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# GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL

# REPORT ON THE

POPE J.P. CLAIM (20 units)

CHERRY CREEK

10/86

### KAMLOOPS MINING DIVISION

BRITISH COLUMBIA

Latitude 50°43'N

Longitude 120°36'W

for

SHAUGNESSY RESOURCES LTD Vancouver, B.C.

Stevenson and Associates

R.E. Game, EIT

November 28, 1984

GEOLOGICAL BRANCH ASSESSMENT PEDOPT

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Vancouver. B.C.

Geologist

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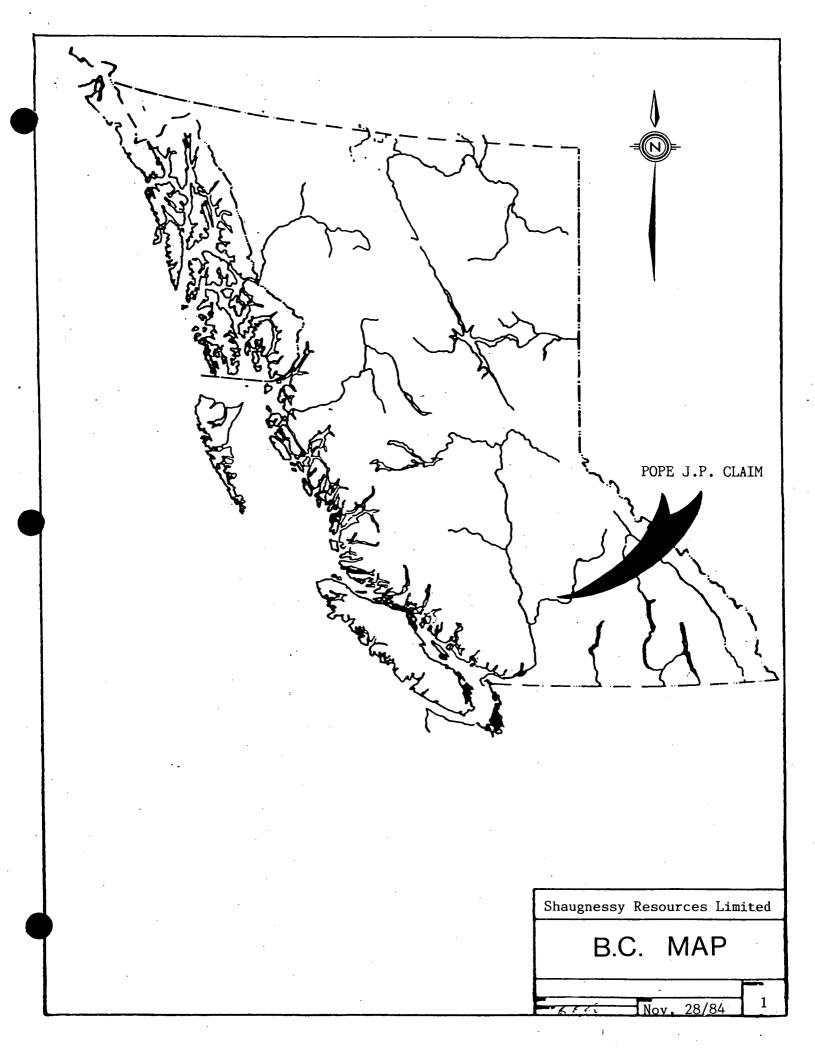
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#### SUMMARY AND RECOMMENDATIONS

The Pope J.P. property, located near Cherry Creek, B.C., is centered in a well mineralized environment on the Cherry Creek pluton. The pluton, thought to be an outlier of the Iron Mask Batholith, has attracted attention in the past for its deposits of copper, gold and silver which have produced, prior to 1940, 7500 tons of 2.6% Cu, 0.29 oz Ag and 0.16 Au.

Pope J.P. property displays a sequence of Triassic volcanic rocks. The centrally located Cherry Creek diorites and monzonites intrude porphyritic andesites of the Nicola Group. Economic deposits of Cu, Ag and Au occur where structural systems within the intrusives had trapped hydrothermal solutions. The predominant sulphide mineralization consists of pyrite and chalcopyrite. Several magnetite veins are also contained within the intrusive.

Geologically, the property is favorable for copper, silver, and gold mineralization. The soil geochemistry (Cu, Au) gave strong anomalous values within a zone which extends north and west of the Copper King Mine. Much of this zone is contained within nine Copper King crown grants. Several other secondary anomalies are scattered throughout the property indicating the podlike nature of the mineralization.

The electromagnetic survey outlined a few good conductors which may be faults, magnetite veins, or sulphide mineralization. The abundance of structure on the property made cross-over correlation difficult and thus the merit of anomalies must be considered individually.

The magnetic survey indicated several zone**s** of high relief. Many of these zones are known to be associated with magnetite veins and magnetite-filled fault zones.

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Given the sufficiently encouraging results of the program, further work is definitely warranted. The next phase of exploration should include:

- 1. Aquisition or option of the Copper King crown grants contained within the Pope J.P. property.
- 2. An induced polarization (IP) survey be conducted over the grid to test the geochemical and other geophysical anomalies.

3. Trenching and sampling of major anomalous zones.

4. Diamond drilling.

#### 1.0 INTRODUCTION

## 1.1 General Statement

The metalliferous deposits in the vicinity of Cherry Creek, near Kamloops, B.C., have attracted the attention of prospectors since the early nineteen hundreds. Origonally, copper and iron were the principal metals prospected. However, recent limited finds of gold and silver are renewing interest in the region.

