

**Ministry of Energy, Mines & Petroleum Resources**  
Mining & Minerals Division  
BC Geological Survey

**Assessment Report**  
**Title Page and Summary**

TYPE OF REPORT [type of survey(s)]: Geophysical Report on the Wildcat Property

TOTAL COST: \$106,670

AUTHOR(S): Rory R. Ritchie, & Brad J. Peters

SIGNATURE(S): 

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): MX-13-284

YEAR OF WORK: 2017

STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S): 5648434 (May 5 2017), 5654601 (June 30 2017)

PROPERTY NAME: Wildcat Property

CLAIM NAME(S) (on which the work was done): no names. 511,859 & 511800

COMMODITIES SOUGHT: Copper and gold

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: \_\_\_\_\_

MINING DIVISION: Omineca Mining Division

NTS/BCGS: 093N /01

LATITUDE: 55.005 ° \_\_\_\_\_ ' \_\_\_\_\_ " LONGITUDE: -124.186 ° \_\_\_\_\_ ' \_\_\_\_\_ " (at centre of work)

OWNER(S):

1) Pacific Empire Minerals Corp.

2) \_\_\_\_\_

MAILING ADDRESS:

211 - 850 West Hastings Street

Vancouver, BC V6C 1E1

OPERATOR(S) [who paid for the work]:

1) Pacific Empire Minerals Corp.

2) \_\_\_\_\_

MAILING ADDRESS:

211 - 850 West Hastings Street

Vancouver, BC V6C 1E1

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):

Takla group, Late Triassic to Early Jurassic, volcanics, diorite, monzonite, phyllic, propylitic, pyrite-chalcopyrite.

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: 19585, 20416, 23809, 24257, 27331, 27733, 29097, 30000, 31818, 32882

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
<b>GEOLOGICAL (scale, area)</b>			
Ground, mapping			
Photo interpretation			
<b>GEOPHYSICAL (line-kilometres)</b>			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization 27.8 line km		511859, 511800	106670
Radiometric			
Seismic			
Other			
Airborne			
<b>GEOCHEMICAL (number of samples analysed for...)</b>			
Soil			
Silt			
Rock			
Other			
<b>DRILLING (total metres; number of holes, size)</b>			
Core			
Non-core			
<b>RELATED TECHNICAL</b>			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
<b>PROSPECTING (scale, area)</b>			
<b>PREPARATORY / PHYSICAL</b>			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			\$106,670
<b>TOTAL COST:</b>			<b>\$106,670</b>

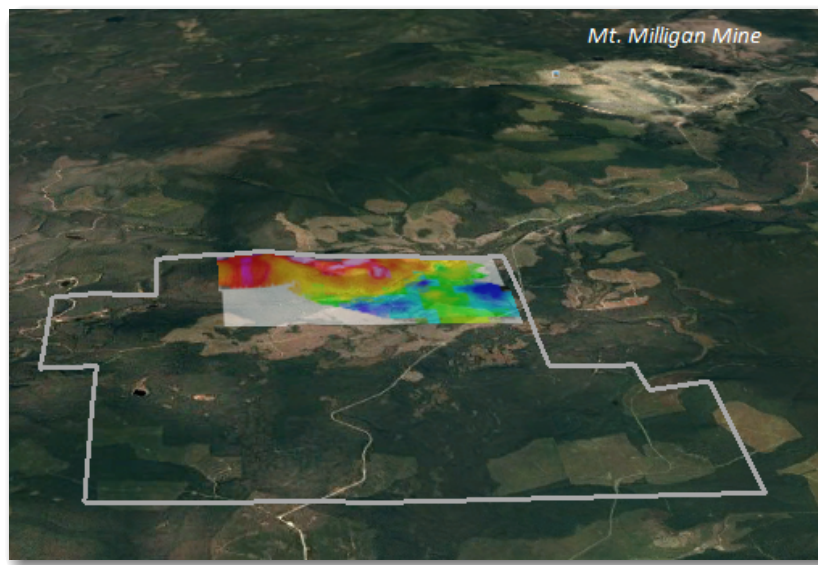
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Geophysical REPORT  
*on the*  
WILDCAT PROPERTY

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BC Geological Survey  
Assessment Report  
36614

OMINECA MINING DIVISION, BRITISH COLUMBIA, CANADA  
428,000 E / 6,096,000 N  
LONGITUDE -124.125° / LATITUDE 55.005°  
(NAD 83 - ZONE 10) NTS: 93K/16 & 93N/01



*Prepared by*  
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CLAIM OWNER  
RICHARD JOSEF HASLINGER JR.  
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*June 30, 2017*

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# 1 Summary

The Wildcat Property is located 65 km north of Fort St. James and 150 km northwest of Prince George, in central British Columbia, Canada. The property is comprised of 10 mineral claims covering an area of 5,825.64 hectares. The Property is readily vehicle accessible via Forest Service Roads whereby the driving time from Fort St. James to the property is approximately 1 hour. The property is located approximately 10 km southwest of the Mt. Milligan Copper-Gold Mine currently operated by Centerra Gold Inc. The Wildcat Property mineral claims are owned wholly by Richard Josef Haslinger Jr. of Vancouver, British Columbia.

The Wildcat Property is subject to an option agreement whereby Pacific Empire Minerals Corp. may earn a 100% interest in the Wildcat claims by completing certain share issuances and incurring exploration expenditures in connection with certain exploration commitments. In April and May of 2017, Pacific Empire Minerals Corp. incurred approximately \$110,000 of exploration expenditures on the Wildcat Property. The property is currently 100% owned by Richard Josef Haslinger Jr.

The Property is located within the Quesnel Terrane which is characterized by Late Triassic to Early Jurassic volcanic and sedimentary rocks of island arc affinity that have been intruded by a variety of intrusive phases related to the Late Triassic to Early Jurassic Hogen Intrusive Suite. The economic importance of the Quesnel arc is demonstrated by its rich endowment of porphyry copper-gold mineral deposits.

