving current electrode was set up at various positions in the area, and at each position current was passed between the local electrode and the distant reference electrode. A square wave with 100 mS delay at zero-crossing was employed at a frequency of 0.16 hertz, a long wave usually called DC. The electric field set up by the input current

COMPARATIVE ARRAY PERFORMANCE

Sections Showing Electrode Geometry for 850 Metre Penetration

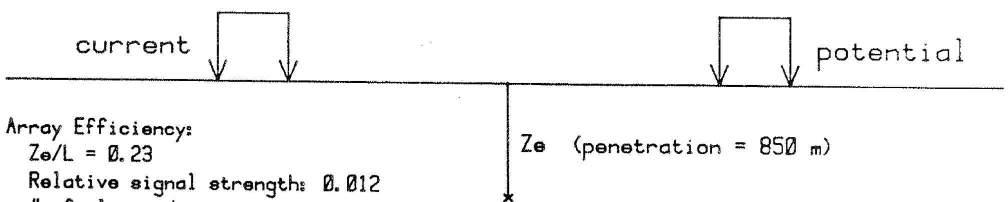
2-POLE ARRAY



Array Efficiency:
Ze/L = 0.87
Relative signal strength: 1.000
# of electrodes to move: 2
Collinearity: inherent in 2 electrode array

Highest penetration/length ratio (Ze/L).
Highest signal return.
Array layout may not need survey lines.
Simple array geometry improves interpretation accuracy.
The two reference electrodes (P2, C2) remain fixed at electrical infinity (>10L).

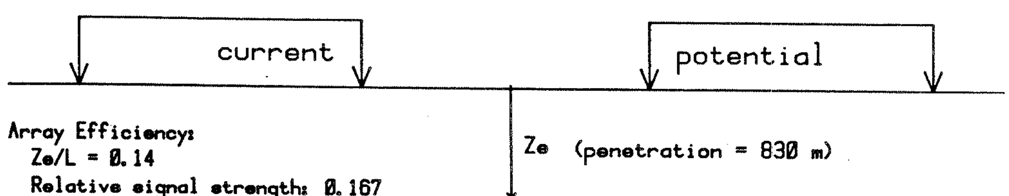
DIPOLE DIPOLE ARRAY



Array Efficiency:
Ze/L = 0.23
Relative signal strength: 0.012
# of electrodes to move: 4
Collinearity: required; survey lines used

Low signal problems at wide inter-dipole spacings.
Increased handling difficulties when dipoles enlarged to improve signal, as below.
Low Ze/L.

DIPOLE DIPOLE ARRAY



Array Efficiency:
Ze/L = 0.14
Relative signal strength: 0.167
# of electrodes to move: 4
Collinearity: required; survey lines used

Improved signal, but requires movement of very long wires for each reading.
Lowest Ze/L.

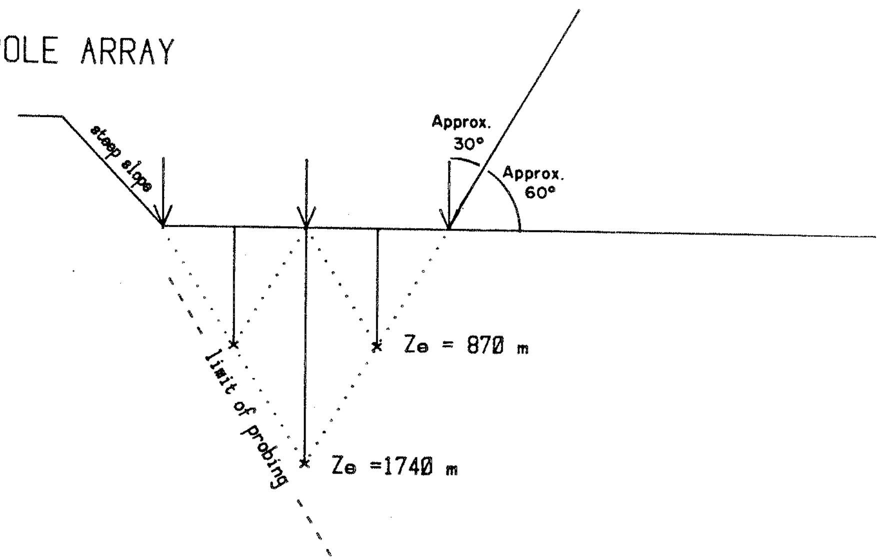
kilometres

ARRAY PERFORMANCE IN MEAGER AREA TOPOGRAPHY

Sections Showing Electrode Geometry for 850 and 1700 m Penetration

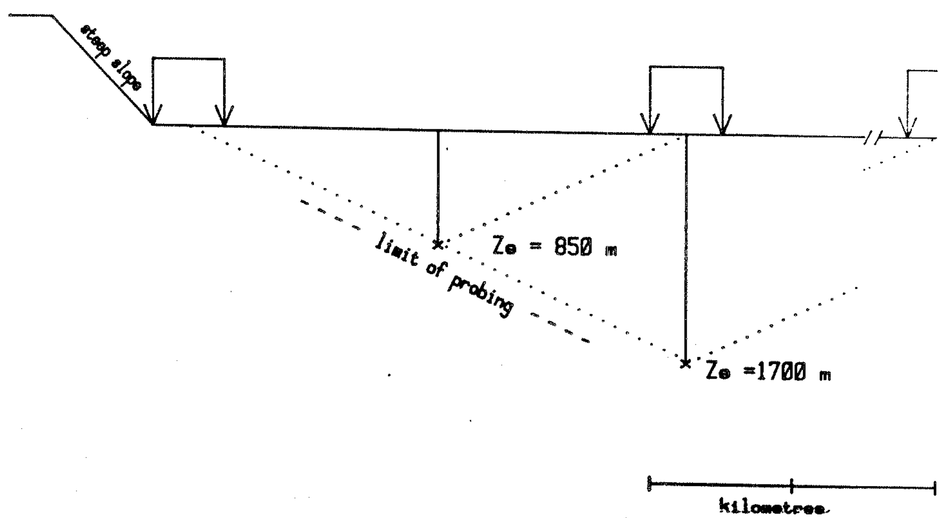
Effect on data gathering of physical obstruction to array layout.

2-POLE ARRAY



Probing to 1.7 km depth is effective
up to 1 km from the physical obstruction.

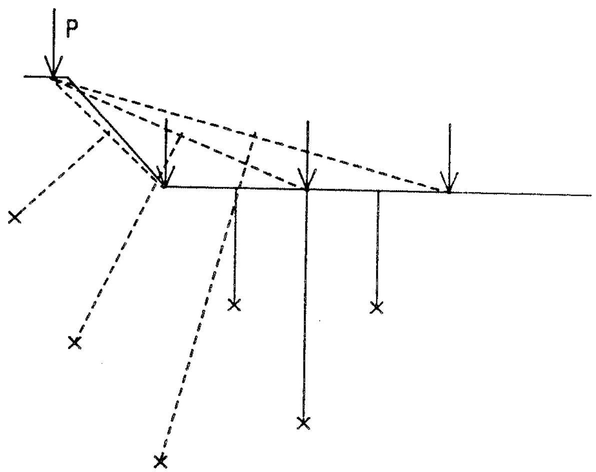
DIPOLE DIPOLE ARRAY



Probing to 1.7 km depth is effective
only up to 4 km from the physical obstruction.

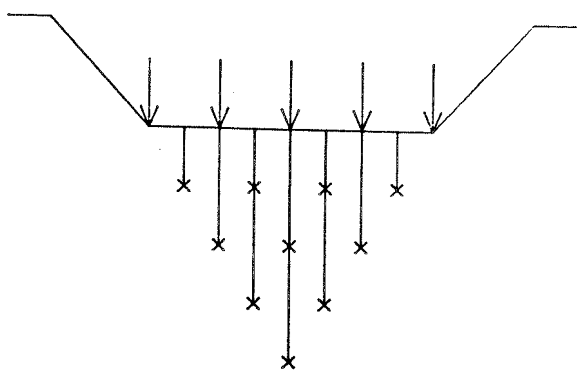
ARRAY PERFORMANCE IN MEAGER AREA TOPOGRAPHY, continued

2-POLE ARRAY



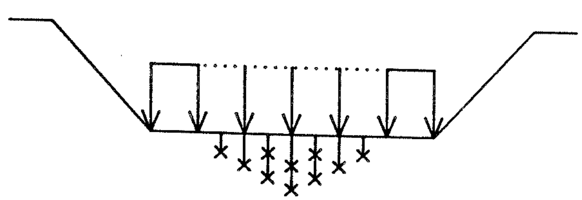
Additional information may be obtained by placing a single potential electrode (P) up the slope and measuring from the electrodes in the valley.