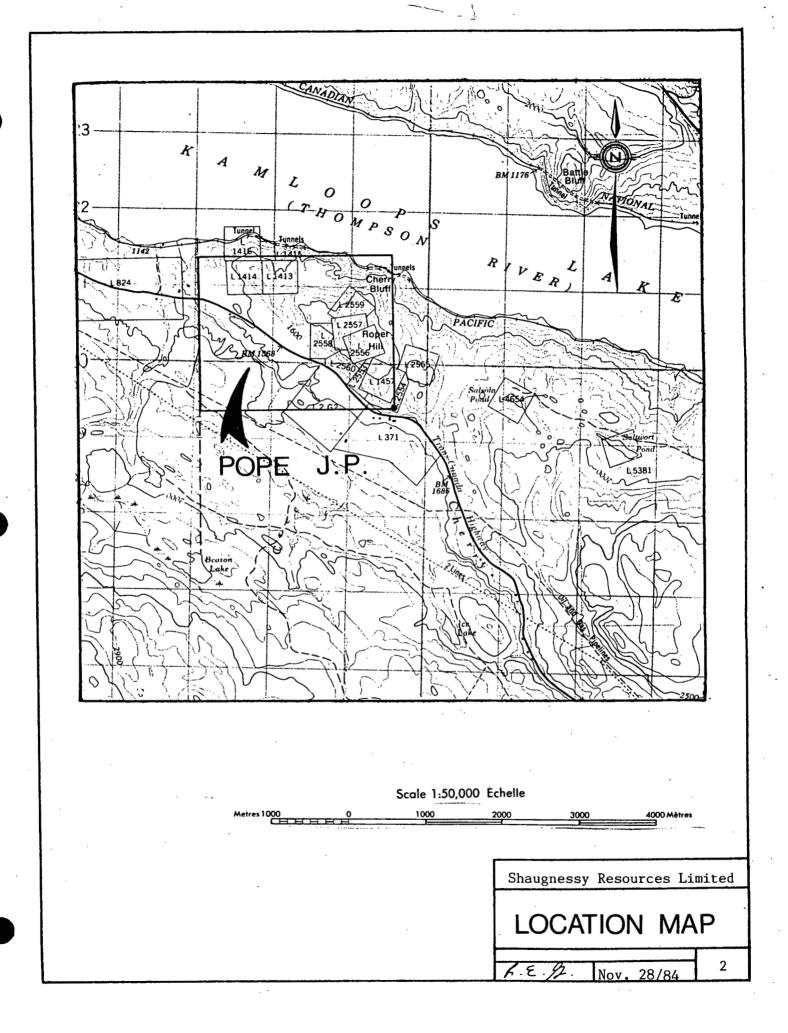
Shaugnessy Resources Ltd. is in the process of aquiring the Pope J.P. property with hopes of discovering similar mineral deposits. The mineralization associated with the Copper King and Glen Iron Mines and the nearby Afton Mine suggested that the Pope J.P. claim was well located in a mineralized environment and that a modest exploration program was warranted.

During November of this year, a field program, supervised by this author, consisting of mapping, prospecting, geochemical and geophysical phases was undertaken. The objective of this program was to locate extensions to, and new, copper-silver-gold bearing structures similar to those found in the past.

#### 1.2 Location and Access

The Pope J.P. property, consisting of 20 mining claims in the Kamloops Mining Division, is located about 25 km west of Kamloops, B.C. (Fig. 1 and 2). The claims are on map NTS 92I/10 near 50°43'north and 120°36' west, above the southern shore of Kamloops Lake at an elevation of 340 to 500 meters.

The property is accessible from the Trans-Canada Highway # 1 which disects the claim block. The majority of this claim area lies north of the highway



and is accessible by various dirt roads.

# 1.3 Topography

The terrain within the northern half of the claim block is dominated by Roper Hill. This hill is moderately steep with several cliff-like structures on the slopes. Vegetation is relatively sparse, primarily sagebrush and wild grasses.

The southern half of the claim block is flat and is used for grazing and cultivation. Several ranches, farms and residences are located in this area. This resulted in no work being undertaken here.

# 1.4 Land Status

The Pope J.P. property, which was staked and recorded on September 19, 1984, consists of the following mineral claims (Fig. 2):

Name	<u>Record #</u>	Units	Expiry
Pope J.P.	101239	20	Sept 19, 1984

It does not include the nine Copper King and two Glen Iron Mine crown grants which are contained within the properties boundaries.

#### 1.5 History

The mineral deposits in the region associated with the intrusives of the Iron Mask Batholith and its outliers are extremely diverse. Gold, silver, copper, molybdenum, mercury, lead, zinc, iron and coal deposits have all prospected since the late eighteen hundreds.

The principal property in the batholith was the Iron Mask Mine which produced

about 200,000 tons of ore averaging 1.6% Cu, 0.20 oz Ag, and 0.02 oz Au between 1903 and 1927. In more recent times, Afton Mines has been developed in an outlier of the Iron Mask Batholith. Reserves in this copper porphyry mine were quoted in 1975 as 47,000,000 tons averaging 0.79% Cu.

The Cherry Creek Intrusives, located within the Pope J.P. property, have been extensively explored and developed in the past. The Copper King Mine, which consists of nine crown grants surrounded by the Pope J.P. property, produced approximately 7500 tons of 2.6% Cu, 0.29 oz Ag, and 0.16 oz Au.

The Copper King properties were staked in 1897 by J.H. Hill. Little work was done until 1906 when approximately 100 tons of ore was shipped averaging 0.2 oz Au and 4.4% Cu. A smal shipment was made in 1929 and in 1939 to 1940 the property was worked until the mill was destroyed by fire. Total development includes 750 ft of adits and shafts along two levels.

In 1972, the Copper King property was held by Rolling Hills Copper Mines Ltd. and optioned to Torwest Resources (1972) Ltd. Extensive geological, geochemical, geophysical and drilling programs were undertaken. Results showed a northwest striking shear zone containing Cu, Ag, and Au that was 155 meters long, 25 meters wide and 62 meters deep.

On the northern boundary of the property, several magnetite veins have been developed. These are partially contained within four crown grants and is known as the Glen Iron Mine. The only apparent development is an extensive wedge-shaped trench system within these veins