Geology on the Wildcat Property can be summarized as variably altered, augite porphyritic, mafic volcanic and volcanoclastic rocks and monzonitic to dioritic intrusives correlated with the Late Triassic-Early Jurassic Takla Group. Alteration assemblages reminiscent of distal porphyry type assemblages have been encountered in historical diamond drilling, along with localized anomalous copper  $\pm$  gold mineralization. Mineralization of economic significance has not been encountered on the Wildcat Property to date.

Induced Polarization surveys completed in April and May of 2017 on the Wildcat Property, commissioned by Pacific Empire Minerals Corp., were successful in outlining an area of high chargeability that coincides with variable and complex resistivity and magnetic geophysical anomalies. The nature of the high chargeability coinciding, at least in part, with high resistivity values and both low and high magnetic values suggests that the high chargeability readings may well be related to sulphide deposition in a hydrothermal environment. The size of the anomalous chargeability area leads the authors to believe that potential for a high tonnage deposit exists.

The authors conclude that there exists an area prospective for copper  $\pm$  gold porphyry exploration on the Wildcat Property that merits further exploration. The proposed exploration program consists of an initial Reverse Circulation drilling program, followed by a diamond drilling program, if warranted. A two-phase exploration program totaling \$418,000 is recommended by the authors.

## 2 Introduction

This report by Pacific Empire Minerals Corp. (“PEMC”) summarizes two Induced Polarization (IP) surveys recently completed on the Wildcat Property. The property is considered to be in the early exploration stage. To date, ground geophysical IP surveys have identified a large area of anomalous chargeability to the northeast of historical exploration activities. This report presents and comments on exploration results provided by PEMC that were acquired during the 2017 exploration program, as well as on historical exploration data.



### 3 Property Description & Location

The Wildcat Property is located in central British Columbia, approximately 65 km north of Fort St. James and 150 km northwest of Prince George (Figure 3.1). The property can be accessed from Fort St. James via well-maintained Forest Service Roads (“FSR”). The Property is located on NTS map sheets 93K/16 & 93N/01, and falls within the jurisdiction of the Omineca Mining Division. The property currently consists of 10 mineral claims covering 5,825.64 hectares (Figure 3.2); Table 3.1 summarizes the claims as of the date of this report. All claims are on Crown Land and administered by the Government of British Columbia’s, Mineral Titles Online system (“MTO”).

On February 27, 2017, PEMC entered into an agreement with Richard Josef Haslinger Jr. for the option to earn a 100% interest in the property by incurring certain expenditures and completing share issuances over a 4 year period. Exploration commitments consist of a minimum of 10 line-km of Induced Polarization (“IP”) surveying, in addition to the completion of 1 (one) drill hole, either Reverse Circulation (“RC”) or diamond. PEMC must complete the issuance of 2,000,000 shares to Richard Josef Haslinger Jr. over a period of four years.

Having spent \$110,000 on the property to date by completing a total of 27.8 line-km of IP, PEMC has satisfied the first year work commitments under the terms of the option agreement, but has not yet earned any interest in the Wildcat Property. The Wildcat Property mineral tenures are currently owned 100% by Richard Josef Haslinger Jr. Certain exploration expenditures on the property are required to renew claim expiration dates, although the Wildcat and associated mineral claims are currently in good standing for quite some time (refer to Table 3.1 for claim details).

**Table 3.1:** Table of Claims

Tenure ID	Name	Ownership	Owner Name	Good To Date	Status	Area (ha)
511,798		111296 (100%)	R.J. Haslinger	2021/Dec/20	GOOD	649.18
511,800		111296 (100%)	R.J. Haslinger	2021/Dec/20	GOOD	519.11
511,859		111296 (100%)	R.J. Haslinger	2021/Dec/20	GOOD	1168.3
539,399	WILDCAT 4	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	445.36
539,400	WILDCAT 5	111296 (100%)	R.J. Haslinger	2021/Dec/20	GOOD	445.36
769,522	WILDCAT 7	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	371.25
769,542	WILDCAT 8	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	445.36
769,582	WILDCAT 10	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	445.54
841,427	WILDCAT 16	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	445.13
1,050,514	WILDCAT 17	111296 (100%)	R.J. Haslinger	2020/May/01	GOOD	891.06
						<b>5,825.64 ha</b>

## 4 Accessibility, Climate, Local Resources, Infrastructure & Physiography

### 4.1 Accessibility

The project area is accessible via well maintained logging roads from Fort St. James, British Columbia. Travel north on Highway 27 out of Fort St. James for roughly 9 km, and continue northeast on to the Germansen North Road. At about the 56 km point of the Germansen North Road, turn right (east) onto the Rainbow FSR, and proceed for 10 km to the approximate center of the property. A network of old and recent logging roads and trails are found throughout the claims and provide reasonable access to most parts of the

-124°

-123°

-122°



Mackenzie

Mt. Milligan  
Cu-Au Mine



**WILDCAT  
PROPERTY**



Fort St James

Fraser Lake

Vanderhoof

Prince George

55°

54°

<b>Pacific Empire Minerals Corp.</b>	
<b>Wildcat Property Location Map</b>	
Date: 5/8/2017	Author: E.S.
Scale: 1:1,000,000	Projection: Longitude / Latitude (NAD 83)

	Road
	Railroad
	Transmission Line
	Hydro Substation
	Producing Cu-Au Mine
	Wildcat Property Boundary

