BC Geological Survey Assessment Report 33405

## **A REPORT**

## $\underline{\mathbf{ON}}$

## **INDUCED POLARIZATION SURVEYING**

Silver Hope Property Near Houston, BC

54.16° N, 126.27° W N.T.S. 93L/01

Claims Surveyed: 518057-063

Survey Dates: April 19th - 29th, August 6th - 16th, 2011

**FOR** 

**Owner/Operator:** FINLAY MINERALS LTD. Vancouver, B.C.

 $\mathbf{BY}$ 

PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, B.C.

**OCTOBER 2012** 

## **TABLE OF CONTENTS**

	<b>Page</b>
Introduction	3
Property, Location & Access	4
Previous Work	5
Geology	6
Purpose	8
Survey Specifications	9
Discussion of Results	12
Summary, Conclusions & Recommendations	16

## **APPENDIX**

Cost of Survey Personnel Employed on Survey Certification Location Map

## ACCOMPANYING MAPS AND SECTIONS MAP POCKET

Grid Location Map	1:20,000
IP Pseudosection Lines 4400N, 4788N, 5200N, 5600N, 6000N, 6323N	1:10,000
Inverted 3-D sections with Drillholes	1:5,000
Contours of Apparent Chargeability & Resistivity n=5	1:10,000

#### **INTRODUCTION**

From April 19<sup>th</sup> to 29<sup>th</sup>, 2011, Peter E. Walcott & Associates was contracted to carry out induced polarization (IP) surveying on the Silver Hope property for Finlay Minerals Ltd. This was an extension of the previous induced polarization surveys carried out by Peter E. Walcott & Associates in 2006 and 2008, with a larger dipole used to augment deeper depth investigation on 6 of the previous grid lines.

Access to the Silver Hope property is by truck along the Huckleberry Mine road south for approximately 30 kilometres. It is located adjacent to the past-producing Equity Silver Mine owned by Placer Dome.

The combined 2006 and 2008 grid was comprised of 12 east-west lines of varying separations.

Due to heavy snowfall and resulting deep accumulations the surveying was abandoned after the completion of three lines, and was resumed on August 6<sup>th</sup>, with the other three lines surveyed by August 16<sup>th</sup>, 2011.

In addition to the geophysical data, the elevations and horizontal positions of the line stations were also measured.

The IP/Resistivity data is presented as individual pseudosections at a scale of 1:10000.

## PROPERTY, LOCATION & ACCESS.

The property, known as the Silver Hope Property, is located in the Omineca Mining Division of British Columbia and consists of the following claims:

<u>Tenure Number</u>	<b>Anniversary</b>
518057	January 17 <sup>th</sup>
518058	44
518059	"
518060	"
518061	44
518062	"
518063	44
518064	44
530080	March 15 <sup>th</sup>
530081	44
530082	44
530083	"
530084	"
705773	"
705774	"
835782	October 13 <sup>th</sup>
835783	"
835784	"

The claims are some 40 kilometres southeast of the town of Houston, British Columbia, in the gentle hills of the Nechako physiographic region between elevations of 800 to 1400 metres, immediately south of the Equity Mine.

Access can be obtained from Houston via the Equity Silver Mine road, and then along the Goosly North road and road 481 to the property.

#### **PREVIOUS WORK.**

Previous work on the property consisted of regional mapping and geochemistry surveys by Kennco Explorations in the sixties, property scale mapping, geochemistry, magnetic and induced polarization surveys, and limited diamond drilling by Maverick Mining in the late sixties, followed by further diamond drilling by Teck Explorations in the early seventies.

A second phase of drilling on the property was conducted by Teck between 1985 and 1988 with some 3000 metres undertaken in 16 holes.

In 2004 Canadian Empire Explorations optioned the property and conducted a diamond drilling programe completing some 2150 metres in 8 drill holes.

In 2006 Finlay Minerals carried out a ground magnetic, induced polarization and gravity survey programme on three pairs of widely spaced lines over the Hope, Superstition and Gaul showings. This was followed by additional IP and magnetic surveying in 2008.

Finlay completed a six hole diamond drill programme in 2010 with encouraging results, and continued follow-up drilling in 2011.

For further information the reader is referred to reports held by Findlay Minerals and in particular to reports of the 2004 drilling by Janice Fingler, P.Geo., the 2006 and 2008 geophysics by Peter E. Walcott, P.Eng. and the 2011 report by Werner Gruenwald, P.Geo.

#### **GEOLOGY.**

This is excerpted from the previously mentioned report by J. Fingler, P.Geo.

"The lower Cretaceous Goosly sequence in the area of the Silver Hope and Equity Silver Mine properties trends AZ015 and dips moderately to shallowly to the west. Similar to the Skeena Group, the sequence consists of three stratigraphic divisions: a lower clastic sequence, an interbedded and overlying pyroclastic division, and an upper sedimentary-volcanic division. The middle pyroclastic division hosts the main mineral deposists of the Equity-Silver Hope trend, and may be correlatable with the Rocky Ridge Formation identified to the north of the Skeena Arch.

In the area of the Equity Mine and Silver Hope properties, the Goosly Sequence hosts the main mineral deposits and has a general strike of AZ015 and dips moderately to shallowly to the west. A lower clastic division (unit 1) consists of a basal conglomerate, chert pebble conglomerate and argillite. A middle pyroclastic division (unit 2) consists of heterogeneous sequence of tuff, breccia and reworked pyroclastic debris. This division hosts the main mineral deposits. An upper sedimentary-volcanic division (unit 3) consists of tuff, sandstone and conglomerate. There are notable facies variations within the stratigraphy, with overall increased sediment component in south, also finer to reworked tuffaceous sequence in the pyroclastic division. As well the dip of the strata is variably steep" – see Geology map in Appendix I.

"The Goosly sequence in the mine property area is cut to the west by a Paleocene quartz monzonite stock (58 ma) and to the east by an Eocene gabbro-monzonite complex (48 ma). Post mineral andesite and quartz latite dykes of Eocene age (49 ma) cut the Cretaceous strata on both the mine and Silver Hope properties, and also cut the gabbro-monzonite complex on the mine property (Cyr et al., 1984).

It has been interpreted by Cyr et al., 1984, that the copper-silver-gold mineralization at the Equity Mine is epigenetic in origin and may be related to the emplacement of the Paleocene quartz monzonite stock to the west. Coincident K-Ar ages were obtained for both the quartz monzonite and the sericitized tuffs hosting the mineralization. However, given the interpretations by Church and Barakso, 1990 and D. MacIntyre et al., 2003, of the Goosly volcanics (which hosts mineralization) as being correlative with the Lower Cretaceous Skeena Group, it is possible that age dates of the volcanics may have been

### **GEOLOGY cont'd**

thermally resetting by a later intrusive episode. The results of U-Pb dating of samples of volcanics collected from the Equity Mine site in 2003 by D. MacIntyre, are unknown to the author.