### 2.0 GEOLOGICAL SETTING

# 2.1 Regional Geology

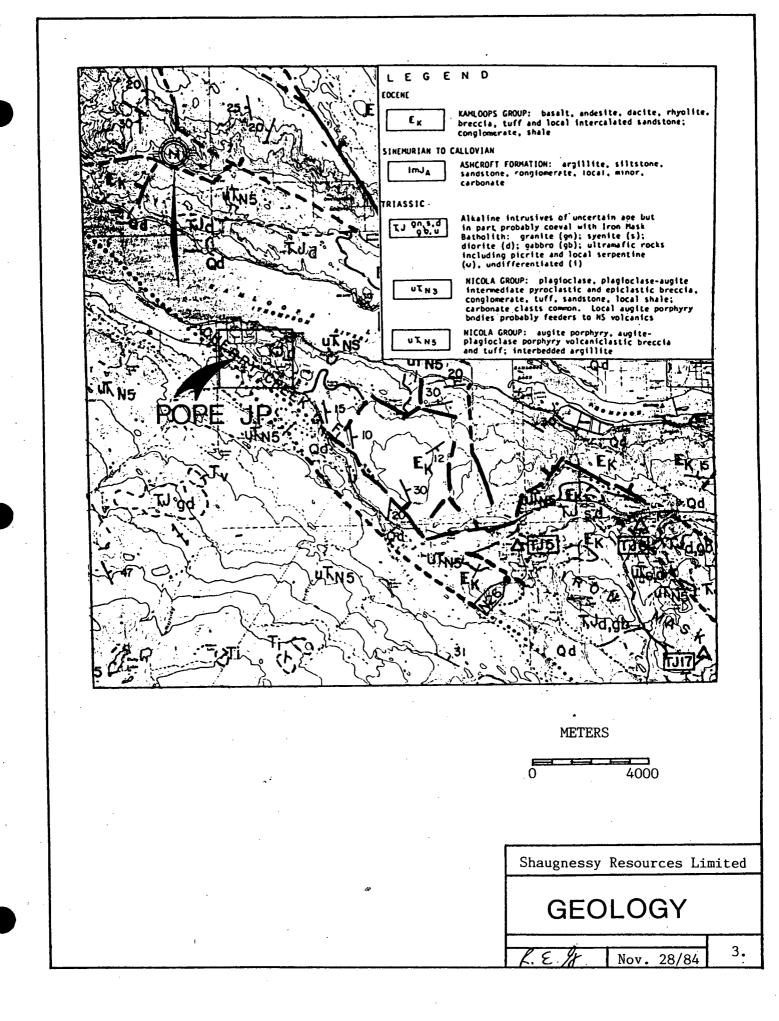
The rocks of the district containing the Pope J.P. property are confined to various igneous formations (Fig. 3). The centrally located Cherry Creek diorite-monzonite intrusives of Triassic age intrude into Early Triassic porphyritic andesites of the Nicola Group. This intrusive is also covered to the east by the vesicular basalts and crystalline tuffs of the Miocene Kamloops Group.

The major structural feature in the vicinity of Cherry Creek is an inferred fault striking northwest bringing the Nicola volcanics and the Cherry Creek intrusives into contact. There are also a number of smaller, approximately north-south trending faults which displace cotacts within the Cherry Creek intrusives. These faults are probably complimentary to the major faulting in the region.

The major ore deposits in the region are related to structural and hydrothermal episodes within the Cherry Creek intrusive. The copper-silver-gold mineralized zone at the Copper King Mine occurs as disseminated chalcopyrite and bornite along fractures and shears in diorite-monzonite. Also of importance are a series of massive magnetite veins which are in an easterly-trending zone known as the Glen Iron Mine.

### 2.2 Local Geology

The portion of the property located north of the Trans-Canada Highway is entirely underlain by the Cherry Creek Intrusions. Outcrops, structure, alteration and mineralization were recorded when mapping the property.



Grid lines seperated by 100 meters with 25 meter stations were used for control. This imformation has been transferred to a geologic map (Fig. 4; in pocket).

### 2.2.1 Lithology

The Cherry Creek intrusive rocks vary lithologically between diorite and monzonite. These two phases have been recognized in the past and attempts were made to map these as seperate. However, in this case no distinction was made between these units since no clear-cut contact could be found. In all probability, the two phases are the result of a differentiate of the same magma.

The diorite is a pinkish-brown, medium grained rock containing up to 80% mafic minerals, primarily hornblende and trace biotite and magnetite. The main felsic minerals are quartz and variable pink-colored potassium feldspar. The monzonite is a similar rock and may vary to diorite and syenite locally, depending on the quantity of K-feldspar. Generally it is a finer grained, moderately silicified rock with little or no biotite and up to 5% magnetite.

## 2.2.2 Structure

A number of small north-south trending faults were mapped which are believed to be complimentary to the possible major fault system cutting the northwest corner of the property. Likewise, fracture and joint systems were recorded. There appears to be two dominant joint sets, both steeply dipping. The major set strikes approximately north to northeast whereas the minor set is inclined westerly.

#### 2.2.3 Alteration

The dominant alteration is propylitic with potassium feldspar and epidote the major constituents. Zones of intense potassic and epidote alteration are noted on the geologic map (in pocket). This alteration appears to be directly associated with fault and fracture zones.

2.2.4 Mineralization

The mineralization found on the property consists of finely disseminated chalcopyrite, pyrite, magnetite, malachite, limonite, and traces of bornite. These occurences have been noted, where found, on the geologic map. A pattern is indicated which shows copper mineralization associated with the region in the vicinity of the Cpooer King Mine. This zone extends from 5000N to 6100N and is contained principally within the Copper King crown grants.

The magnetite mineralization occurs as diseminations in the intrusive rock and as a series of at least 15 massive magnetite veins which are part of the Glen Iron Mine crown grants. These veins trend easterly and swell, branch and terminate abruptly.

#### 3.0 GEOCHEMISTRY

### 3.1 Collection and Analysis

A total of 433 soil samples were taken at 50 meter intervals wherever possible along flagged grid lines (Fig. 5). Two baselines were orientated northsouth with east-west crosslines seperated by 100 meters. Stations were marked with survey flagging and co-ordinates marked with felt pen.

The samples were taken from the 'B' soil horizon with a grub hoe, unless soil development was inadaquate, in which case maximum depth was used. The soils were placed in standard kraft bags and dried prior to shipment to Min-En Laboratories Ltd. in North Vancouver, B.C.