Figure 3.1: Location Map

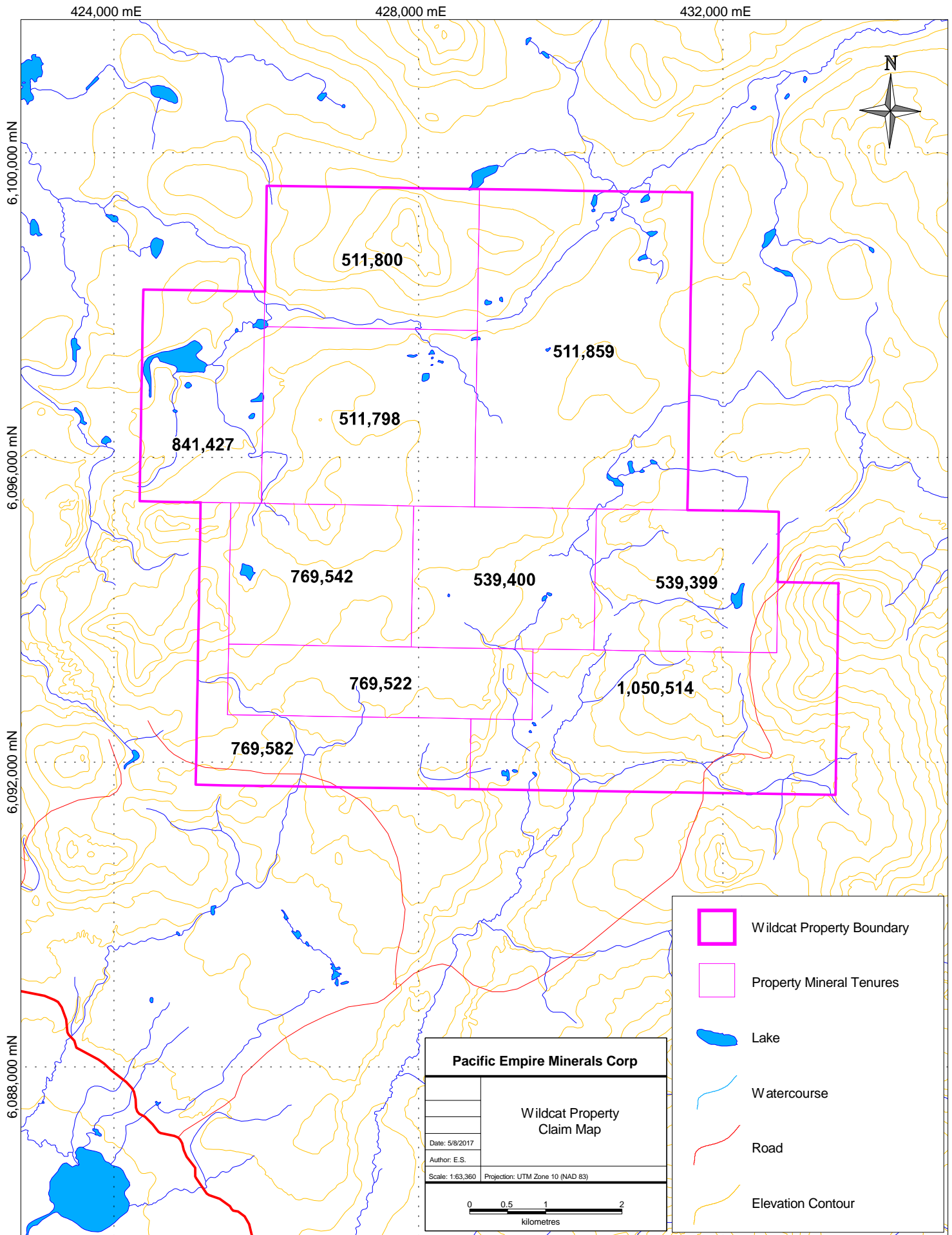


Figure 3.2: Claim Map

property. Alternatively, access to the northwestern portion of the property can be achieved by continuing on the Germansen North Road to the 74 km point, and turning east onto unnamed logging roads that proceed east to southeast and end up on the northwestern portion of the property after travelling roughly 6 km.

## 4.2 Climate

The following data has been taken from Environment Canada's National Climate Data and Information Archive for the Fort St. James, BC area and contains climate data collected beginning in 1971.

The area has short cool summers and long cold winters with an annual average temperature of 3.1°C. The highest daily average temperatures of 15.3°C occur in July and the lowest daily average temperatures of -11.3°C occur in January.

The region receives an average of 295 mm rainfall and 192 cm of snowfall annually, with 138 days per year where precipitation exceeds 0.2 mm. The Property is snow covered from early November to late May. As such, the ideal operating period on the Property is late May to early November.

## 4.3 Local Resources

Labour and services are readily available from Prince George, Fort St. James and Vanderhoof. Trucking, expediting, industrial supply, heavy machinery and operators are available in Fort St. James, as are personnel for line-cutting, core-cutting and other exploration services.

## 4.4 Infrastructure

There are no permanent structures or facilities located on the property, and the sufficiency of surface rights for mining operations is not known at this time, due to the early stage nature of the project.

Infrastructure on the property consists of logging roads and an access road to the Mt. Milligan Mine which runs through the southern and eastern portions of the property. Electric power can be accessed from the BC Hydro Kennedy Substation south of Mackenzie, where hydro electric power lines have been extended to the Mt. Milligan Mine site, approximately 10 km northeast of the property.

## 4.5 Physiography

The Property lies near the northern boundary of the Southern Plateau and Mountain Region of the Canadian Cordilleran Interior System. More specifically, the property is within the Nechako Plateau near the southern limits of the Swannell Range of the Omineca Mountains.

The Nechako Plateau was covered by the Cordilleran ice cap, which moved eastward from the Coast Ranges towards the Rocky Mountains near McLeod Lake, overriding the mountains, coating the landscape with a blanket or veneer of glacial drift, and altering the pre-glacial drainage patterns.

The region is generally gently sloped and covered with numerous ponds and wetlands. Rainbow Creek has its headwaters in the central area and flows northeast in a broad valley at an elevation of 1100 m. a.s.l. Elevations on the property range from 1100 m to 1400 m, with topography being generally subdued. The majority of the property lies at elevations between 1100 m and 1200 m.