2-POLE ARRAY



The 2-pole array and dipole dipole array at maximum penetration in a restricted 2 km wide valley. The superior Ze/L characteristics of the 2-pole array are evident.

DIPOLE DIPOLE ARRAY



was sampled at each potential electrode in turn, and the measurement data for the active electrode were recorded in memory, which already had the stored position coordinates (easting, northing, and elevation) for each.

Each placement of a current electrode yielded up to 30 2-pole measurements in sequence: installation of a large number of current electrodes over the whole area of interest yielded 554 measurements in all, representing a wide variety of depths, lateral locations and current directions.

For each reading the apparent resistivity (Ra), in ohm-metres, was calculated according to the standard pole-pole formula:

$$Ra = 2 \pi a \, Vp \, / \, Ig$$

where a = electrode spacing in metres, Vp = measured potential in volts, and Ig = current output of transmitter in amperes.

The centre-point for plotting purposes lies on the downward-extending normal,in the vertical plane, drawn from the midpoint of a line between the active potential and current electrode positions, and at a distance along the normal equal to the true distance between the electrodes.

Thus the end product of each reading has five components: an apparent resistivity value, an orientation for the value, and north, east, and elevation coordinates.

Computed data were printed out on an impact printer for operator review as required. A comprehensive summary plot of all accumulated data was maintained on an X-Y plotter, allowing the operator to see the developing data picture in terms of apparent resistivity values distributed in three dimensions, with indication of current direction. Apparent ambiguities or incompletely defined data areas were identified and field electrode crews directed by radio to set up appropriate detailing positions.

The potential electrodes used were non-stainless steel rods (Stelco Superior Ground Rod, 110,000 PSI tensile), 1 metre by 1.2 or 1.5 cm diameter, installed without addition of water or chemicals. They proved stable and effectively non-polarizing after being allowed to equilibrate in position for an hour.

B.4 Interpretation of Data

The following annotated and contoured printout of pseudosection 470500E shows the type of interpretation undertaken. The low resisitivity river gravels and clays form the classic inverted "V" pattern to a depth of about 500 m. The near-vertical or north-dipping discontinuity between high values to the north and low values to the south is interpreted as a fault, and is persistent on all pseudosections.

Spurious readings in the lower left are contoured, but discounted somewhat in the final analysis.

The resistivity low, coming in at -2500 m elevation is bordered on the west by a linear, steep high -- an unknown structure -- and above and to the north by another high -- a large impermeable block (?) within the reservoir.

The directional components of resistivity were interpreted for the time being by inspecting clusters of points on the same pseudosections, especially comparing the 0 - 045 vs. the 090 - 135, and the 045 - 090 vs. the 135 - 180 currents. Where data in two or more "half-quadrant" azimuths coincide in position, and where one set was dominant in lower resistivity values, this dominant orientation was noted.

In compiling these interpreted data onto maps, the 500 m width of the sections had to be considered, as well as the duplication of data on both the E and N sections. Some sections provide clearer views of a phenomenon also noted on others, and took precedence. All-in-all, interpretation and construction of the reservoir plan map was a [illegible] and is subject to future revision.

APPARENT RESISTIVITY PSEUDOSECTION PLOT

Pole-Pole Array

VARIABLE CURRENT DIRECTION

LINE 470500E

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO AND POWER AUTHORITY
Aug-Oct, 1977

SELECTED PLOT PARAMETERS

Horizontal search envelope, width in metres: 500

Vertical data envelope, no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres

Current direction, deg. true
min: => 0
max: =< 180

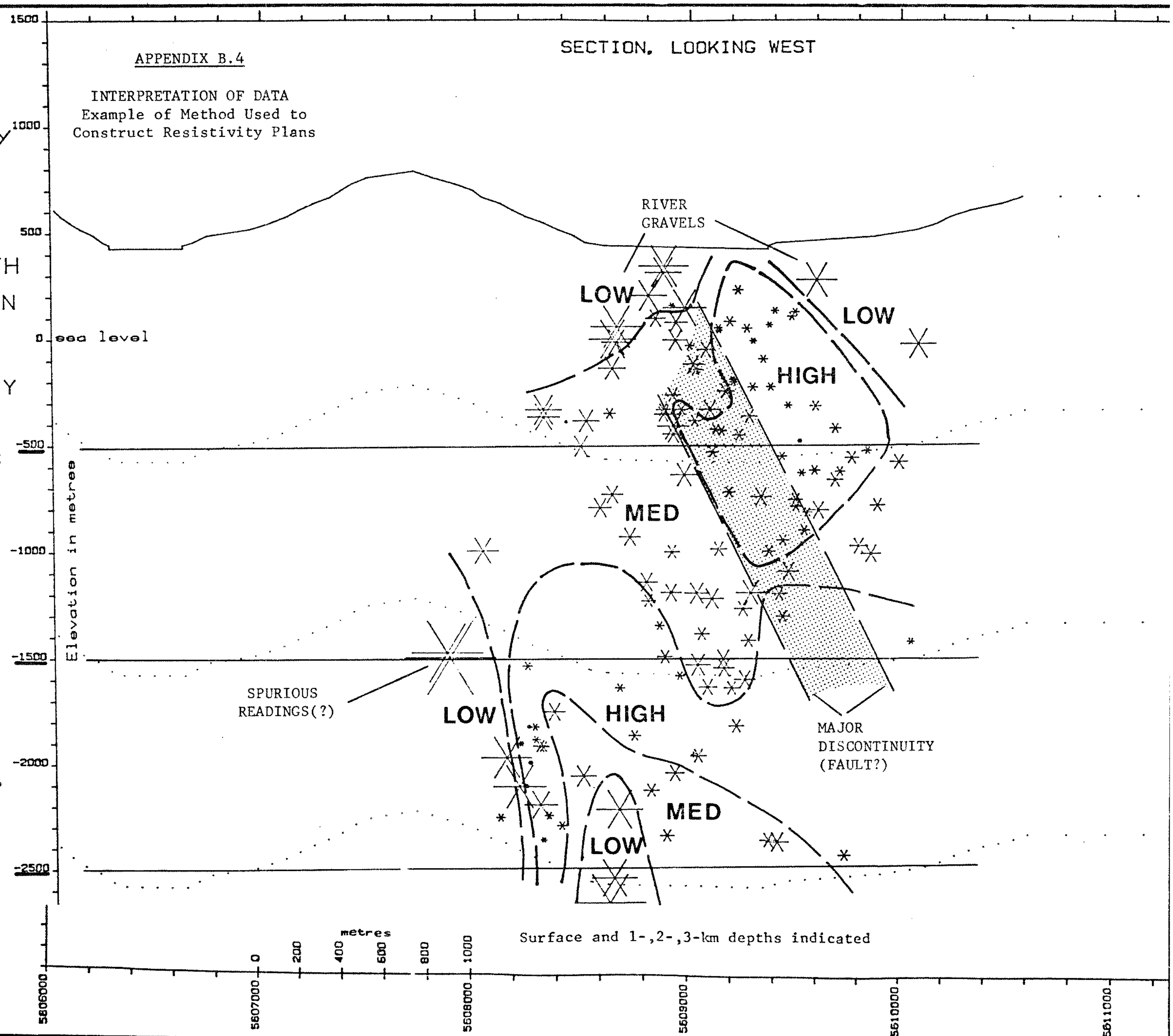
SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values

LOW less than 175 ohms

MED 175 - 550 ohms

HIGH greater than 550 ohms



APPENDIX C: RIVER PROBE

Purpose: To investigate the ability to discern the presence of a thermal component in stream waters draining the Meager Creek geothermal prospect and if possible, to locate the thermal source.

Equipment: A river probe assembly consisting of a YS1 44032 thermistor (time required to indicate 63% of a newly impressed temperature is 1 sec; max. operating temperature 100° C) mounted in a perforated tip at the base of 10 feet of aluminum drill rod, thermally insulated from the metal and freely monitoring the temperature change in a continuously flowing sample.

A Weston 6000 digital multi-meter with liquid crystal display to monitor resistance changes within the thermistor, a function of temperature.

Method: The DMM was mounted on a chest harness allowing eye contact with the display while the probe tip is poked between rocks on river bottom. The operator worked from a boat or from the shore with chest waders.

The probe was tested where thermal waters are known to enter cold stream waters, specifically the several point of entry of the Meager hot spring flow into Meager Creek.

In well mixed waters of constant flow and virtual constant temperature, the thermistor requires up to [illegible] minutes to achieve a constant resistance reading. Temperature changes are picked up by resistance drift within 1 to 2 seconds of the thermistor encountering the change.

River waters above the hot spring are mostly 78 to 81 kilohms (DMM reading) but can fall to 77 or rise to 82 kilohms, a range of 5 kilohms representing a temperature variation of about 1.5° C.