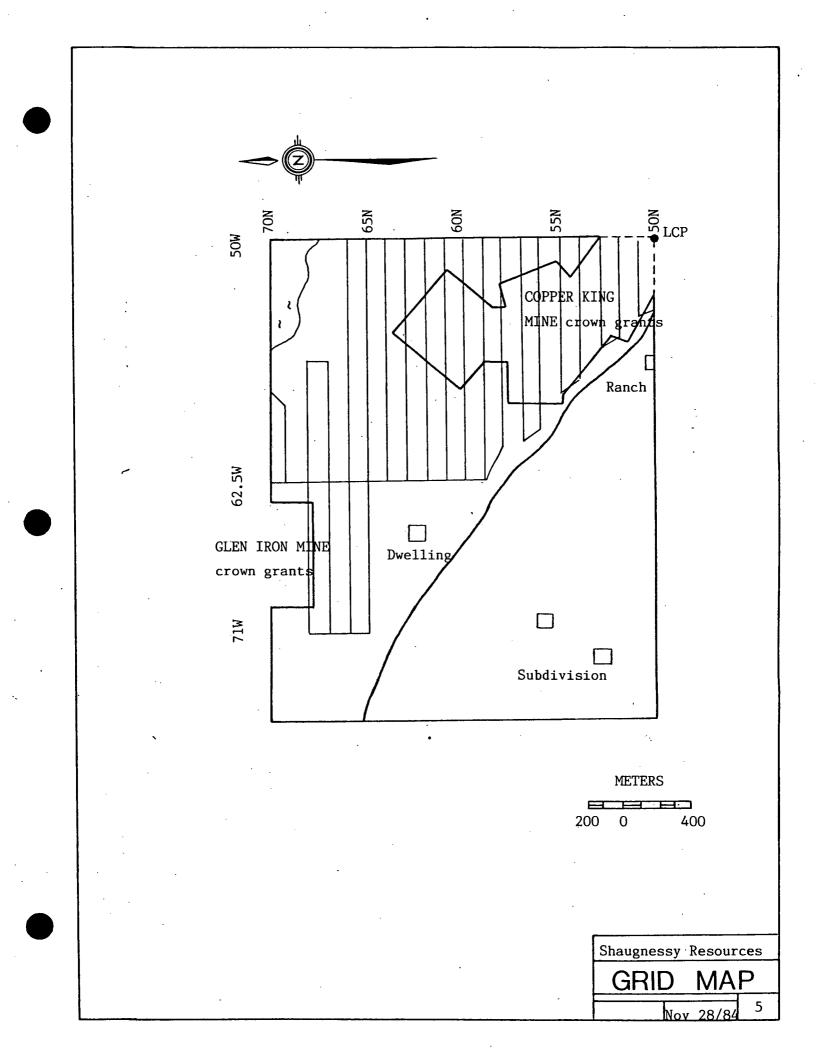
All samples were ovened dried, screened to -80 mesh, and analysed for copper and gold as follows:

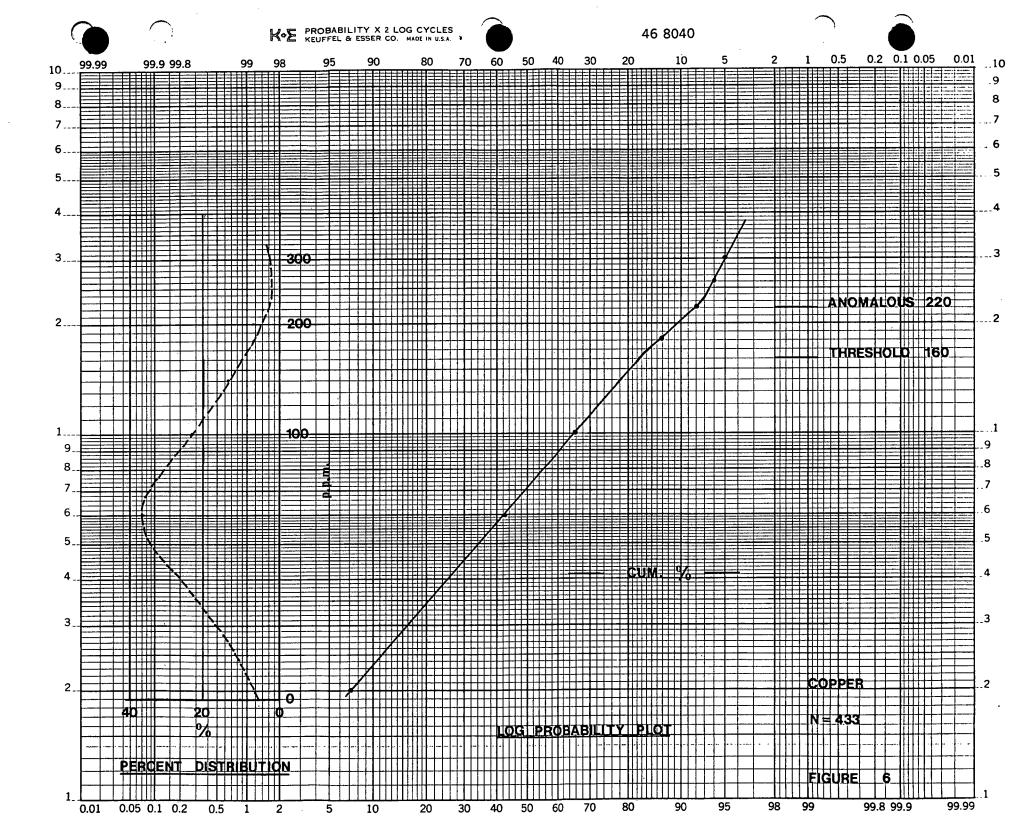
> Cu - nitric, perchloric digestion; A.A. analysis Au - aqua regia; A.A. analysis

### 3.2 Results of survey

The percent distribution and log probability plots for the soil copper values are shown in figure 6. The indicated threshold and anomalous levels are 160 and 220 ppm respectively. These values may be slightly misleading because a large portion of the property had very shallow soil cover. Shallow areas gave results which probably reflect bedrock values whereas areas with deep alluvium cover, such as in the northern part of the property, gave lower representative values, as to be expected.