At the Equity mine, erosion has exposed the upper part of the Goosly stock and subvolcanic structures. A thickened zone of disseminated an massive sulphides rich in pyrite, chalcopyrite and tetrahedrite, with some pyrrhotite, minor sphalerite and magnetite, is mostly adjacent to the stock. Aluminous alteration, characterized by andalusite, scorzalite, pyrophyllite and corundum, accompanies much of this mineralization. A narrow tail-like appendage to the ore zone strikes south and away from the orebody."

Further and updated geology is contained in the previously mentioned report by W. Gruenwald, P.Geo.

# **PURPOSE**

The purpose of the survey was to augment the existing shallower induced polarization datasets to better facilitate 3D inversion, in an effort to locate additional mineralization at depth.

#### **SURVEY SPECIFICATIONS**

#### *Induced Polarization Survey*

The induced polarization (IP) survey was conducted using a pulse type system, the principal components of which were manufactured by Huntec Limited of Metropolitan Toronto, Canada and Instrumentation GDD Inc. of Quebec, Canada.

The system consists basically of three units, a receiver (GDD), transmitter (Huntec) and a motor generator (Honda). The transmitter, which provides a maximum of 7.5 kw d.c. to the ground, obtains its power from a 7.5 kw 400 c.p.s. three phase alternator driven by a Honda 20 h.p. gasoline engine. The cycling rate of the transmitter is 2 seconds "current-on" and 2 seconds "current-off" with the pulses reversing continuously in polarity. The data recorded in the field consists of careful measurements of the current (I) in amperes flowing through the current electrodes  $C_1$  and  $C_2$ , the primary voltages (V) appearing between any two potential electrodes,  $P_1$  through  $P_7$ , during the "current-on" part of the cycle, and the apparent chargeability, ( $M_a$ ) presented as a direct readout in millivolts per volt using a 200 millisecond delay and a 1000 millisecond sample window by the receiver, a digital receiver controlled by a micro-processor – the sample window is actually the total of twenty individual windows of 50 millisecond widths.

The apparent resistivity ( $\int_a$ ) in ohm metres is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The chargeability and resistivity are called apparent as they are values which that portion of the earth sampled would have if it were homogeneous. As the earth sampled is usually inhomogeneous the calculated apparent chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey was carried out using the "pole-dipole" method of surveying. In this method the current electrode,  $C_1$ , and the potential electrodes,  $P_1$  through  $P_7$ , are moved in unison along the survey lines at a spacing of "a" (the dipole) apart, while the second current electrode,  $C_2$ , is kept constant at "infinity". The distance, "na" between  $C_1$  and the nearest potential electrode generally controls the depth to be explored by the particular separation, "n", traverse.

### **SURVEY SPECIFICATIONS cont'd**

On this survey a 200 metre dipole was employed and first to sixth separation readings were obtained.

In all, a total of some 20 kilometres of I.P. surveying were completed.

## Horizontal control.

The horizontal position of the stations were recorded using a Garmin 60CSxMap GPS unit.

#### Vertical Control.

The elevations of the stations were recorded using an ADC Summit altimeter manufactured by Brunton of Wyoming, U.S.A. This instrument measures elevations using barometric pressures to an accuracy of plus or minus 3 metres. Corrections for errors due to variations in atmospheric pressure were made by comparison to readings obtained on a similar instrument, held stationary at one location – base -, at 10 minute intervals.

#### Data Presentation.

The I.P. data are presented as individual pseudosection plots of apparent chargeability and resistivity at a scale of 1:10000 on the topographic profile. Plots of the 21 point moving filter – illustrated on the pseudo section – for the above are also displayed in the top window to better show the location of the anomalous zones.

### **SURVEY SPECIFICATIONS cont'd**

Two dimensional smooth model inversion of the resistivity and chargeability was carried out using the Geotomo RES2DINV Algorithm, an algorithm developed by Loke et-al. This algorithm uses a 2-D finite element method and incorporates topography in modeling resistivity and I.P. data. Nearly uniform starting models are generated by running broad moving-average filters over the respective lines of data. Model resistivity and chargeability properties are then adjusted iteratively until the calculated data values match the observed as closely as possible, given constraints which keep the model section smooth. The smooth chargeability and resistivity models were then imported into Geosoft format for presentation at the same scale of 1:10,000 on the topographic profile. A slight discrepancy can be observed between the measured and modeled plots as the former are processed in Geosoft which assumes horizontal distances for the station separation.

The 2D inversions are not presented in this report.

The data was merged with the previous data and subsequently subjected to 3D inversion utilizing the Geotomo RES3DINV Algorithm by Loke et-al.

The data was then imported into Geosoft where voxels were created for presentation.

Stacked sections of the resistivity and chargeability along with historic drilling are presented in this report at a scale of 1:5,000.

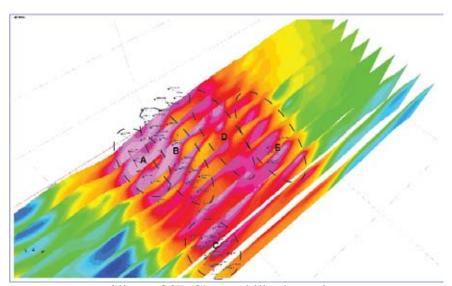
#### **DISCUSSION OF RESULTS**

The 2011 induced polarization survey was designed to test for mineralization at depth over portions of the Silver Hope property where historic drilling had successfully identified significant mineralization.

Six east-west lines were traversed using a 200 metre a-spacing overlapping with previous surveys which utilized smaller 50 and 100 metre a-spacing. The respective datasets were subsequently merged in order to facilitate an area wide 3D inversion over known zones of mineralization in an effort to identify additional features at depth, along with plan additional drilling in these areas.

The results of the survey and subsequent inversions yielded a number of areas of interest. While the majority of the zones had been identified in previous surveys, the addition of the 200 metre dataset greatly extended the depth of investigation.

Anomaly A – situated in the north western portion of the survey. This broad chargeability associated with moderate to high resistivity appear extent to depth and remains open to the north. Deep drilling within this area has identified a significant porphyry style system.



Slices of 3D Chargeability inversion

### **DISCUSSION OF RESULTS con't**

Anomaly B – flanking the eastern edge of anomaly A. This feature appears to merge at depth with anomaly A. It is situated on a resistivity contract in a moderate to low resistivity and extends from the northern limit of the survey down through the Hope, and Superstition zones, and into the Gaul zone in the south as illustrated. This feature has been extensively drill tested and returned significant mineralization.