Moving the probe upstream towards a known zone of mixing of thermal inflow and depending on shore line and stream flow configuration, there is a zone of variable and equivocal instrument readings beginning about 3 metres from the point of entry of the thermal waters. It is not until the thermistor is within 2 meters of the source that the change in temperature becomes reliably noticeable, with instrument readings plunging from 77-74 to 60-50-30 kilohms.

This readily detectable zone of mixing was greater in calmer shoreline conditions than in deeper, more turbulent ones.

Conclusions: The thermistor probe, a sensitive and rapid device, was able to discern shoreline zones of mixing of thermal waters and cold stream waters reliably within 2 metres of the point of origin of the thermal waters, less reliably within 2-3 metres and not at all beyond 3 metres.

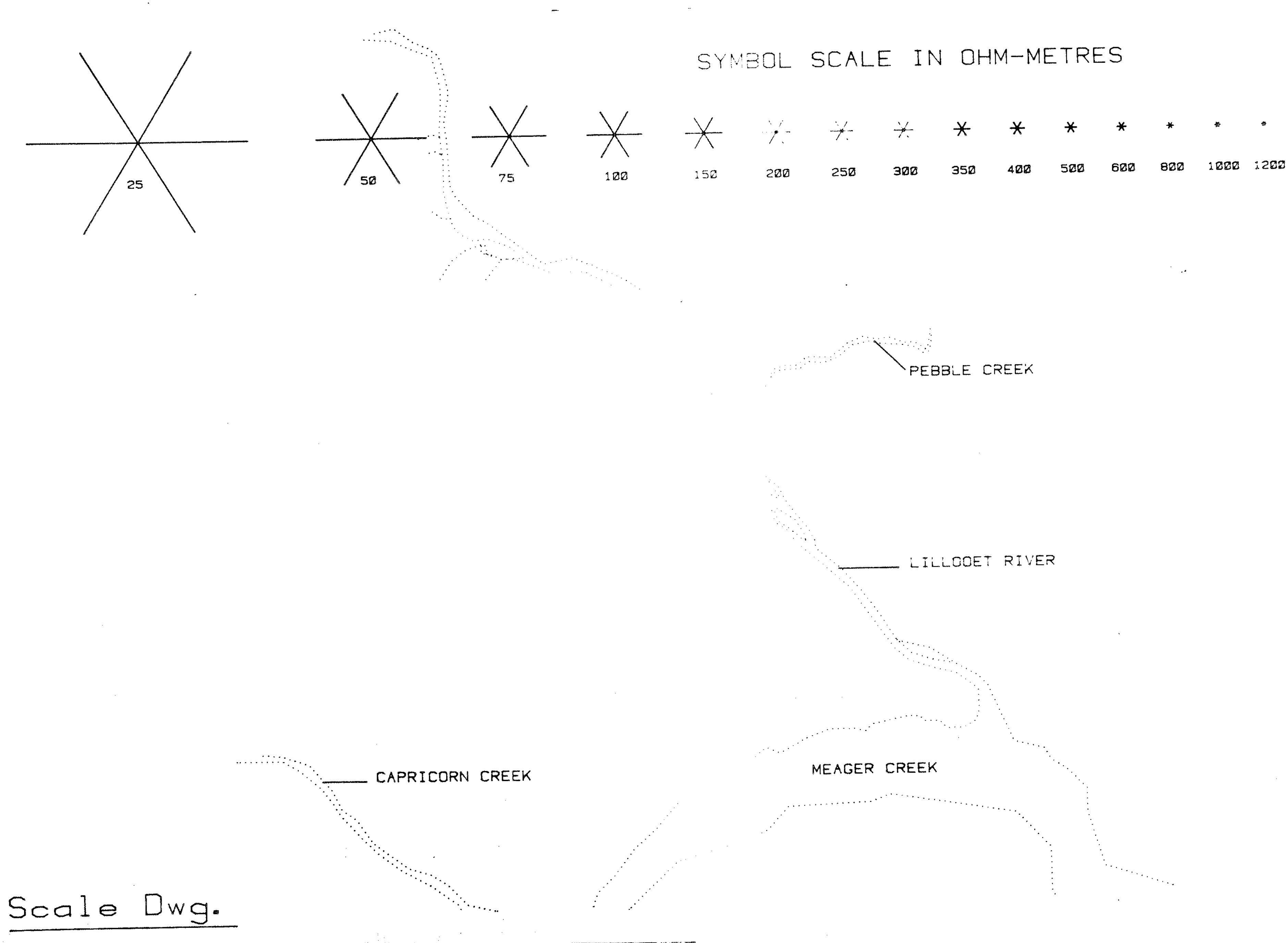
Comments: The streams to be probed in the Meager Creek area have generally steep gradients and are boulder-strewn, giving rise to turbulent, well-mixed waters. Hence, a survey to discern and pinpoint a discharge of thermal water in the stream bed would have to traverse the stream on lines spaced 2 - 3 metres apart. The length of stream environment of interest for this type of survey in the Meager area is 10 - 15 km with particular interest in 3 - 4 kilometres of the Lillooet River. The method does not appear practical. The probe should be re-mounted and adapted for use in drill holes.

Lillooet River: A section of the SW shore of the Lillooet River extending 1400 metres down stream from just above the mouth of Pebble Creek was probed by a man wading in the river in chest waders. Average instrument readings in a 5 metre zone along the river's edge were 80 - 76 kilohms (3.5 - 4.5° C). Ground water, seeping into the river in sand gave a reading of 69 kilohms. This was the only anomalous reading.