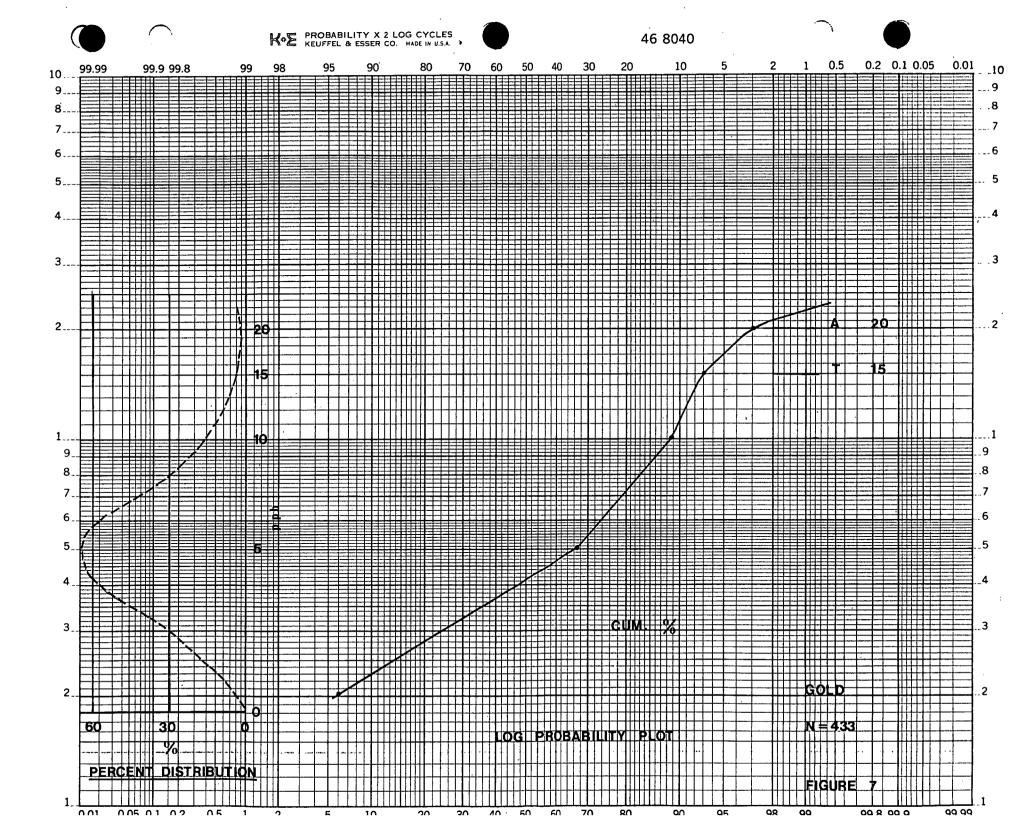
Copper soil values are plotted in plan on figure 8 (in pocket). The major





copper anomaly on the property is in the Copper King Mine area, principally within the crown grants. This zone extends from 5000W and 5750W to 6100N. Also, several very strong, smaller secondary copper anomalies, apart from the Copper King anomaly, occur. Two of these stronger anomalies are located at 6300N and 6100W and at 6500N and 6550W. These may be related to a relatively high trace copper content in the diorite or monzonite, comparatively thin overburden, or underlying zones of copper mineralization; or a combonation thereof.

Gold soil values are also plotted in plan on figure 9 (in pocket). Gold threshold and anomalous values are 15 and 20 ppb respectively.(Fig. 7). The gold values generally mirror the copper data. This is most noticeable in the vicinity of the Copper King Mine. Several smaller, secondary anomalous gold zones are also found. The small zone at 6500N and 6700W is co-incident with a strong copper anomaly whereas small gold zones located at 6800N and 6700W, at 7000N and 6600W, at 6500N to 6600N and 5850W, and at 6400N and 5450W are independent of copper anomalies, and likely represent slight nugget effects in the underlying bedrock.



#### 4.0 VLF ELECTROMAGNETICS

## 4.1 Survey Procedure

The VLF EM 16 survey readings were taken at 25 meter intervals wherever possible along flagged grid lines (Fig. 5). Two baselines were orientated north-south with east-west crosslines seperated by 100 meters. Stations were marked with survey flagging and co-ordinates marked with felt pen.

Care was taken in regard to technique to compensate for the steep terrain and talus prevelent on the property. All readings were taken facing approximately perpendicular to the transmitting station at Seatle.

### 4.2 Compilation of Data

The readings were reduced by applying the Fraser Filter and plotted at a scale of 1:2500. Filtered data, as shown on the accompanying map, is plotted between reading stations. The positive filtered values were contoured at intervals of 5°, starting at 0°.

The Fraser Filter is essentially a 4-point difference operator which transforms zero crossings into peaks, and a low pass smoothing operator which reduces the inherent high frquency noise in the data. Therefore, the noisy, non-contourable data is transformed into less noisy, contourable data. Another advantage of this filter is that a conductor that does not show up as a cross-over on the unfiltered data will quite often show up on the filtered data.

### 4.3 Instrumentation and Theory

A standard Geonics VLF EM 16 reciever was used for this survey. This instrument is designed to measure the magnetic component of a very low frquency

(VLF) electromagnetic field. The U.S. Navey submarine transmitter located at Seattle, Washington, and transmitting at 24.8 KHz, was used.

In all electromagnetic exploration, a transmitter produces an alternating magnetic field (primary) with a strong alternating current usually through a wire coil. If a conductive mass such as a sulphide body is within this magnetic field, a secondary alternating current is induced within which in turn induces a secondary magnetic field that distorts the primary magnetic field. It is this distortion that the VLF EM reciever measures. The VLF EM uses a frquency range from 16 to 24 KHz whereas most EM instruments use frequencies ranging from a few hundred to a few thousand Hz. Because of its relatively high frequency, the VLF EM can pick up bodies of low conductivity and therefore is more susceptable to clay beds, electrolyte-filling fault shear zones and porous horizons, graphite, carbonaceous sediments, litholo-ical contacts, as well as sulphide bodies of too low a conductivity for the other EM methods to pick up. Also, since the signal derives from an infinite source, faults of great horizontal and vertical extent give particularly strong anomalous responces.

Consequently, the VLF EM has additional uses in mapping structure and in detecting sulphide bodies of too low a conductivity for conventional EM methods and too small for induced polarization. However, its susceptibility to lower conductive bodies results in a number of anomalies, many of them difficult to explain and, thus, VLF EM preferably should not be interpreted without a good geological knowledge of the property and/or other geophysical and geochemical surveys.

### 4.4 Results of Survey

The VLF EM 16 survey results were plotted and contoured on figure 10 (in pocket). The primary purpose of the VLF EM survey was to locate potential veins and structures for localizing mineralization. As with most VLF EM 16 surveys, there is an abundance of minor conductors and topographical effects; these would likely account for the anomaly paralleling the eastern end of lines 6700N to 6800N and a portion of 6600N, and several smaller anomalies.

Positive conductors were obtained in the northern part of the surveyed grid, along the eastern boundary, and in the vicinity of the Copper King Mine crown grants. The anomaly at 6600N to 6800N and 6450W appears to be due to the Glen Iron Mine magnetite structures. Several conductors in the vicinity of the baseline at 6250W are probably due to faulting and associated mineralization. Likewise, several conductors on nothern half of the eastern baseline are probably fault and fracture related. The elongated anomaly at 6500N to 6600N and 5450W appears to be associated with a soil gold geochemical high. However, most anomalies should be considered on their own merit when work is done in those areas due to the nature of the EM survey.

### 5.0 PROTON PRECESSION MAGNETICS

## 5.1 Survey Procedure

The magnetometer survey readings were taken at 25 meter intervals along flagged grid lines (Fig. 5). Two baselines were orientated north-south with east-west crosslines seperated by 100 meters. Stations were marked with survey flagging and co-ordinates marked with felt pen.