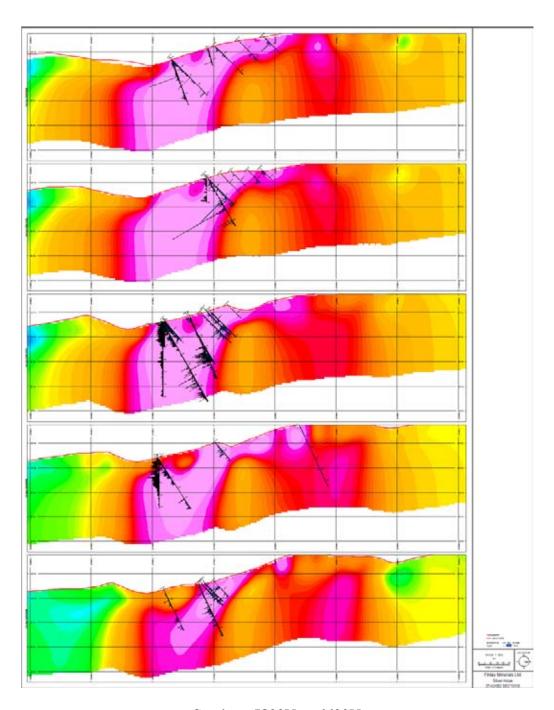
Anomaly C- situated some 800 metres south of Anomaly A. This moderately chargeable feature is associated with moderate resistivity, and is centered over the Gaul zone. Anomaly C is a likely extension of Anomaly B. This area has also been drill tested and returned significant mineralization.

Anomaly D – situated in the north eastern portion of the survey area, in a highly resistive zone. This is a shallower feature, which parallels the northerly trending resistivity structure immediately to the west that has received minimal drill testing, thus may warrant further investigation.

Anomaly E – immediately to the east of anomaly D. This a moderate chargeability feature at depth associated within a higher resistivity. This feature was drill tested with varying degree of success.

A series of stacked sections of the 3D inversions of modeled chargeability are presented on the following pages.

# **DISCUSSION OF RESULTS con't**

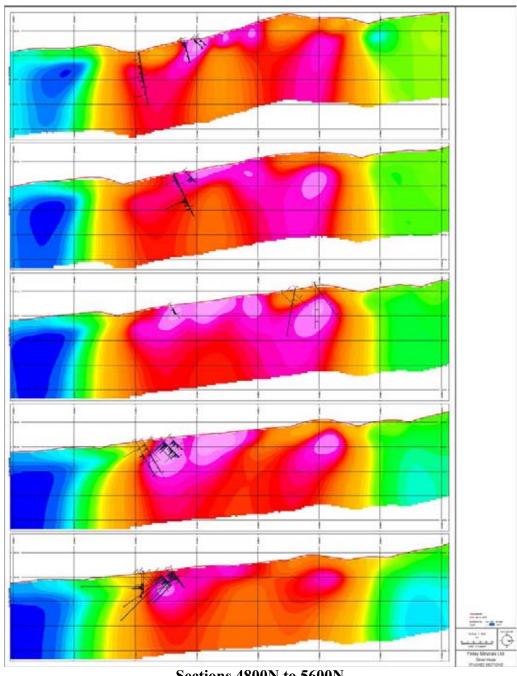


Sections 5800N to 6600N Modelled Chargeability

Peter E. Walcott & Associates Limited Geophysical Services

Induced Polarization Surveying Finlay – Silver Hope

# **DISCUSSION OF RESULTS con't**



Sections 4800N to 5600N Modelled Chargeability

Peter E. Walcott & Associates Limited Geophysical Services

Induced Polarization Surveying Finlay – Silver Hope

#### SUMMARY, CONCLUSIONS & RECOMMENDATIONS.

Between April 19<sup>th</sup> and 29<sup>th</sup>, and August 6<sup>th</sup> and 16<sup>th</sup>, 2011, Peter E. Walcott & Associates Limited carried out induced polarization surveying on portions of the Silver Hope property for Finlay Minerals Ltd.

The Silver Hope property is located some 40 kilometres southeast of Houston, B.C., and is adjacent to the past-producing Equity Silver Mine.

The surveys were an extension of the 2006 and 2008 geophysical programmes and were likewise carried out over the Hope, Superstition and Gaul Zones.

The survey and subsequent inversion were successful in identifying the known areas of copper-silver-gold mineralization and providing additional information proximal to these features to a depth of some 500 metres. A number deep drill holes are warranted to test the large chargeability anomaly in the area of Anomaly A.

While the western anomalies have been drill tested and returned positive results, only minimal testing has been conducted on the eastern features, and these remain of interest. A review of all available geological, geochemical and geophysical data should be undertaken prior to additional testing of these anomalies.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LIMITED

Alexander Walcott Geophysicist Peter E. Walcott, P.Eng Geophysicist

Vancouver, B.C. October 2012

Peter E. Walcott & Associates Limited Geophysical Services

Induced Polarization Surveying Finlay – Silver Hope

# **APPENDIX**

## **COST OF SURVEY**

Peter E. Walcott & Associates Limited undertook the survey on a daily basis with provision of a six man crew, I.P. equipment, altimeters, GPS, 4x4 truck and skidoos at a cost of \$3,500.00 on the April survey with accommodation and fuel costs at \$5,038.68. Mobilization costs were \$6,900.00.

On the August survey the crew and equipment less skidoos was furnished at a daily cost of \$3,350.00 with an additional operator, receiver, helper and truck at \$1,600.00. Accommodation and fuel costs were \$4,558.54 while mobilization costs – split with another project – were \$5,000.00.

Reporting was done for \$2,500.00 so that the total cost for the services provided was \$83,197.22.

Inversion and reporting costs were \$1,500.00 so that the total cost of services provided was \$41,735.84.