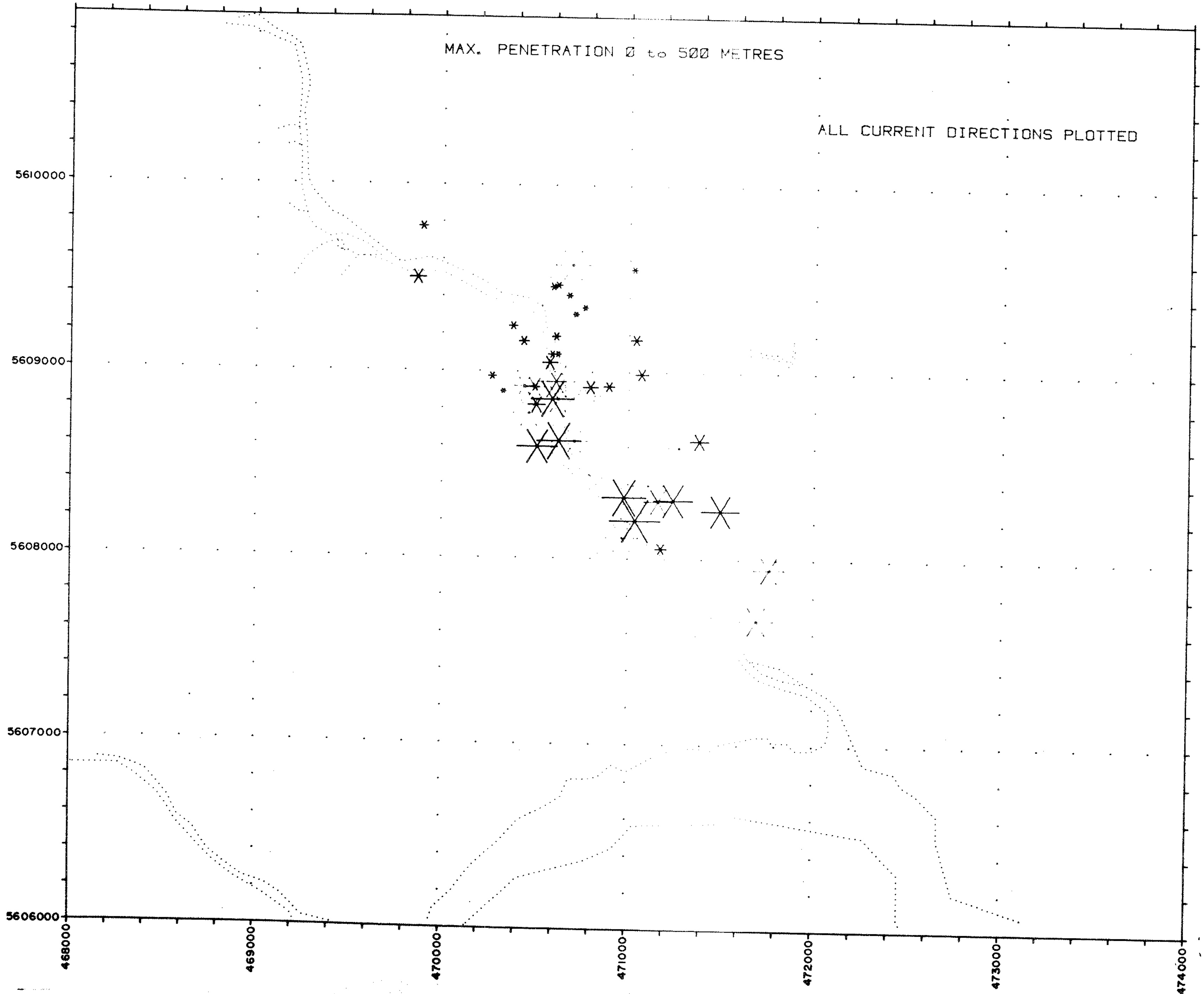
M A P S   A N D   S E C T I O N S

A: SUMMARY MAPS

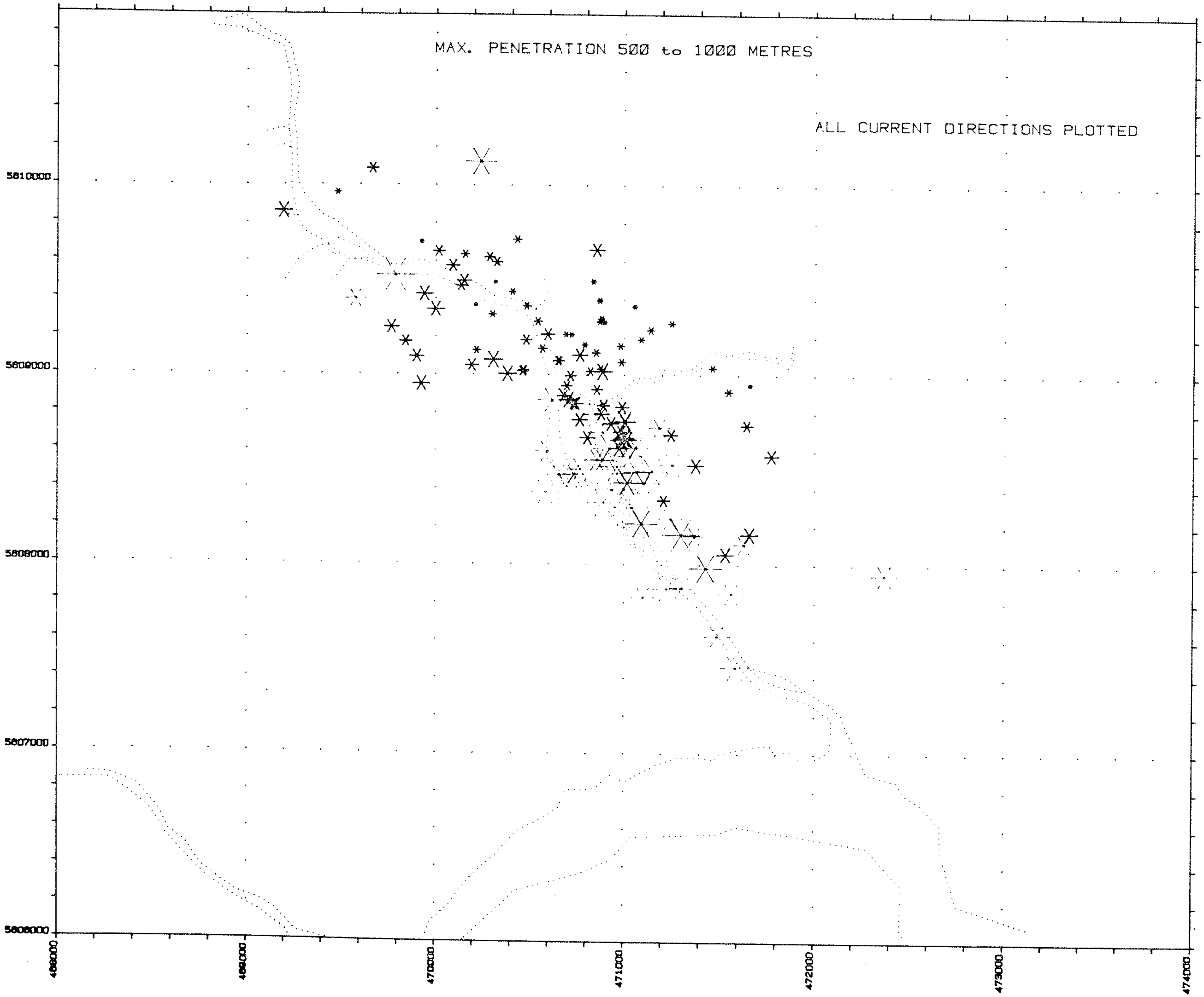
6 pages


SYMBOL SCALE IN OHM-METRES
25
50
75
100
150
200
250
300
350
400
500
600
800
1000
1200
PEBBLE CREEK
LILLOOET RIVER
CAPRICORN CREEK
MEAGER CREEK
Scale Dwg.

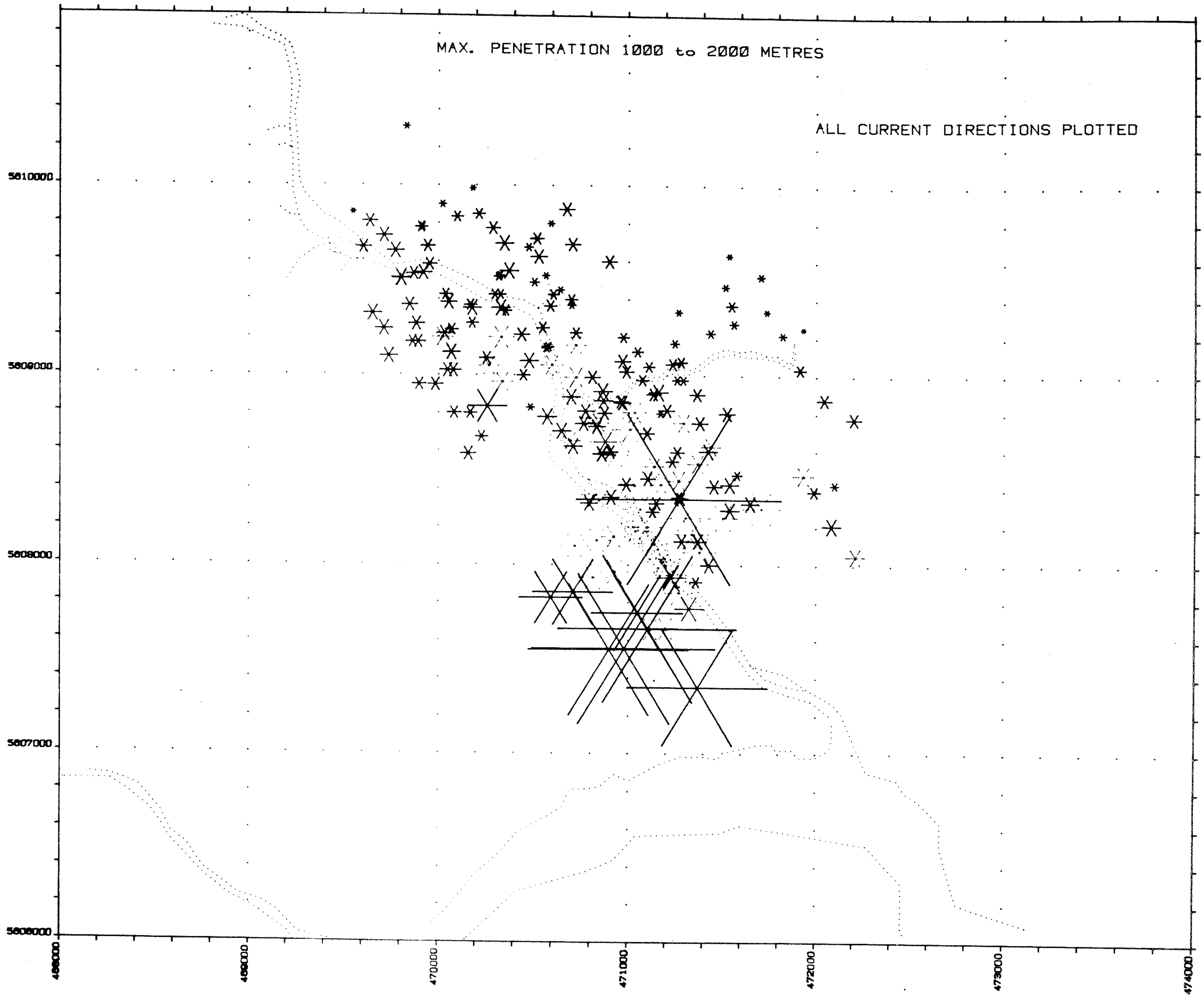
PLAN VIEW


MAX. PENETRATION Ø to 5ØØ METRES
ALL CURRENT DIRECTIONS PLOTTED
5610000
5609000
5608000
5607000
5606000
468000
469000
470000
471000
472000
473000
474000