Until recently, the Wildcat Property has been covered by thick stands of mixed mature spruce, fir and locally poplar forests. Logging has resulted in extensive clear-cuts over large portions of the Property. Valley

bottoms at lower elevations are poorly drained and covered with grassy wetlands and scattered willows.

## 5 History

The exploration history of the Wildcat Property dates back to late 1980's when the region became a target for bulk tonnage copper-gold porphyry type mineralization after the discovery of the Mt. Milligan deposits roughly 10 km to the northeast of the property. The exploration history of the property is summarized in the Table 5.1.

**Table 5.1:** Summary of Historical Exploration

Year	Operator	Report	Activity
1989	HLX Resources	(Grunenberg, 1989)	17 line-km ground magnetics
1990	Continental Gold Corp.	(Sivertz, 1990)	Airborne Mag, VLF-EM
1991	Geological Survey of Canada	(Shives et al., 2000)	Airborne Geophysical Surveys
1994	Robin Day and Larry Hewitt	(Day, 1994)	Soil/till sampling, prospecting
1995	Robin Day and Larry Hewitt	(Day, 1995)	Soil/till sampling, prospecting
1996	Robin Day and Larry Hewitt	(Day, 1996)	Grid soil/till sampling
2004	H.R.S. Resources Ltd.	(Haslinger, 2004)	Ground magnetic survey
2006	Yankee Hat Industries Corp.	(Wells, 2005)	Grid soil sampling survey, prospecting
2007	Terrane Metals Corp.	(O'Brien, 2007)	Geotechnical drilling
2008	Terrane Metals Corp.	(Lustig and Duba, 2008)	Diamond drilling (1,040 m, 4 holes)
2010	Cayden Resources Inc.	(Lustig and Duba, 2010)	43-101 Technical Report
2011	Cayden Resources Inc.	(Duba, 2010)	Helicopter-Borne ZTEM survey
2011	Cayden Resources Inc.	(Duba, 2012)	Diamond drilling (1,302.1 m, 6 holes)

In the area of the Wildcat property, an aeromagnetic anomaly (high) south of Rainbow Creek was staked as the Bow claim group by HLX Resources Ltd in 1989. A 17 line-kilometre ground magnetic survey defined the eastern flank of the anomaly (Grunenberg, 1989, AR#19585). Further work was recommended but does not appear to have been completed.

Continental Gold Corp. staked the Bee and Bonanza claims covering the same area in 1990. These were subject to an airborne (helicopter) magnetometer and VLF-EM survey (Sivertz, 1990, AR#20416). This survey indicated at least two areas for further geological investigation.

In 1991, the Geological Survey of Canada ("GSC") conducted a high-resolution airborne gamma ray spectrometric ("AGRS") and aeromagnetic survey over the Mt. Milligan area (Shives et al., 2000). The Wildcat property area was also covered by this airborne survey. A strong northwest trending magnetic (high) anomaly was indicated on the Wildcat 1 and 2 claims south of Rainbow Creek (same as (Grunenberg, 1989, AR#19585), (Sivertz, 1990, AR#20416)).

In 1994 and 1995, prospectors R. Day and L. Hewitt conducted a preliminary prospecting and soil sampling program on the Rooster claims along the northern edge of the aeromagnetic high (Rooster 1 Group). The soil program outlined a copper anomaly 400 m long, which was open to the southwest. Eight new claims (Rooster 23 to 30) were staked in this area following initial geochemical survey results. In 1996, an expanded grid and soil program (128 samples) defined a copper-in-till anomaly approximately 1500 m long by 100 to 400 m wide (Day, 1996, AR#24858).

The property was staked as the Wildcat 1 to 4 mineral claims by Richard Haslinger of H.R.S. Resources in 2003. A reconnaissance ground magnetic survey was conducted to further define the airborne magnetic high anomaly underlying the property. The highest readings >59,000 gammas defined a “bulls eye” magnetic high 800 m by 600 m (Haslinger, 2004, AR#27331).

In 2004, the property was optioned to Yankee Hat Industries Corp who conducted grid soil sampling and prospecting surveys. Results of soil sampling confirmed the earlier soil/till copper anomaly and located several isolated gold and copper anomalies to the northwest. Anomalous copper, silver, gold and palladium values were returned from prospecting near the core of the magnetic high (Wells, 2005, AR#27733). Further work was recommended but the option was dropped.

In 2006, Terrane Metals Corp. optioned the Wildcat Property to investigate the mineral potential of the property as well as the possibility of using part of the property as tailings storage for the proposed Mt. Milligan mine (O’Brien, 2007, AR#29097). Terrane Metals’ drilling program in 2007 targeted a copper in soil/till anomaly coincident with an IP chargeability high anomaly, and a northwest trending “bulls eye” magnetic high. Drilling results indicated anomalous copper and, in part, elevated gold, silver and molybdenum concentrations in megacrystic plagioclase monzonite and hornblende  $\pm$  plagioclase monzonite/diorite porphyry. The most significant intersections are 259 ppm copper and 16 ppb gold over 290 m (DDH WC07-02) and 188 ppm copper and 11 ppb gold over 239 m (DDH WC07-04) (Lustig and Duba, 2008, AR#30000).

In 2010, the Wildcat Property was optioned from H.R.S. Resources by Cayden Resources Inc. In the same year the company completed a 322.2 line-km helicopter-borne ZTEM (Z-Tipper Axis Electromagnetic) and aeromagnetic surveys (Duba, 2010, AR#31818). Analysis of geophysical data indicated numerous high resistivity anomalies from the electromagnetic component of the survey and confirmed the “bulls eye” high magnetic anomaly from previous geophysical surveys (Haslinger, 2004, AR#27331). Cayden Resources completed a diamond drill program in 2011 consisting of 6 drill holes totaling 1,302 metres. Significant, yet uneconomic, intervals of copper were encountered in the two most northerly drill holes, WC11-07 and WC11-08. Cayden Resources dropped the Wildcat Option in September of 2013.