## PERSONNEL EMPLOYED ON SURVEY

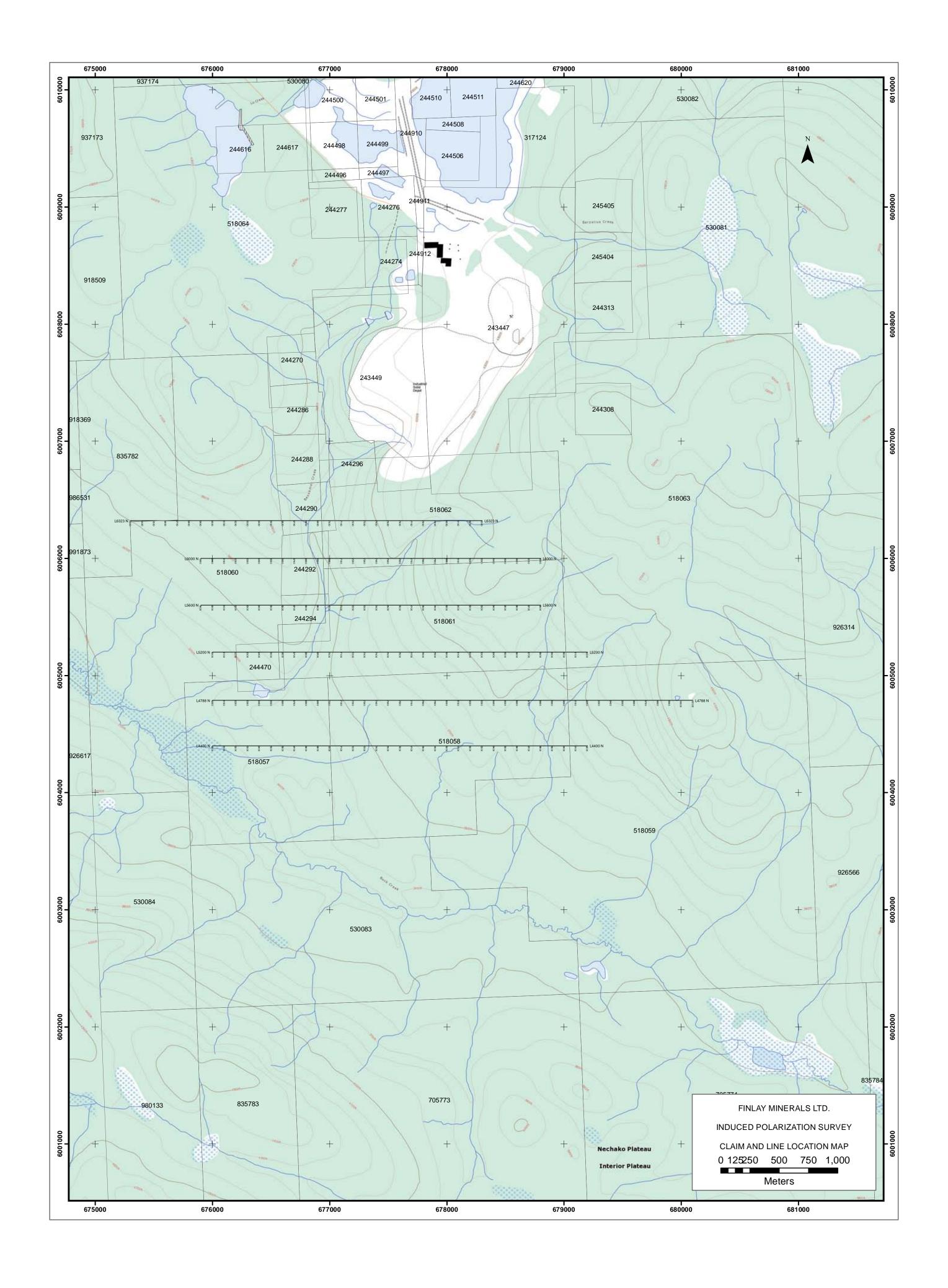
Name	Occupation	Address	Dates
Peter E. Walcott	Geophysicist	Peter E. Walcott & Associates Limited 608-1540 W. 2 <sup>nd</sup> Ave Vancouver, B.C.	Oct 30/12 e.
Alexander Walcott	Geophysicist	"	Dec 1-8/11
Marek Welz	4	"	Apr 6-16/11
Brett Dupreez	44	"	Aug 19-29/11
G. Munoz	"	"	"
C. Pearson	Geophysical Technician	"	
M. Berlinguette	Geophysical Assistant	"	"
Royce Gairdner	"	"	"
Ryan Gairdner	"	44	"
J.Steblin	"	46	Aug 25-29/11
D.Tennant	44	44	"
D. Minskip	44	44	44
K. Heatherington	44	44	Apr 6-16/11
S. Lessard	46	44	44
C. Dickey	44	44	44
Aaron Charlie	44		46
O. Janout	Geophysical Technician	"	"
Peter E. Walcott & Asse Geophysical Services	ociates Limited		ced Polarization Surveying ay – Silver Hope