PLAN VIEW


MAX. PENETRATION 500 to 1000 METRES
ALL CURRENT DIRECTIONS PLOTTED
5810000
5809000
5808000
5807000
5806000
468000
469000
470000
471000
472000
473000
474000

PLAN VIEW



MAX. PENETRATION 1000 to 2000 METRES
ALL CURRENT DIRECTIONS PLOTTED
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5809000
5808000
5807000
5806000
468000
469000
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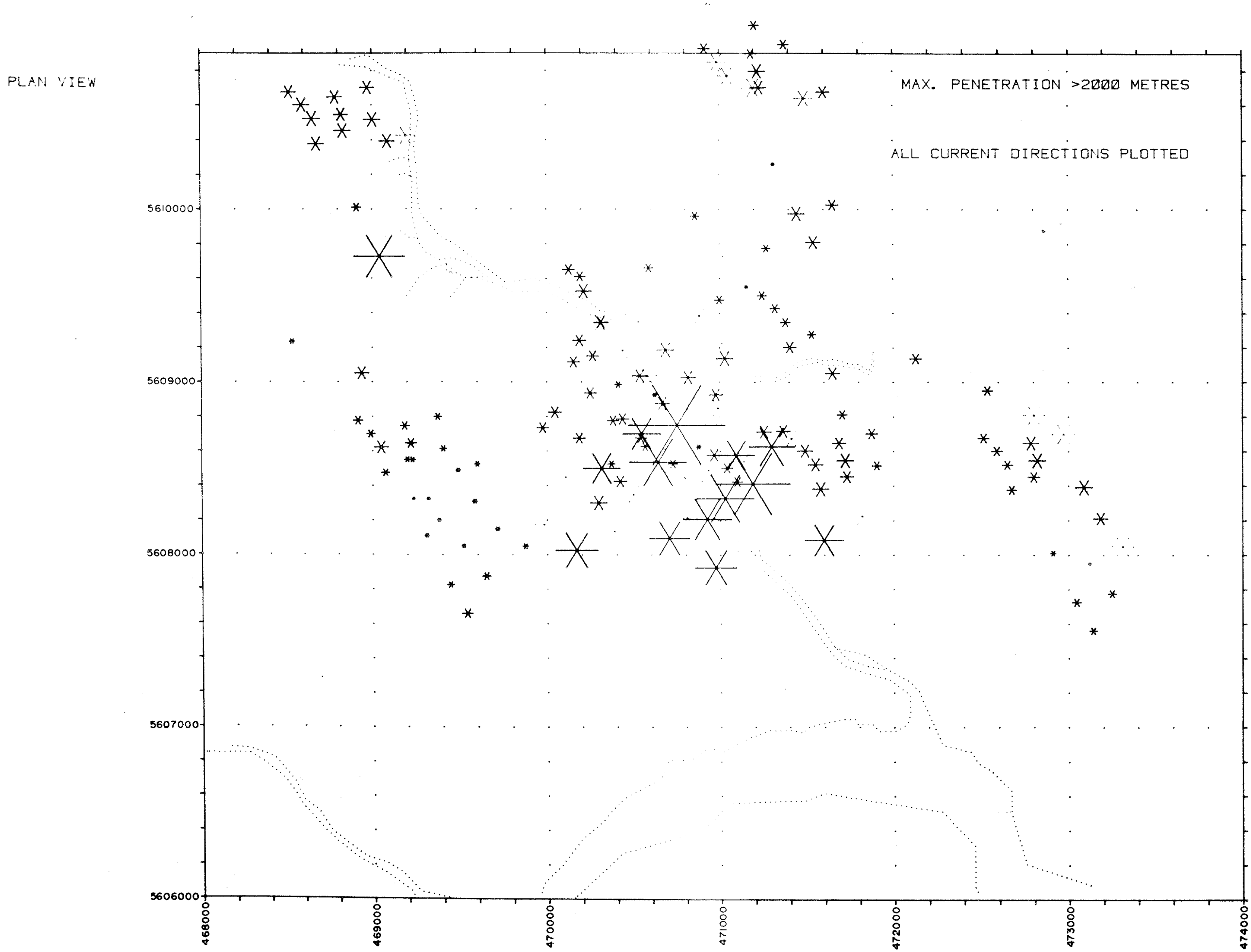
471000
472000
473000
474000


PLAN VIEW
MAX. PENETRATION >2000 METRES
ALL CURRENT DIRECTIONS PLOTTED
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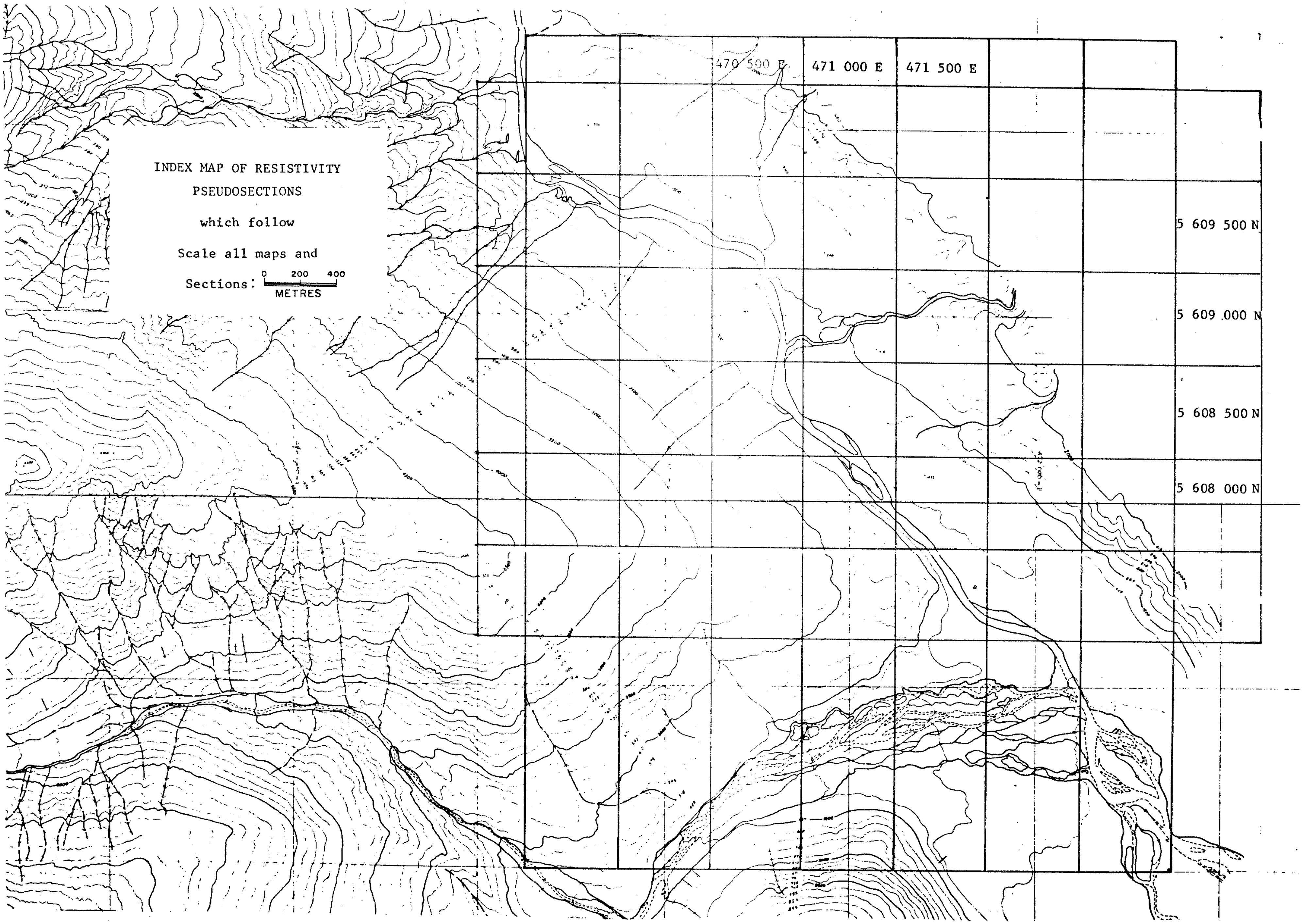
5609000
5608000
5607000
5606000
468000
469000
470000
471000
472000
473000
474000


INDEX MAP OF RESISTIVITY
PSEUDOSECTIONS
which follow
Scale all maps and
Sections: 0 200 400
METRES
470 500 E
471 000 E
471 500 E
5 609 500 N
5 609 000 N
5 608 500 N
5 608 000 N