The baseline at 6250W was set up as the base station for the readings, and each'loop' of the survey closed on this line. This was necessary in order to correct for diurnal variations in the earth's magnetic field anf for instrument drift.

#### 5.2 Instrumentation and Theory

A Scintrex proton precession magnetometer was used for this survey. This instrument is designed to make a point measurement of the earth's total magnetic field.

The magnetic metod of prospecting depends on the fact that most rocks contain small but significant amounts of ferrimagnetic minerals such as magnetite or hematite. This gives the rock a weak magnetization which is made up of induced and remanent magnetization. This magnetization modifies the earth's field so that it can be detected at the surface by sensitive instruments.

The theory behind the proton precession magnetometer is quite complicated. Basically, atoms consist of of nuclei of positive charge surrounded by electrons, and all nuclei are in constant spinning motion. If there is an odd number of electrons, angular and magnetic moments will occur. Since the nuclei possess a magnetic moment they will attempt to align up in the direction of the ambiant field. If the direction of the field is changed (when an anomaly

occurs) the nuclei will try to follow the field. Since the nuclei possess angular momentum, they act as spinning tops and precess gradually. The precessing nuclei set up a rotating magnetic field, and therefore a coil placed around them will have a voltage induced into it. The frequency of the induced voltage, which is the precession frequency, can be measured by the magnetometer. Thus a point measurement of the total earth's magnetic field at a given point can be made.

### 5.3 Results of Survey

The proton precession magnetometer results were plotted and contoured on figure 11 (in pocket). The primary purpose of the magnetometer survey was to locate area of strong magnetite mineralization which would help interpret strong EM anomalies, and to locate areas of low intensity which would indicate altered zones due to the breakdown of magnetite.

The north-south trending magnetic high zone on lines 6500N to 6800N at 6600W corresponds to a magnetite vein zone related to the Glen Iron Mine system. Several other zones of magnetic relief occur in the northern part of the property. These must be evaluated individually in the field as a number of possible origins for their existance are possible.

A significant magnetic valley exists on the south and eastern part of the survey grid. The low magnetic response is probably due to alteration of the intrusive rock. It may represent a contact between magnetite rich monzonite and diorite.

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Private report for Shaugnessy Resources Ltd.

### 7.0 CERTIFICATION

I, R.E. Game, of the City of Vancouver, Province of British Columbia, hereby certify as follows:

- I am a Geologist residing at 206-8636 Laurel St., Vancouver, B.C. and with office at 101-736 Granville St., Vancouver, B.C.
- (2) I am a graduate of the University of British Columbia with a Bachelor of Applied Science in Geological Engineering(1984).
- (3) I have practiced mining exploration for three years, most of which was bases in the Province of British Columbia.
- (4) I am NOT a Professional Engineer; I am registered as an Engineerin-Training and am a member of the Canadian Institute of Mining.
- (5) Iam a director/president of Shaugnessy Resources Ltd. and therefore have direct interest in the Pope J.P. property.
- (6) This report is based on the supervision of a field program on the Pope J.P. property, together with a review of pertinent data.