## 6 Geological Setting & Mineralization

### 6.1 Regional Geology

The Wildcat Property lies within the Quesnel Terrane, part of the Intermontane Belt, a composite of low metamorphic grade magmatic arc segments of mixed oceanic and continental affinities, and oceanic plates, which amalgamated to the North American continental margin in the Early Jurassic Period (Figure 6.1).

The Quesnel Terrane formed along or near the western North American continental margin and accreted to the margin in the late Early Jurassic (186-181 Ma). Quesnellia is found along most of the length of the Canadian Cordillera and in the Nation Lakes area is characterized by Late Triassic to Early Jurassic volcanic and sedimentary rocks of island arc affinity (Nelson and Colpron, 2007).

The Quesnel Terrane is in contact to the east with Proterozoic and Paleozoic carbonate and siliciclastic rocks of the Cassiar Terrane, representing part of the ancestral North American miogeocline. In places, the Quesnel and Cassiar terranes are separated by an intervening assemblage of late Paleozoic oceanic rocks of the Slide Mountain Terrane. The boundary between the Quesnel and Cassiar terranes is a complex structural zone that includes late Early Jurassic east-directed thrust faults that juxtapose the Quesnel Terrane above the Cassiar Terrane.

Towards the west the Quesnel Terrane is in fault contact with the late Paleozoic through mid-Mesozoic oceanic rocks of the Cache Creek Terrane, interpreted to be part of the accretion-subduction complex that

was responsible for generating the Quesnel Magmatic arc. Younger rocks commonly found in the region include Cretaceous granitic stocks and batholiths, Eocene volcanic and sedimentary rocks, and flat lying basalts of both Neogene and Quaternary age.

Intrusive units of a wide variety of sizes, ages, compositions and textures occur in the region. The largest bodies are the Hogem and Germansen batholiths. The Hogem Intrusive Suite is composed of many discrete plutons including mafic to syenitic Late Triassic to Early Jurassic intrusions, as well as mid-Cretaceous granites. A myriad of small intrusions and some larger ones are equivalent to the Early Jurassic volcanic units and to the late stages of Takla Group volcanism. Significant porphyry copper-gold deposits in the area are associated with “crowded porphyries”. In a typical crowded porphyritic monzonite, small blocky plagioclase phenocrysts (1-2 mm), with lesser hornblende, biotite and/or augite touch each other in a fine grained matrix of plagioclase, potassium feldspar, mafic and oxide minerals.

In the Mt. Milligan area, the Takla Group is informally subdivided into a lower, predominantly volcanoclastic Inzana Lake Succession and an upper, predominantly pyroclastic Witch Lake Succession. The Witch Lake Succession, the host of the Mt. Milligan deposits, is characterized by augite-phyric pyroclastic rocks and coherent basalt to andesite, subordinate epiclastic beds and co-magmatic Takla Group and post-Takla Group intrusions. Coeval intrusions comprise most of the Mt. Milligan intrusive complex consisting of monzonite with minor diorite and monzodiorite.

The Quesnel arc had two predominant phases of development: Late Triassic and Early Jurassic. The first, Late Triassic early arc development phase is dominated by augite phyric basalt and alkali basalt (shoshonitic) volcanism. Basal sediments of the Slate Creek succession (235-204 Ma) grade upwards into increasingly volcanic and volcanoclastic rocks of the Inzana, Willy George, Plughat Mountain and Witch Lake successions (230-204 Ma), collectively referred to as the Takla Group. A depositional hiatus marks a break in volcanic activity prior to the onset of renewed volcanic activity in the Early Jurassic.