M A P S A N D S E C T I O N S

B: SECTIONS EAST

3 pages

APPARENT RESISTIVITY
PSEUDOSECTION PLOT

Pole-Pole Array
VARIABLE CURRENT DIRECTION

LINE 471000E

MEAGER CREEK NORTH

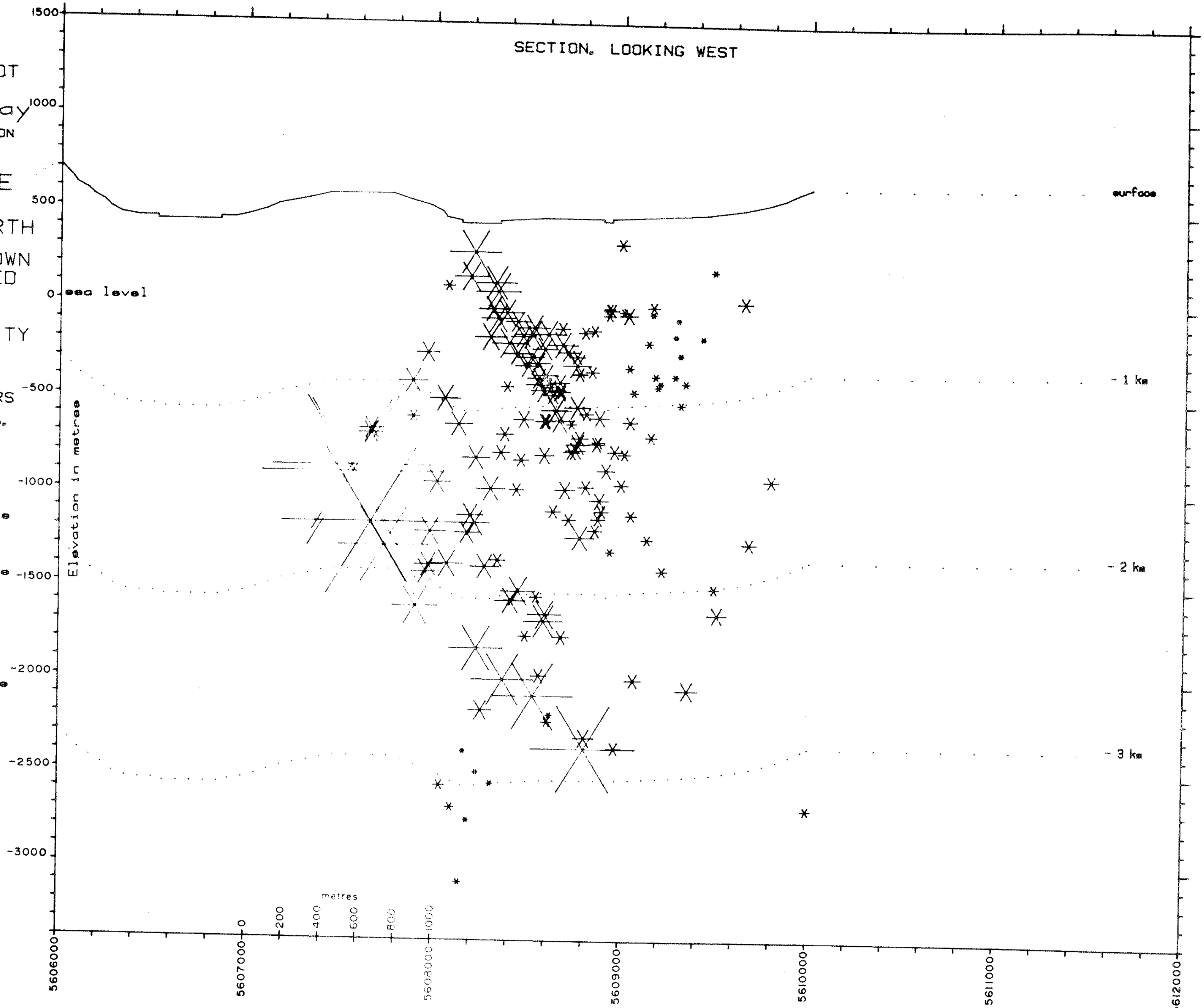
NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO AND POWER AUTHORITY
Aug-Oct, 1977

SELECTED PLOT PARAMETERS
Horizontal search envelope, width in metres: 500
Vertical data envelope, no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres
Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