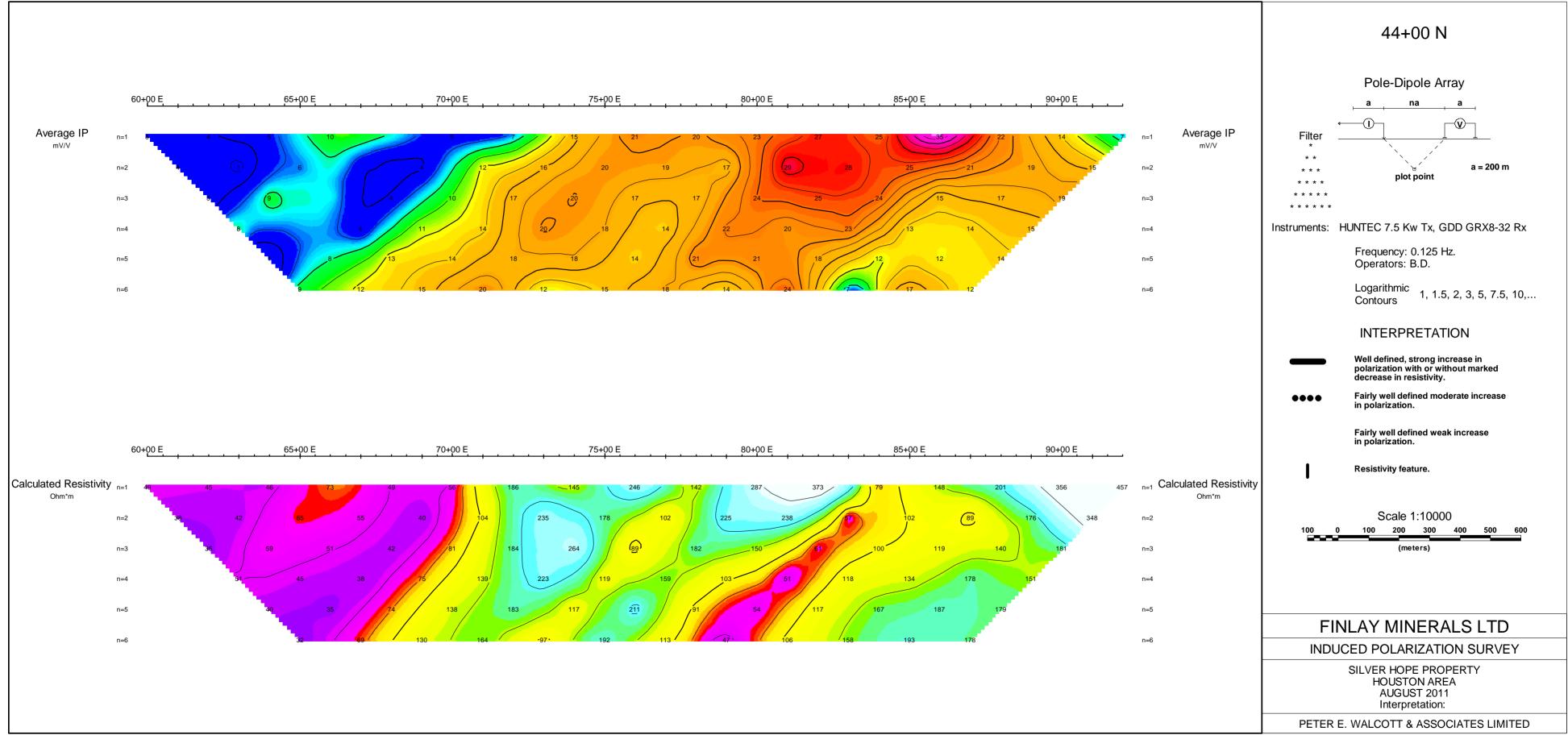
## **CERTIFICATION.**

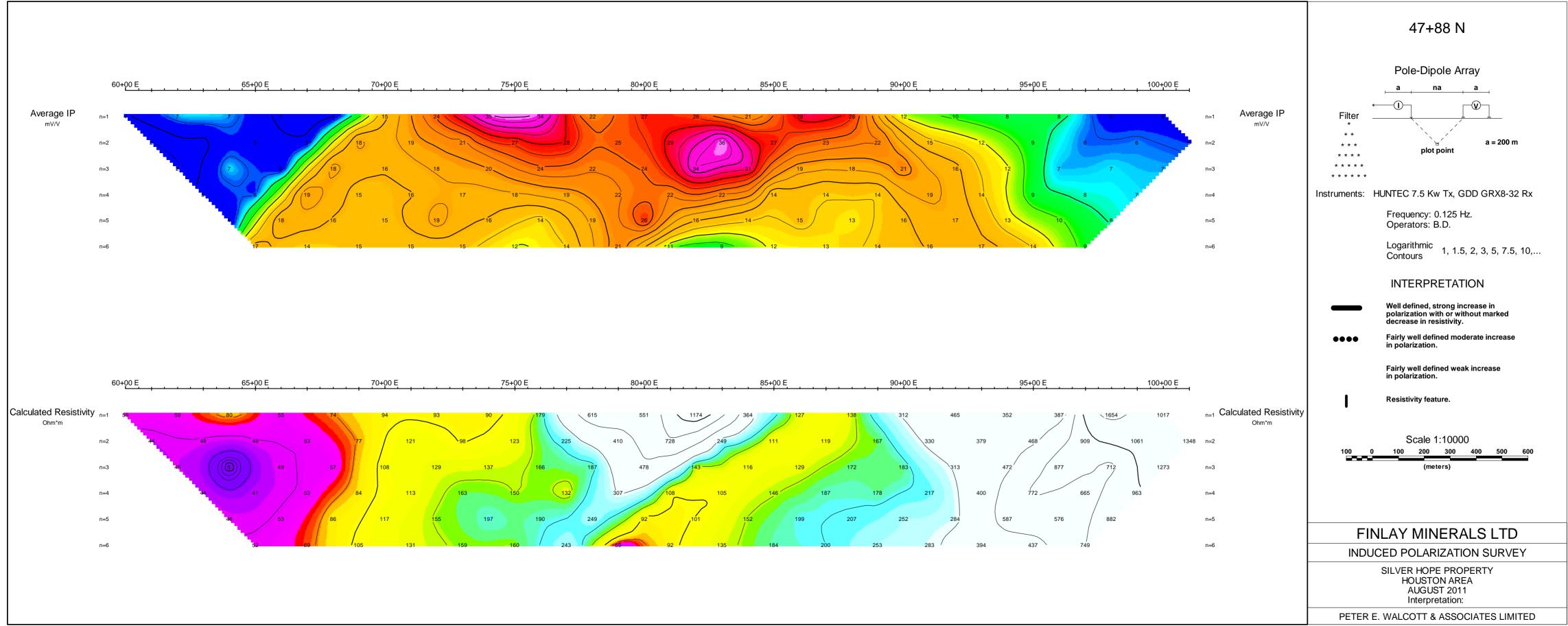
- I, Peter E. Walcott of 605 Rutland Court, Coquitlam, B.C., hereby certify that:
  - 1. I am graduate of the University of Toronto in 1962 with a Bachelor of Applied Science degree in Engineering Physics Geophysics Option.
  - 2. I have been practicing my profession for the last 50 years.
  - 3. I am a member of the Association of Professional Engineers of British Columbia and Ontario.
  - 4. I hold no interest, direct nor indirect, in Finlay Minerals Ltd., nor do I expect to receive any.

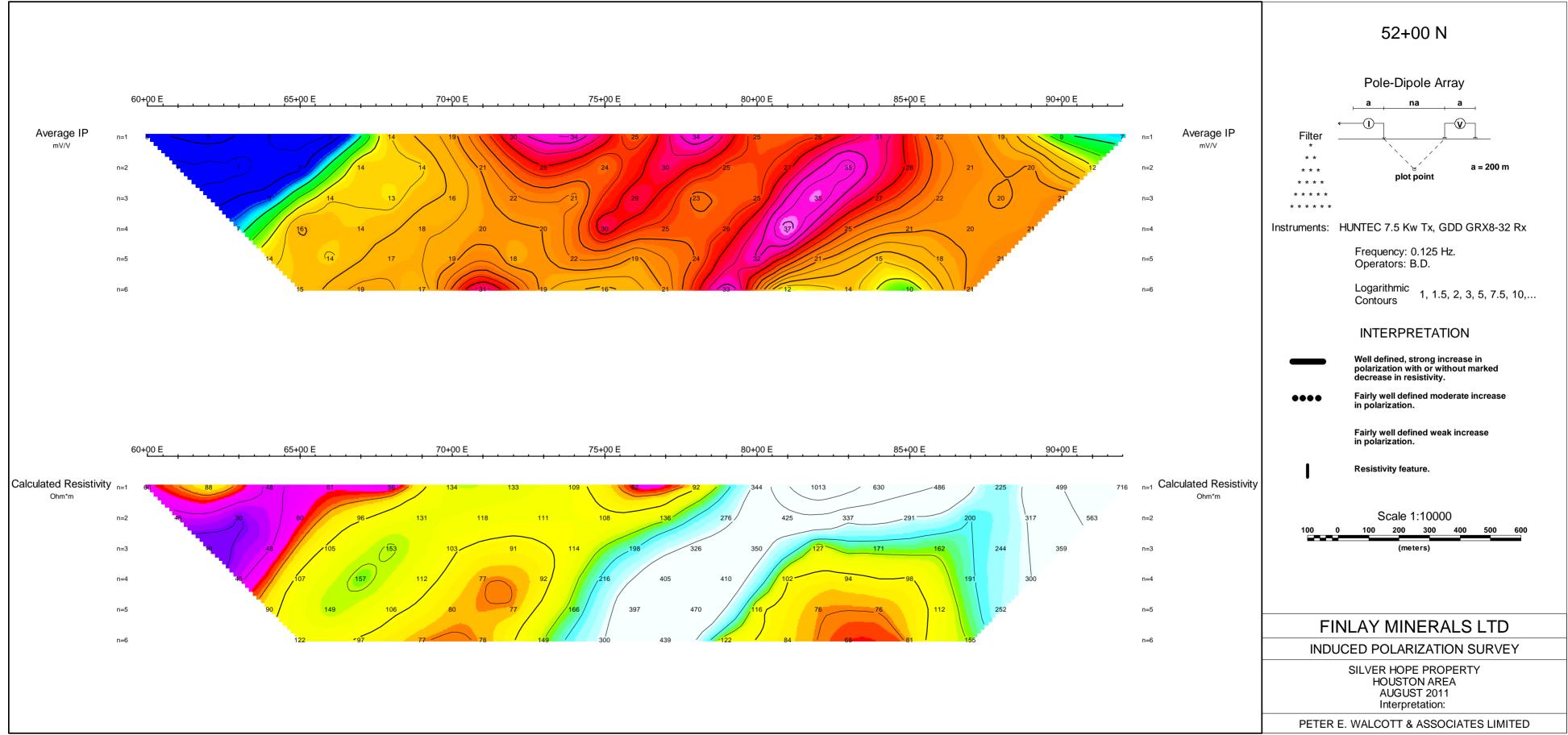
Peter E. Walcott, P.Eng.