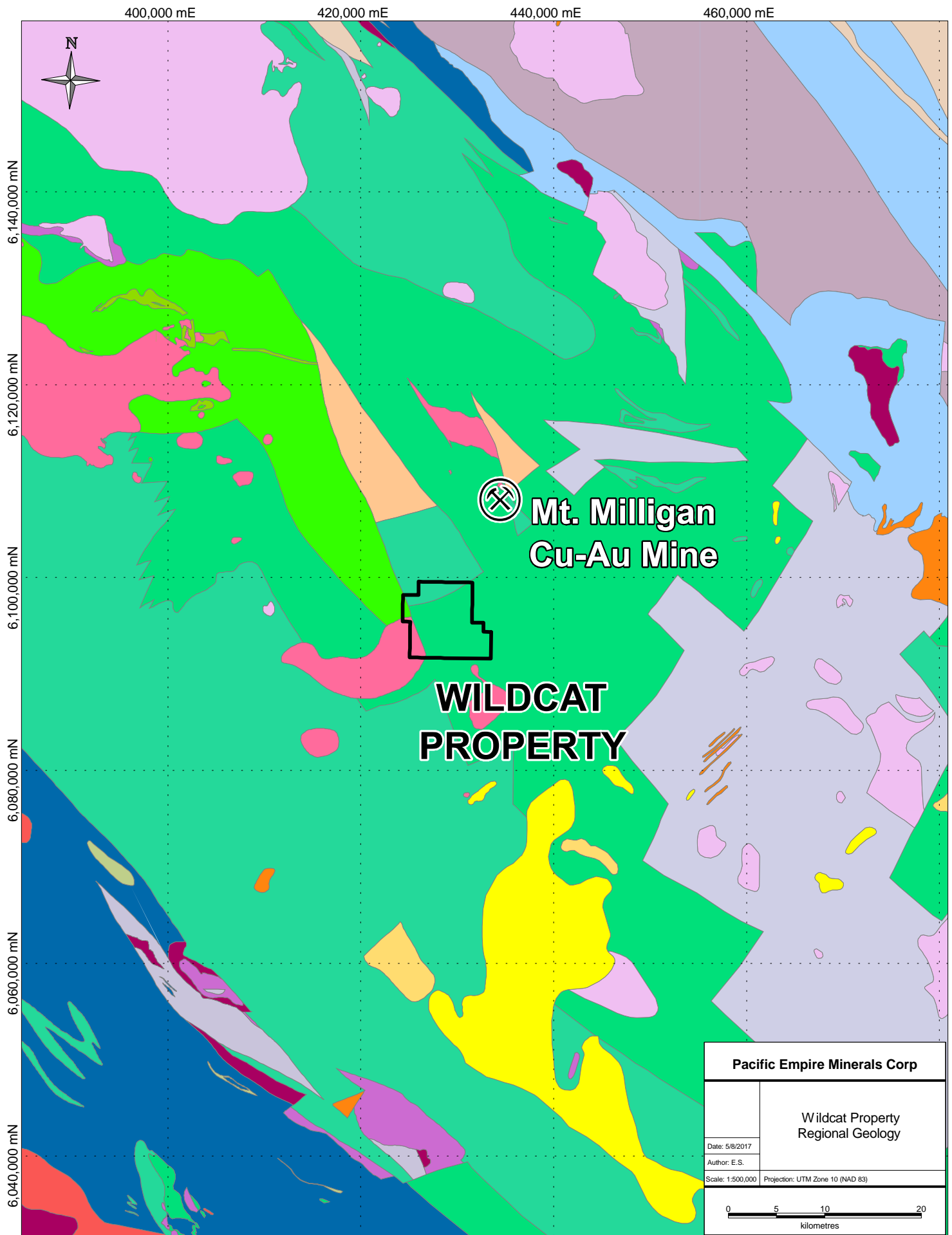
The second phase of arc development began in the early Jurassic and is characteristic of a more mature arc, developed on thicker crust. These early Jurassic volcanic suites were compositionally more heterogeneous and dominated by plagioclase and plagioclase-augite phyric, sub-alkaline to shoshonitic lithologies. The Triassic arc successions are overlain paraconformably by the early Jurassic suites of the Inzana Lake and Witch Lake Successions.

The property lies in close proximity to the southeastern extent of the Hogem Batholith. The Hogem batholith differs from other Upper Triassic batholiths in the Quesnel terrane in two significant ways.

1. It is unusually long lived (Late Triassic to Cretaceous) rather than confined to a shorter interval near the Triassic-Jurassic boundary such as the Guichon and Iron Mask Batholiths.
2. The Guichon and Iron Mask Batholiths are calc-alkaline and alkaline respectively, whereas the Hogem Batholith is composed of four phases which alternate from alkaline to calc-alkaline, with each phase becoming progressively more felsic.

### 6.1.1 Regional Mineral Occurrences

**The Mount Milligan Copper-Gold Mine** is operated by Centerra Gold Inc. and is located approximately 10 kilometres to the northeast of the Wildcat Property. Production of copper-gold concentrate commenced in September 2013, followed by the first truckload of concentrate to Mackenzie on September 24, 2013. Accumulated copper-gold concentrate is shipped via rail to the port of Vancouver. The Mt. Milligan Mine is a conventional truck and shovel open-pit mine designed to process 60,000 tonnes per day of copper bearing ore. Average annual production over the 22 year mine life is estimated to be 81 million pounds of copper and 194,500 ounces of gold.



**Figure 6.1:** Regional Geology - simplified units. *Modified from BCGS 1:1.5M scale digital geology.*



**SEDIMENTARY ROCKS**

Mainly shale, sandstone, siltstone, conglomerate, limestone and dolostone.

TERTIARY



CRETACEOUS +/- TERTIARY



UPPER CRETACEOUS



LOWER CRETACEOUS



JURASSIC



TRIASSIC



UPPER PALEOZOIC



LOWER PALEOZOIC



UPPER PROTEROZOIC



MIDDLE PROTEROZOIC



**VOLCANIC ROCKS**

Mainly basalt, andesite, dacite and rhyolite.

LATE TERTIARY TO QUATERNARY



EARLY TERTIARY



CRETACEOUS



JURASSIC



TRIASSIC



PALEOZOIC



PROTEROZOIC



**METAMORPHIC ROCKS**

Mainly slate, schist, gneiss, marble, greenstone and amphibolite.

CENOZOIC



MESOZOIC



PALEOZOIC



LATE PROTEROZOIC



EARLY TO MIDDLE PROTEROZOIC



AGE UNKNOWN



**INTRUSIVE ROCKS**

Mainly granite, diorite and granodiorite.

MIDDLE TO LATE TERTIARY



LATE CRETACEOUS TO EARLY TERTIARY



EARLY CRETACEOUS



MIDDLE TO LATE JURASSIC



TRIASSIC TO EARLY JURASSIC



PALEOZOIC



PROTEROZOIC



AGE UNKNOWN



ULTRAMAFIC ROCKS (VARIOUS AGES)



**Figure 6.2:** Geological Legend for Regional Geology - simplified units. *Modified from BCGS 1:1.5M scale digital geology.*

The Mt. Milligan deposits are centered on two principal intrusive bodies, the MBX and Southern Star stocks. Within the stocks, monzonite varies texturally and compositionally.

Late syn-mineral plagioclase hornblende porphyritic monzonite dykes are common throughout the Southern Star stock. Hydrothermal breccia occurs extensively throughout the Southern Star stock, and less commonly in adjacent volcanic rocks and along the margins of the MBX stock. It is characterized by potassium feldspar veinlets and flooding that vary in amount and size.

Important east-northeasterly trending cross-faults and northwesterly trending, steeply easterly dipping faults separate the MBX stock from the Southern Star stock.