APPARENT RESISTIVITY PSEUDOSECTION PLOT

Pole-Pole Array

VARIABLE CURRENT DIRECTION

LINE 47Ø5ØØE

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN GOODBRAND LIMITED

for

B. C. HYDRO AND POWER AUTHORITY

Aug-Oct. 1977

SELECTED PLOT PARAMETERS

Horizontal search envelope, width in metres: 5ØØ

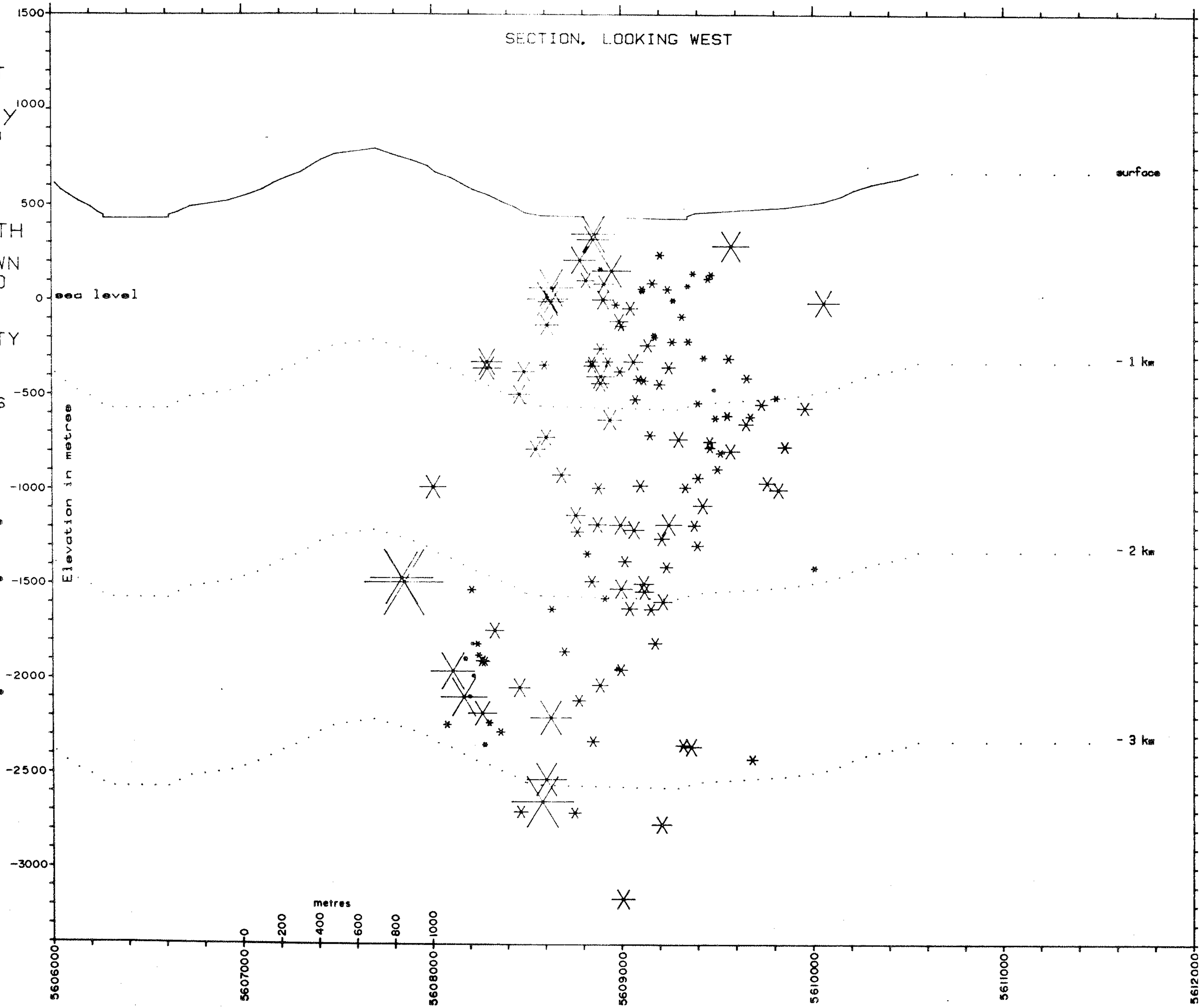
Vertical data envelope, no restrictions

Apparent resistivity limits
max: 1ØØØØ ohm-metres
min: Ø ohm-metres

Current direction, deg. true
min: => Ø
max: =< 18Ø

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



APPARENT RESISTIVITY

PSEUDOSECTION PLOT

Pole-Pole Array

VARIABLE CURRENT DIRECTION

LINE 471500E

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO
AND POWER AUTHORITY

Aug-Oct, 1977

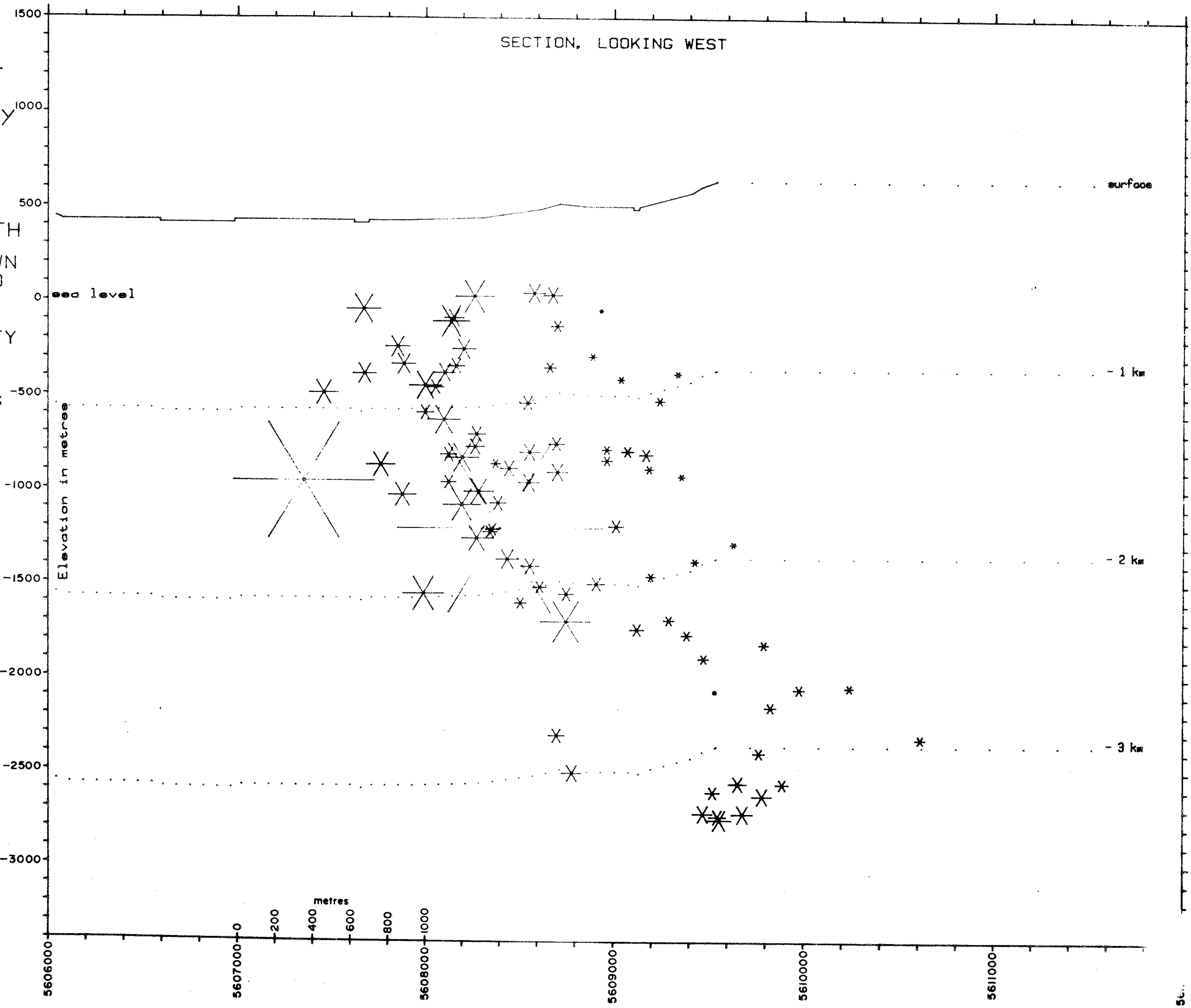
SELECTED PLOT PARAMETERS

Horizontal search envelope,
width in metres: 500
Vertical data envelope,
no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres
Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



M A P S A N D S E C T I O N S

C: SECTIONS NORTH

4 pages

APPARENT RESISTIVITY
PSEUDOSECTION PLOT

Pole-Pole Array

VARIABLE CURRENT DIRECTION

LINE 5608000N

MEAGER CREEK NORTH

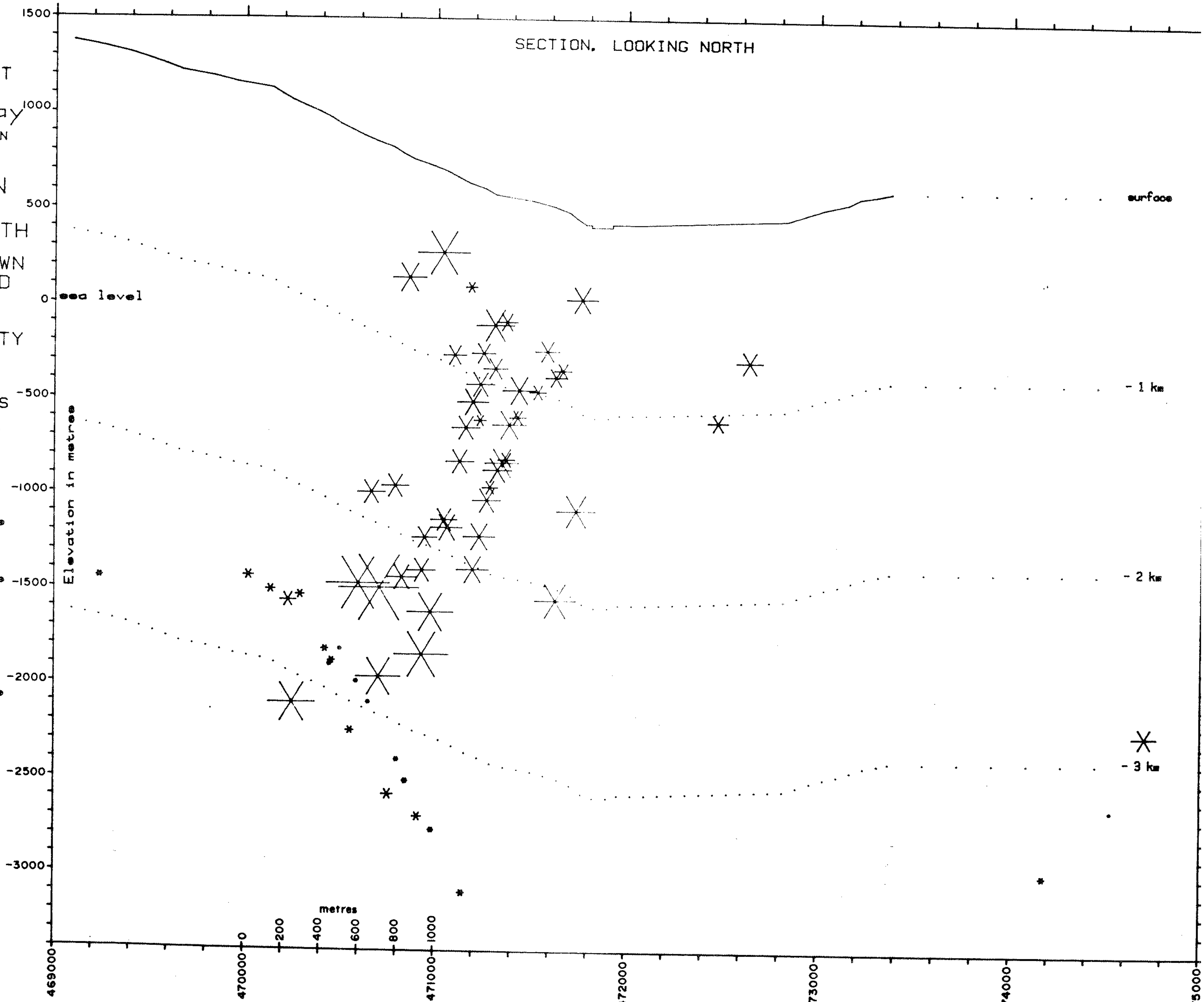
NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO AND POWER AUTHORITY
Aug-Oct, 1977

SELECTED PLOT PARAMETERS

Horizontal search envelope,
width in metres: 500
Vertical data envelope,
max depth: 10000 metres
min depth: -10000 metres
Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres
Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



APPARENT RESISTIVITY
PSEUDOSECTION PLOT

Pole-Pole Array
VARIABLE CURRENT DIRECTION

LINE 5608500N

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO AND POWER AUTHORITY
Aug-Oct, 1977