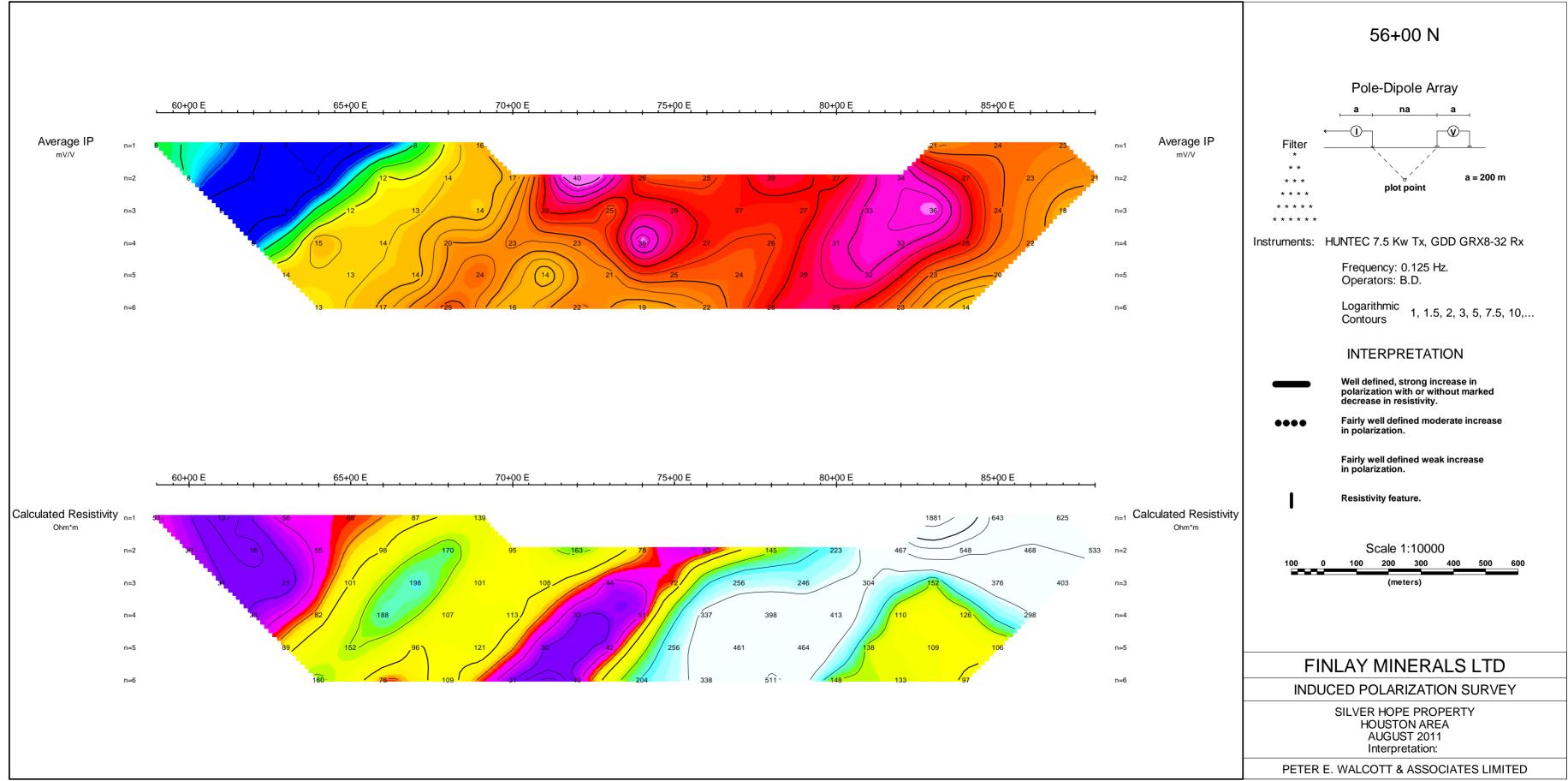
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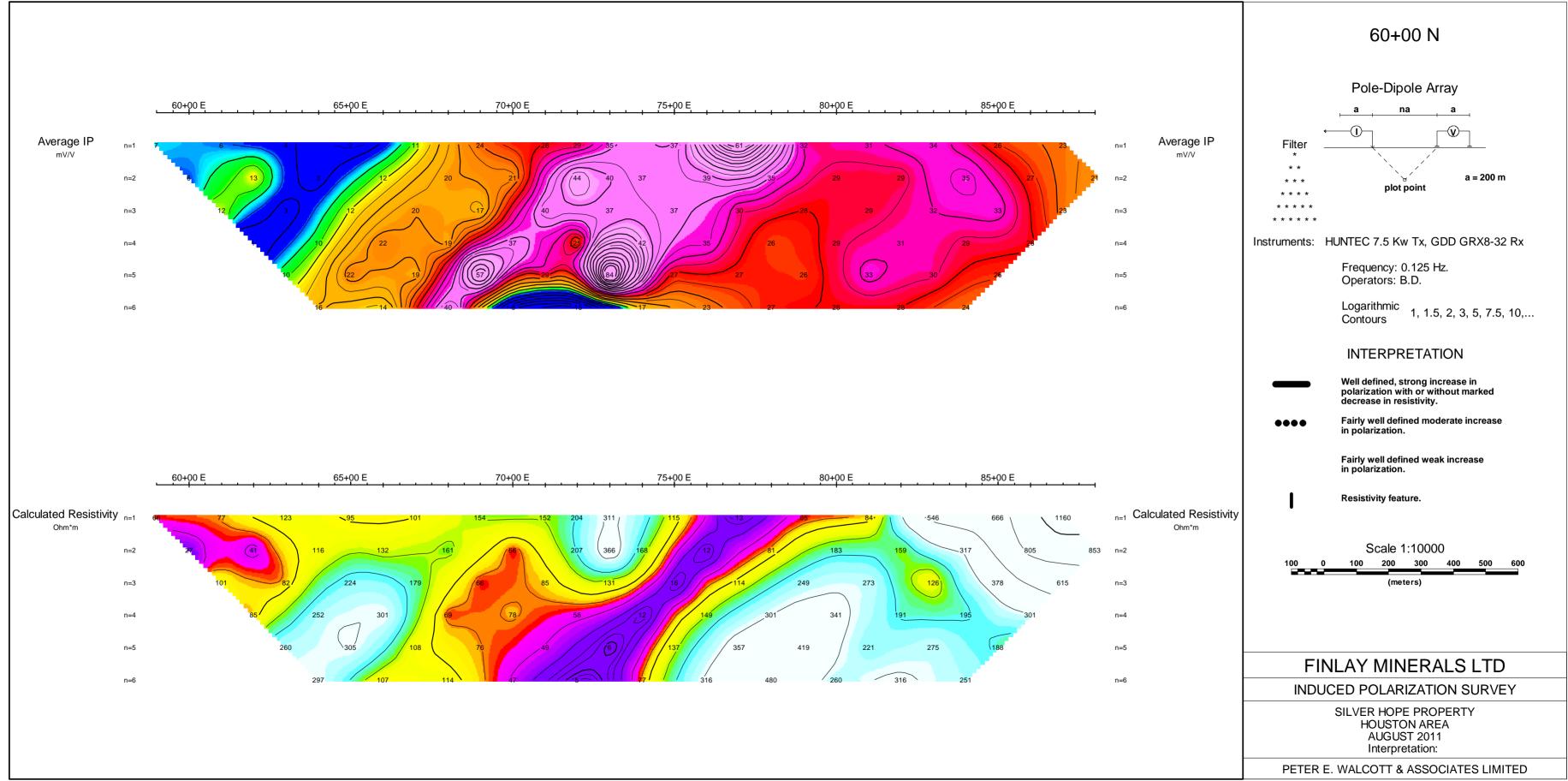