In the Mt. Milligan area the Quesnel Terrane is characterized by widespread Late Triassic to Early Jurassic arc rocks comprising (Herbert et al., 2007):

- Volcanic rocks: mainly volcanoclastics, with subordinate coherent volcanics of basaltic to dacitic compositions. Augite-porphyry is particularly characteristic of Quesnellia, and forms an eastern facies of alkaline to sub-alkaline augite-phyric basaltic andesite;
- Coeval and partly comagmatic plutons ranging from calcalkaline (in the west) to alkaline (in the east); and
- Sedimentary rocks including shale, limestone, and epiclastic deposits.

The Witch Lake Succession hosts the Mt. Milligan deposit, and is characterized by augite-phyric pyroclastic and coherent basaltic andesites, with subordinate epiclastic beds. The Witch Lake Succession is intruded by coeval Takla Group and post-Takla Group intrusions. Coeval intrusions comprise most of the Mt. Milligan intrusive complex, which consists dominantly of monzonitic rocks with minor dioritic/monzodioritic and gabbroic/monzogabbroic rocks.

**Table 6.1:** Mt. Milligan Reserve & Resource Information

<b>Reserves (as of December 31, 2014)</b>					
<b>Category</b>	<b>Tons (millions)</b>	<b>Cu (%)</b>	<b>Au (oz/t)</b>	<b>Contained Cu lb (million)</b>	<b>Contained Au oz (Million)</b>
Proven	300.1	0.206	0.424	1,366	4.10
Probable	242.0	0.195	0.269	1,041	2.10
Total	542.1	0.201	0.355	2,407	6.20
<b>Resources <sup>1</sup>(as of December 31, 2014)</b>					
<b>Category</b>	<b>Tons (millions)</b>	<b>Cu (%)</b>	<b>Au (oz/t)</b>	<b>Contained Cu lb (million)</b>	<b>Contained Au oz (Million)</b>
Measured	43.2	0.122	0.465	116	0.64
Indicated	79.1	0.172	0.243	301	0.61
Total	122.3	0.155	0.321	417	1.25
Inferred	10.1	0.146	0.337	33	0.11

<sup>1</sup> Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

Source: From 43-101 Technical Report dated January 21, 2015 (Clifford and Berthelsen, 2015).

Note: Figures may not total exactly due to rounding.

**The Kwanika Copper-Gold Deposit** is located approximately 80 kilometers to the northwest of the Wildcat Property and is owned and operated by Serengeti Resources Inc. (“Serengeti”). Discovered in 2006,

the Kwanika deposit consists of two closely-separated deposits (Kwanika Central Zone & Kwanika South Zone) containing Indicated Resources of 0.94 billion pounds of copper and 1.42 million ounces of gold at a Cut-off of 0.2% CuEq at the Kwanika Central Zone (Serengeti Resources Inc., 2016).

Copper-gold mineralization in the “Central Zone” consists of disseminated chalcopyrite, bornite and pyrite in and around a potassically altered monzonite stock intruding andesitic rocks of the Takla Volcanic Group. Where strongly mineralized, the unit commonly displays quartz stockwork and hydrothermal brecciation. Copper-gold-molybdenum-silver mineralization in the “South Zone” consists primarily of chalcopyrite and molybdenite with trace amounts of chalcocite, bornite and enargite and is associated with potassically altered alkalic to intermediate composition intrusive rocks (Serengeti Resources Inc., 2016).

In April of 2016, Serengeti announced that it had signed a deal with Daewoo Minerals Canada Corp. (“DMC”), a 100% owned Canadian subsidiary of Posco Daewoo Corp, whereby Posco Daewoo has the right to earn up to a 35% interest in Serengeti’s Kwanika copper-gold project by providing funding of \$ 8.2 million.

**The BP Chuchi Deposit** or Chuchi Lake Deposit is located roughly 25 km to the west-northwest of the Wildcat Property, and is currently owned by AuRico Metals Inc. The BP Chuchi deposit is considered a small, copper-gold alkalic porphyry deposit. Copper-gold mineralization is associated with locally pervasive potassic and propylitic alteration and abundant secondary magnetite, and is centered about a cluster of plagioclase porphyry stocks, dikes and sills which intrude a sedimentary unit of the Lower Jurassic Chuchi Lake succession. This sedimentary unit consists of well-bedded sandstones, siltstones and tuffs that grade downwards into massive coarse lapilli tuffs and agglomerates. The best grades fall within a northeast-trending zone that crosses the monzonite stock. A rough estimate (non 43-101 compliant) of the geological resource is 50 million tonnes with grades between 0.21% and 0.40% copper and 0.21 g/t and 0.44 g/t gold (Nelson and Bellefontaine, 1996).

## 6.2 Local and Property Geology

There has been no systematic geological mapping of the Wildcat property other than the 1:50,000 scale regional mapping by (Nelson et al., 1992).

The Wildcat Property has very sparse outcrop with much of the property covered by till and glaciofluvial gravels (1 to >10 m thick). Reconnaissance prospecting has been conducted by (Day, 1996) and prospecting and geological mapping in the central region by R. Wells (Wells, 2005) and D. Duba (Lustig and Duba, 2008). Recent clear-cut logging activity has opened up new road-cuts and exposed more bedrock in some parts of the Wildcat Property.

Based on the regional geological understanding, lithologies encountered in drilling and lithologies identified in limited outcrop exposures, a property geology map has been constructed as shown in Figure 6.3. The Wildcat Property is primarily underlain by variably altered, augite porphyritic, intermediate to mafic volcanic and pyroclastic rocks and monzonite to diorite intrusives correlated with the Late Triassic-Early Jurassic Takla Group (Nelson et al., 1992). Fine clastic sediments typically consisting of siltstone and lesser mudstone, underlie the northern and northwestern portions of the property.