Respectfully submitted

Richard E. Game, EIT

# 8.0 APPENDICIES

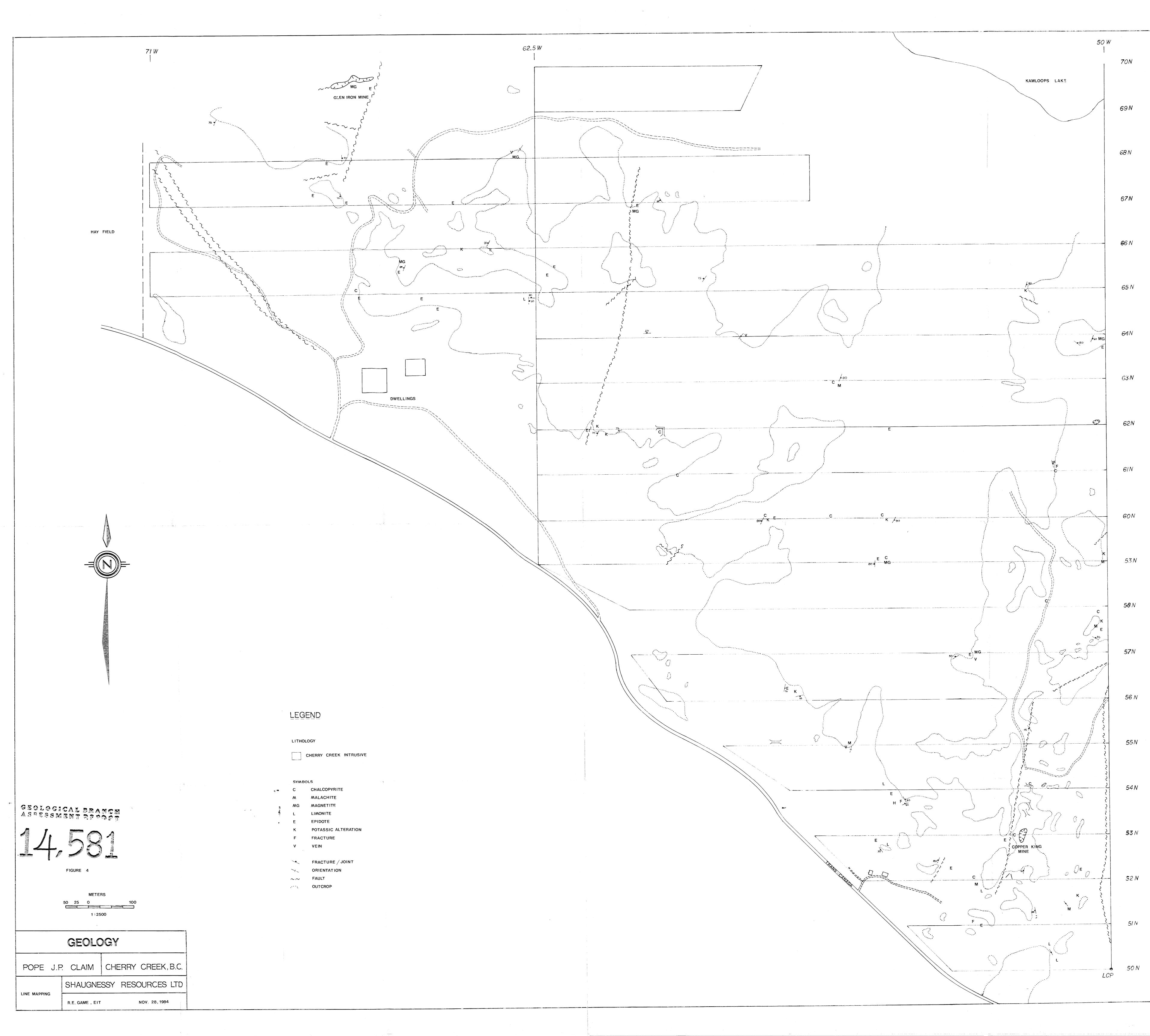
8.1 Geology Map

8.2 Copper Soil Geochemistr Map

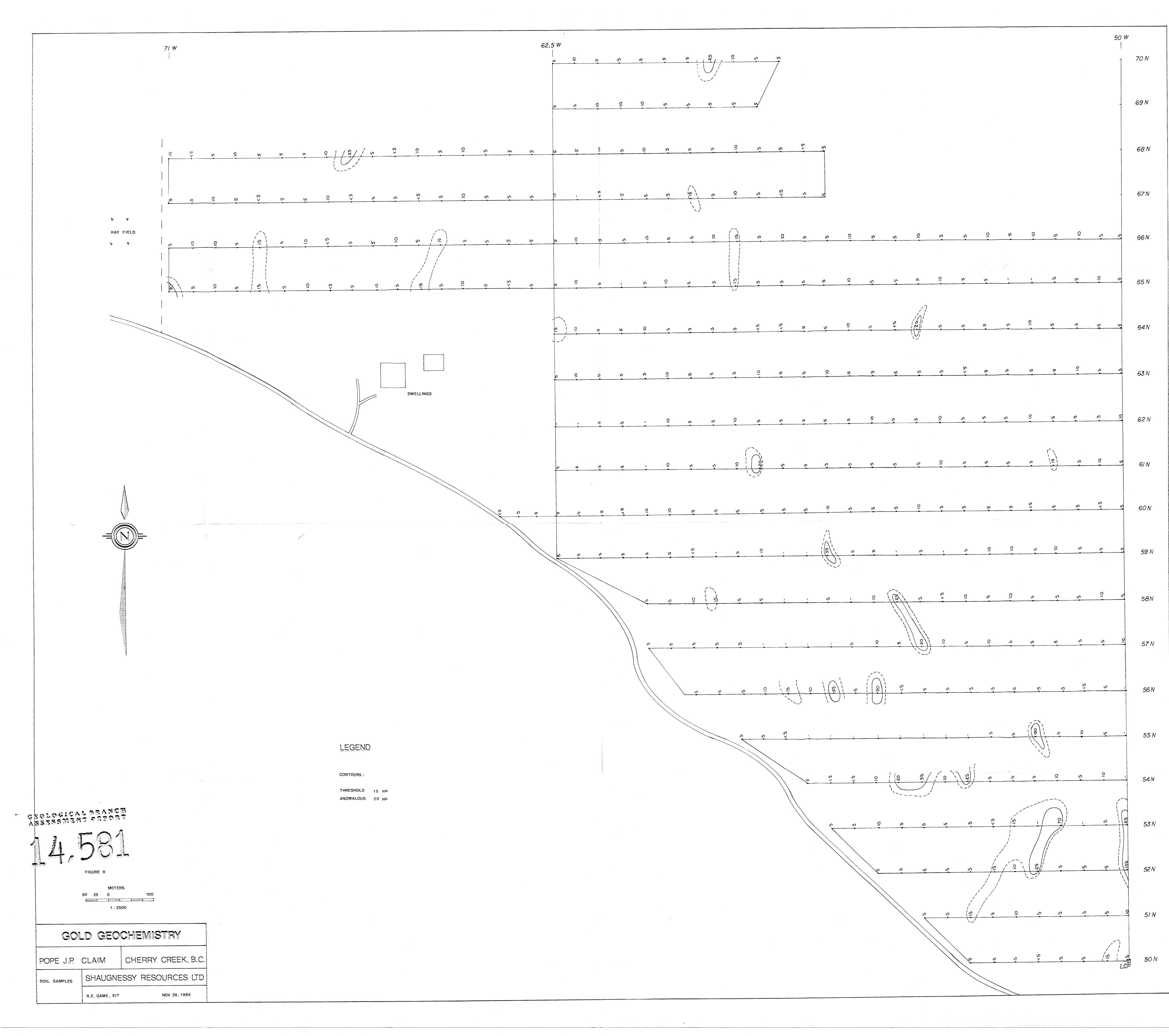
8.3 Gold Soil Geochemistry Map

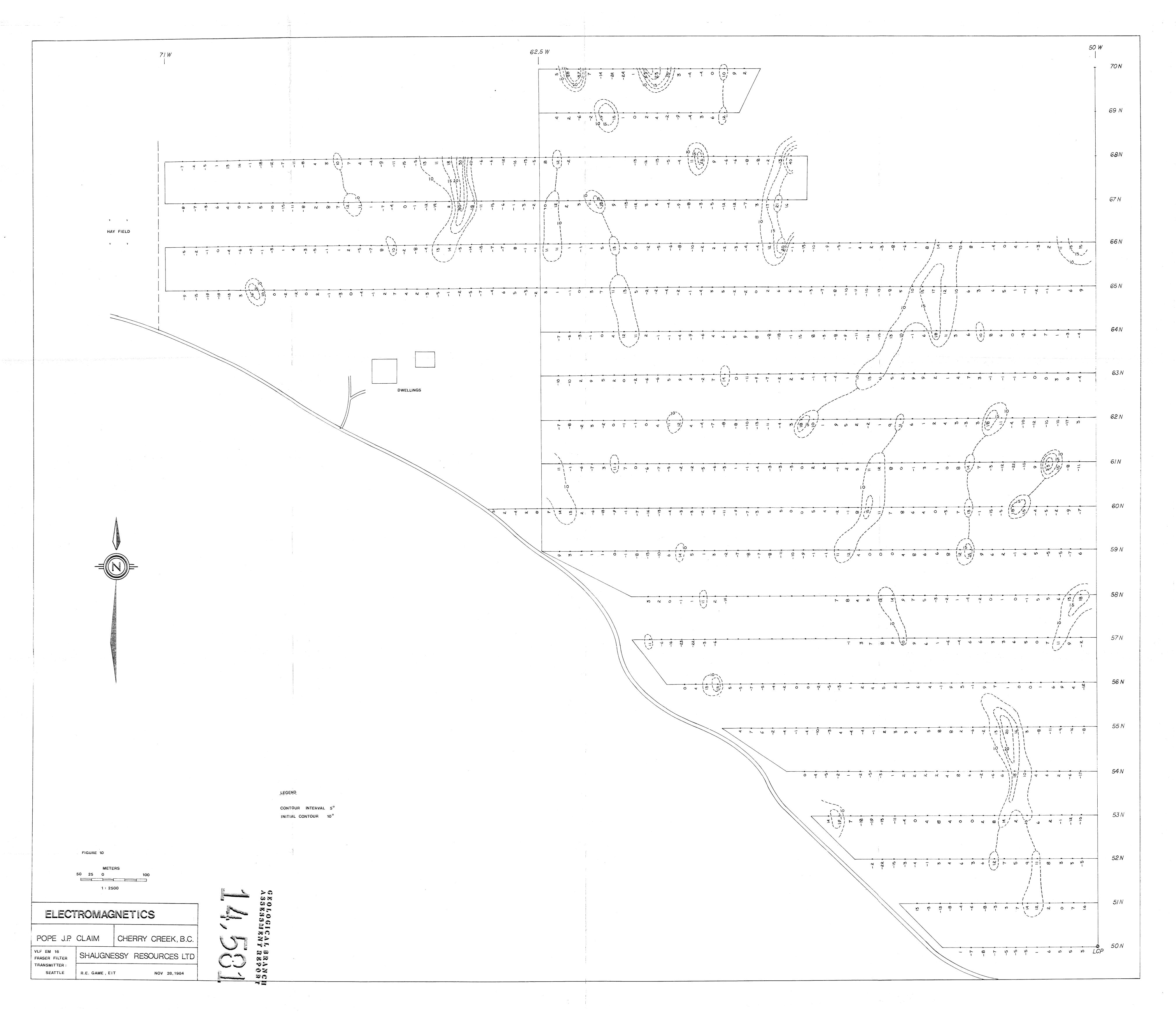
8.4 VLF EM 16 Map