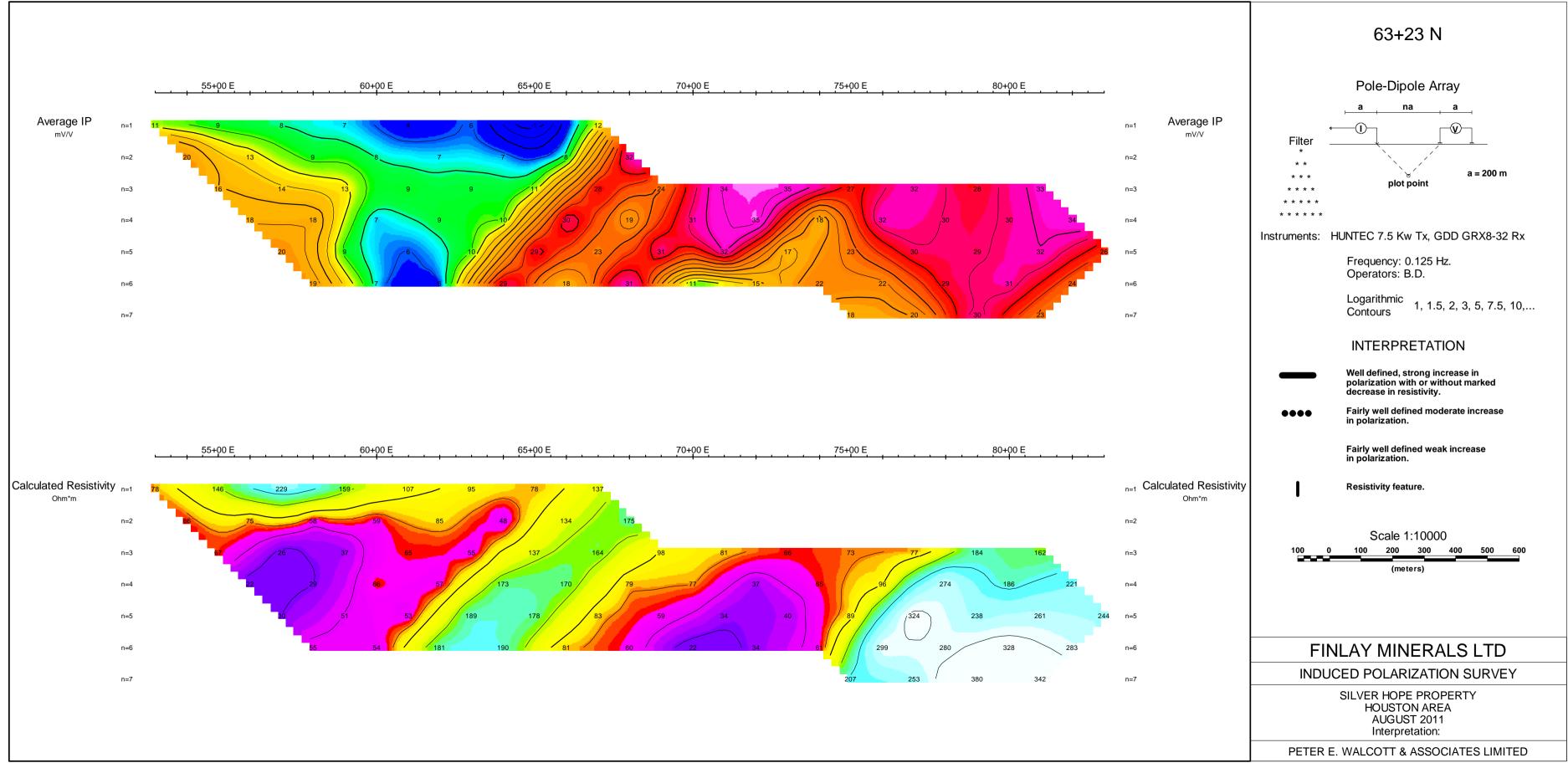


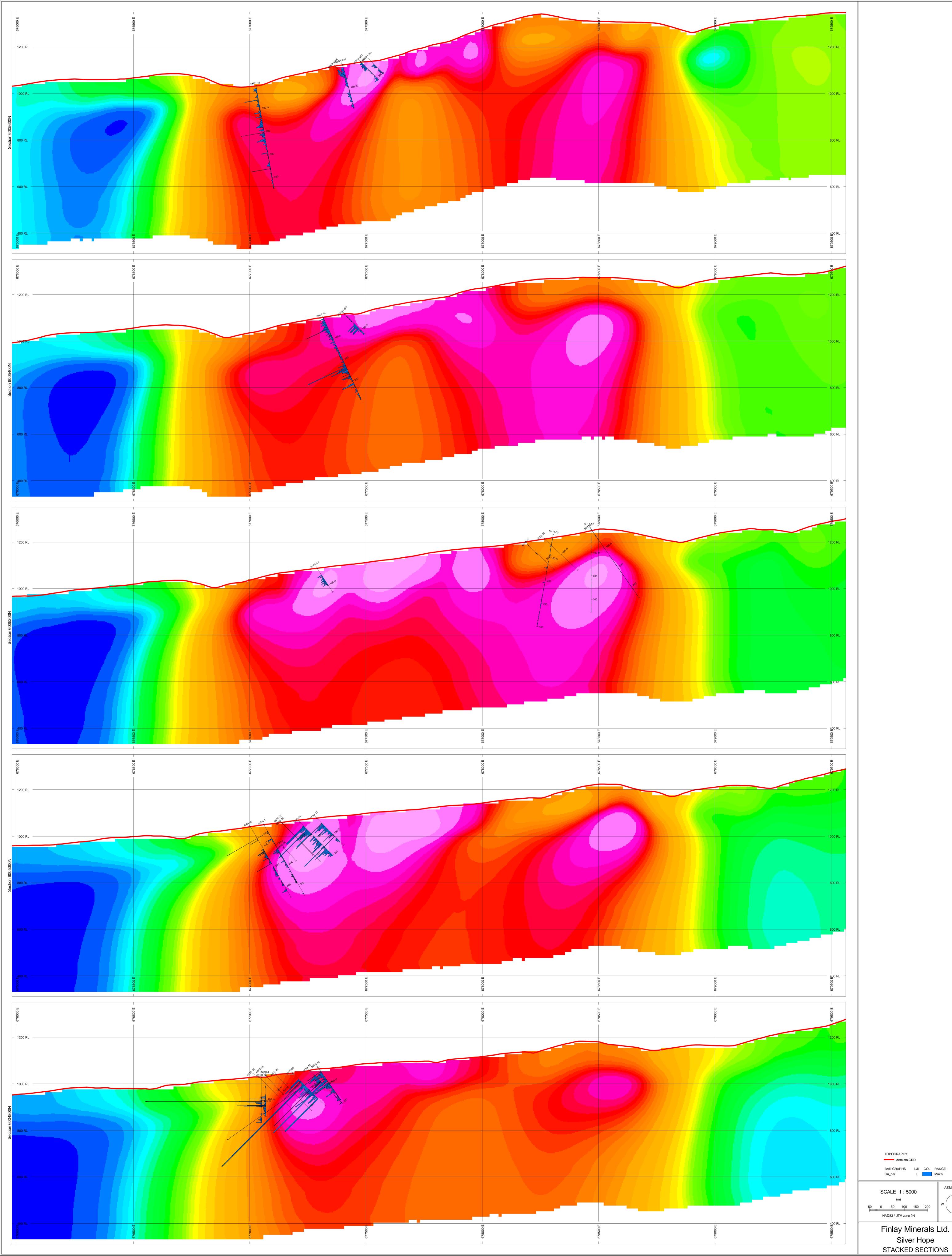




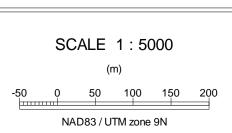




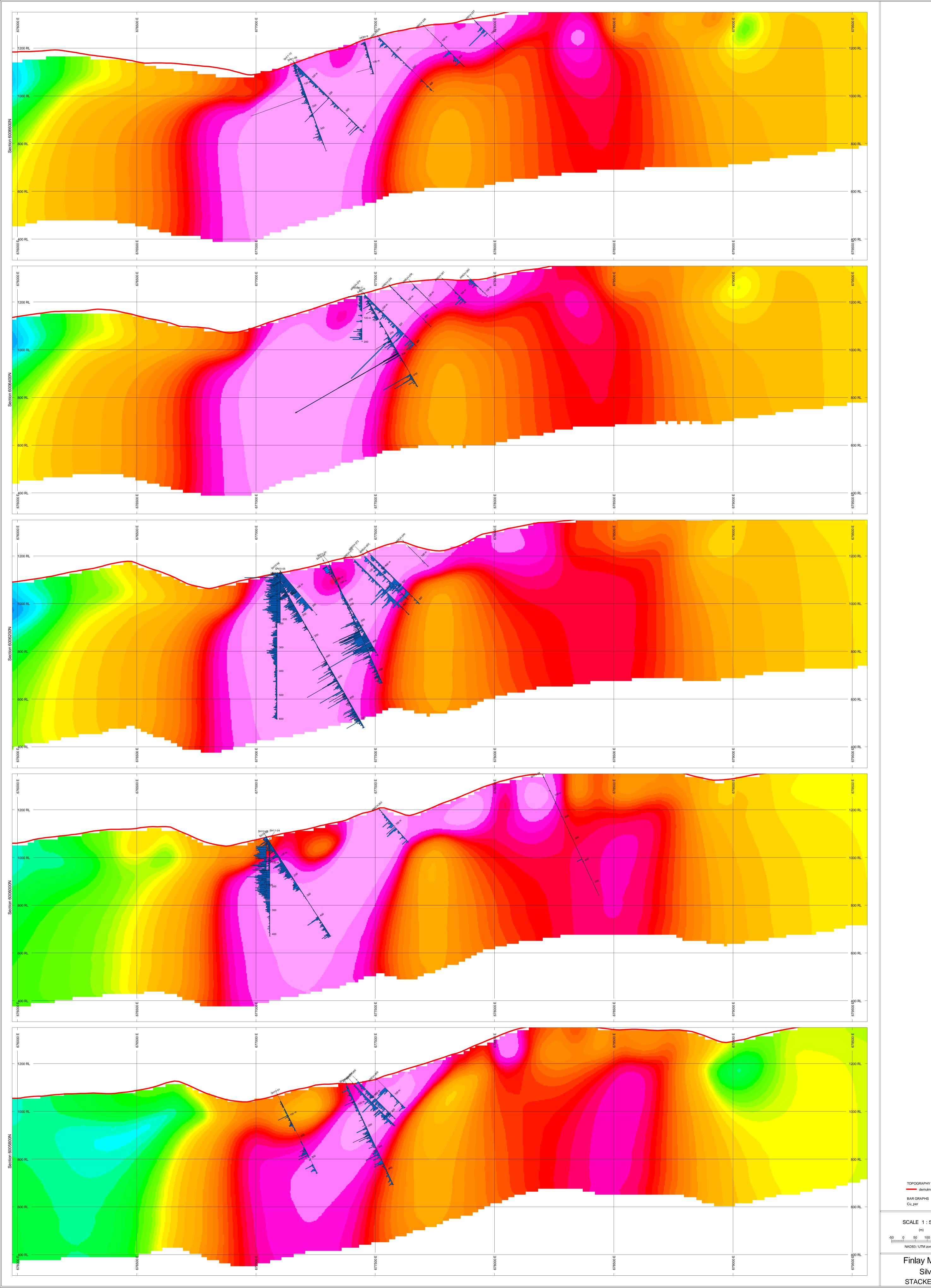




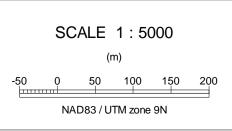
BAR GRAPHS L/R COL RANGE



Finlay Minerals Ltd. Silver Hope



TOPOGRAPHY BAR GRAPHS L/R COL RANGE SCALE 1:5000



Finlay Minerals Ltd. Silver Hope STACKED SECTIONS