SELECTED PLOT PARAMETERS

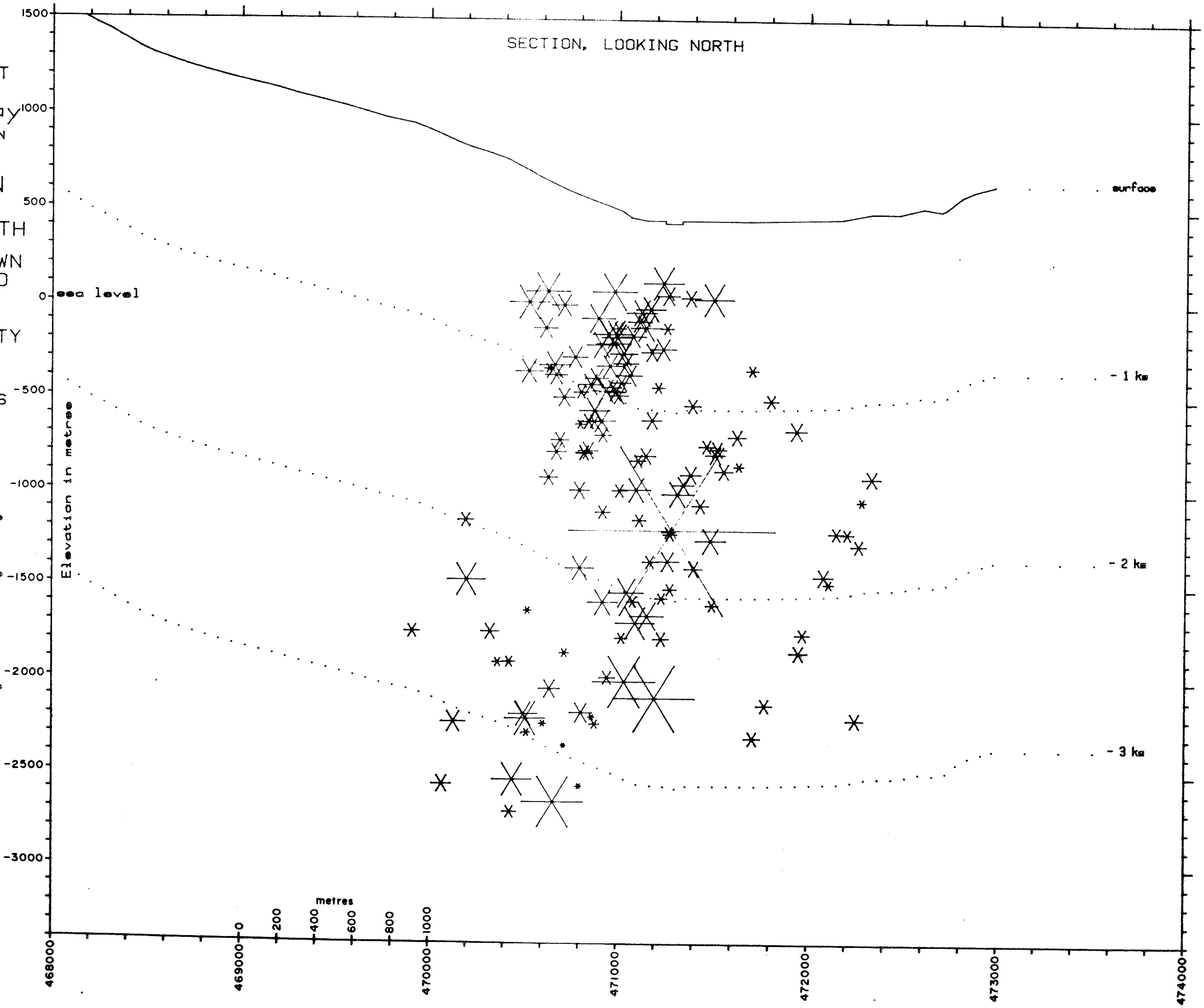
Horizontal search envelope, width in metres: 500
Vertical data envelope, no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres

Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



APPARENT RESISTIVITY PSEUDOSECTION PLOT

Pole-Pole Array

VARIABLE CURRENT DIRECTION

LINE 5609000N

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN GOODBRAND LIMITED
for
B. C. HYDRO AND POWER AUTHORITY

Aug-Oct. 1977

SELECTED PLOT PARAMETERS

Horizontal search envelope,
width in metres: 500

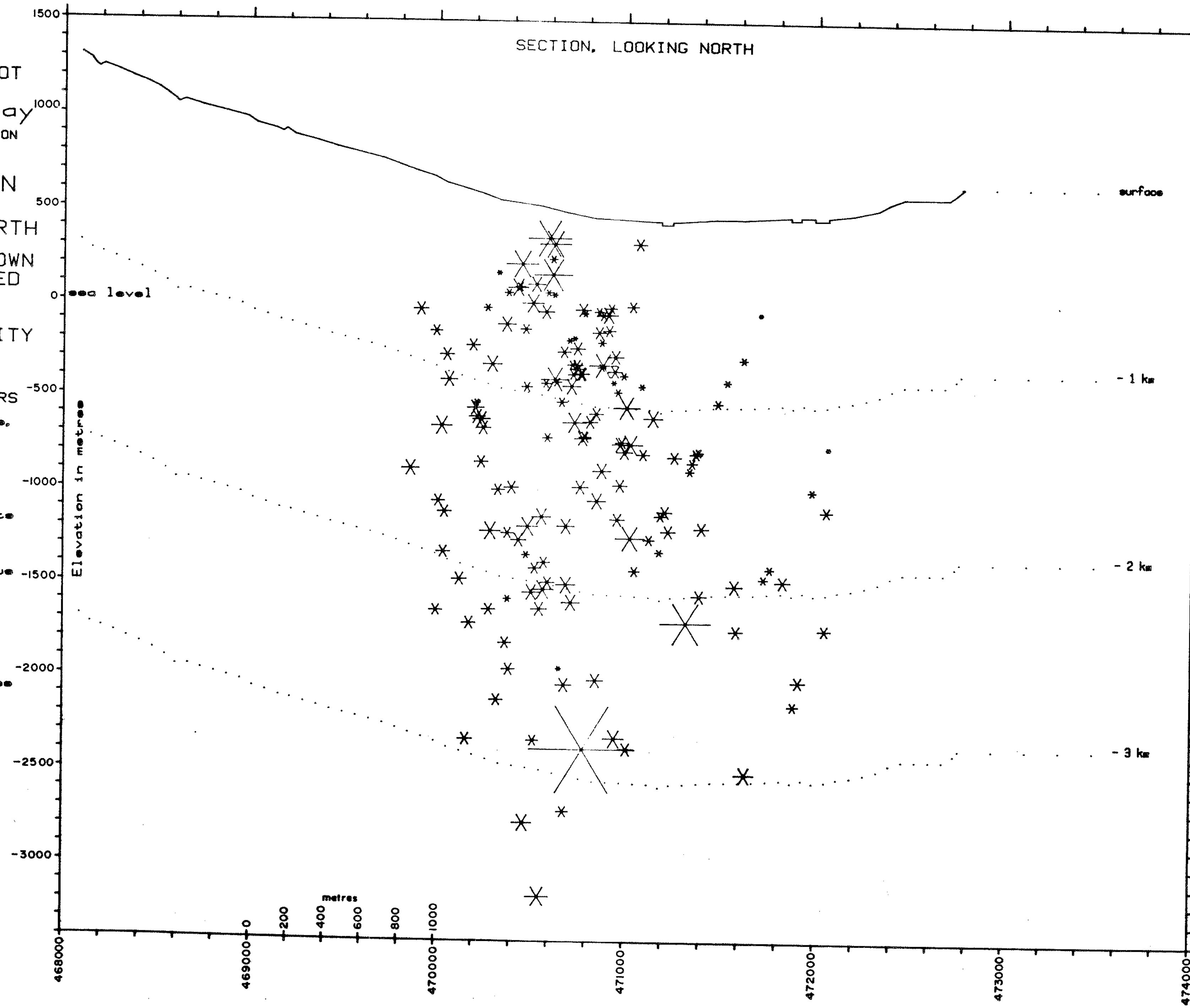
Vertical data envelope,
no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres

Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values



APPARENT RESISTIVITY
PSEUDOSECTION PLOT

Pole-Pole Array
VARIABLE CURRENT DIRECTION

LINE 5609500N

MEAGER CREEK NORTH

NEVIN SADLIER-BROWN
GOODBRAND LIMITED
for
B. C. HYDRO
AND POWER AUTHORITY
Aug-Oct, 1977

SELECTED PLOT PARAMETERS

Horizontal search envelope,
width in metres: 500
Vertical data envelope,
no restrictions

Apparent resistivity limits
max: 10000 ohm-metres
min: 0 ohm-metres
Current direction, deg. true
min: => 0
max: =< 180

SYMBOL PLOTTED: type 1

See 'Scale Dwg' for values