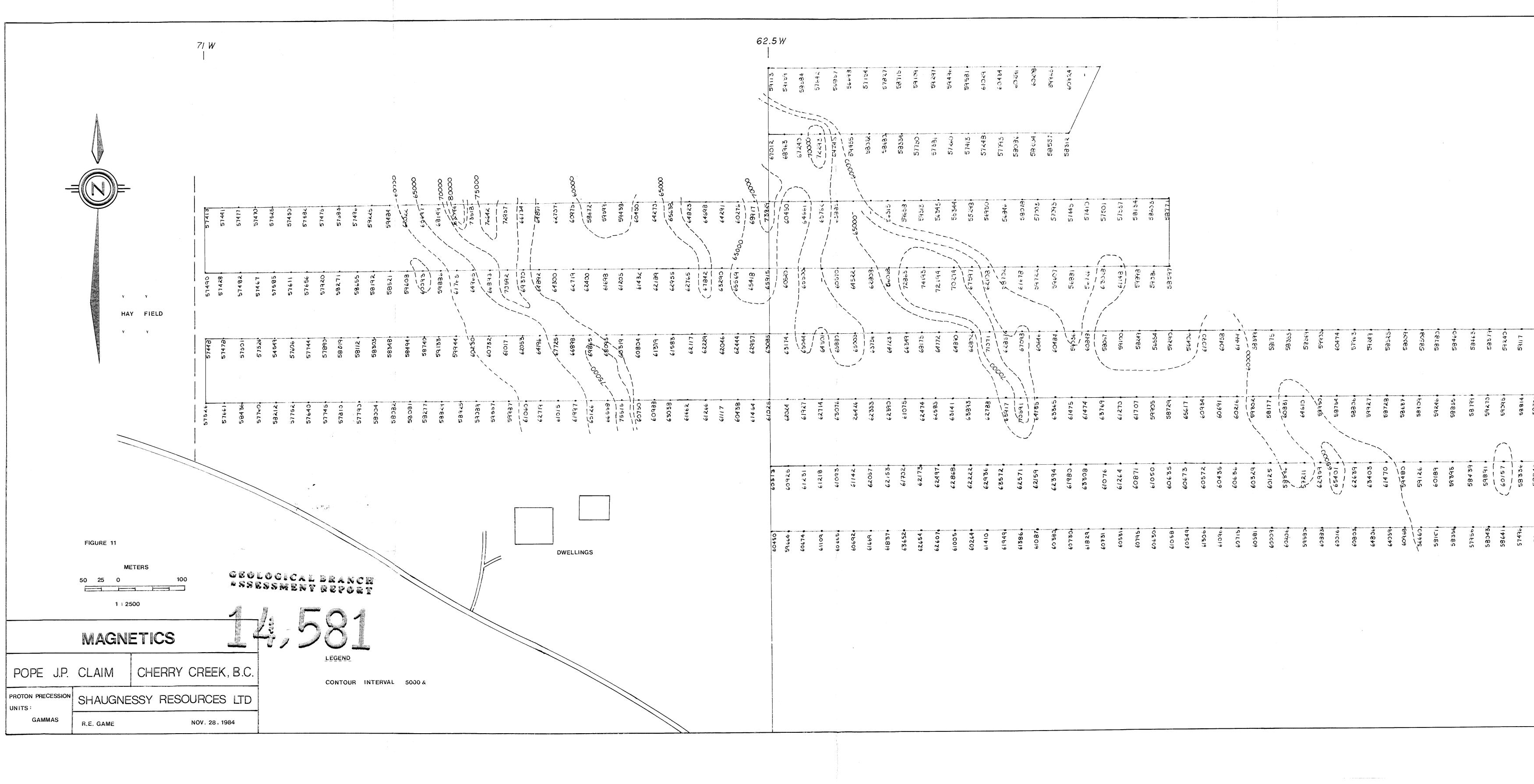
8.5 Proton Precession Magnetometer Map











			Ĺ	50 W	
					70 N
					69N
					68 N
					67 N
59192	58564	59045	59351	58960	66 N
58736	58356	59403	ସେ ଥିବି ଥିବି ଥିବି ଥିବି ଥିବି ଥିବି ଅନ୍ୟ	53776	65 N
58742	58170	58367	58715	58416	64 N
57719	57983	57978	57329.	574424	63 N