Historical diamond drilling has encountered the following Takla Group lithologies; augite-phyric andesite to medium grained gabbro (ANDS), augite-phyric andesite tuff to crystal lithic tuff (ANTF), plagioclase monzonite porphyry (MZPP), hornblende (biotite) ± plagioclase monzonite/diorite porphyry (HMZP) and xenolithic monzonite/diorite porphyry (XNMZ) (Lustig and Duba, 2008).

**Augite-phyric andesite to medium grained gabbro (ANDS):** The rock is medium to dark green and less commonly pistachio green and dark grey-black with mottled alteration patches (chlorite-epidote), massive, fine grained andesite to intrusive-like medium grained gabbro, the latter probably representing

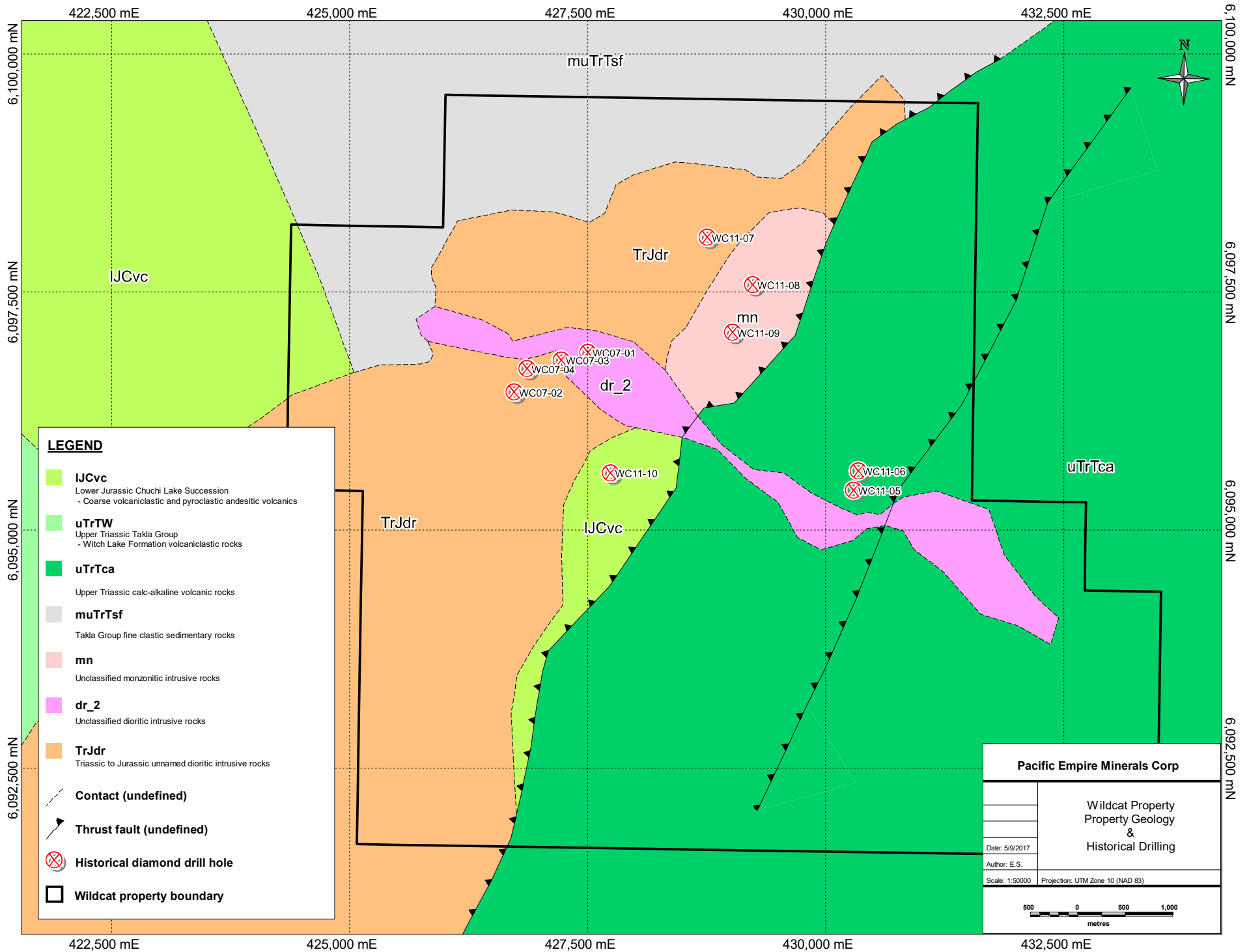


Figure 6.3: Property Geology

deeper levels of a volcanic pile. Andesite is typically porphyritic consisting of subhedral to euhedral augite, 1-3 mm on average, locally to 5 mm, (<5% to 20%) and locally hornblende laths, <2mm, (0% to 50%), often euhedral and variably chloritized and epidotized, and pale grey subhedral plagioclase, 1-2 mm, on average (0% to 40%) set in an aphanitic to fine grained variably propylitized mafic groundmass. Fragment-supported volcanic breccia zones are rare. These consist of <1 cm to >5 cm subangular andesite fragments in a matrix of similar composition, andesite to fine-medium grained gabbro.

**Augite-phyric andesite tuff to crystal tuff (ANTF):** This lithological unit is only recognized in drill core (WC07-1 and WC07-3) and appears to be subordinate to coherent andesite/gabbro. It is typically dark grey to grey-green, well bedded (foliated), altered, fine grained and contains euhedral/subhedral augite crystals, 1-3 mm (up to 25%), in a fine to medium grained, variably propylitized mafic matrix.

All volcanic rocks are weakly to locally strongly magnetic with magnetite contents up to 5% to 12% as coarse blebs, disseminations and lesser, fine grained fracture fillings that have associated  $\pm$  calcite-epidote-pyrite-chalcopyrite. Pyrite is commonly present as fine disseminations, blebs and narrow veinlets, trace to 2%, averaging 1%.

Alteration is moderate to strong, imparting a patchy and mottled texture to the rock. It is dominated by pervasive and lesser fracture-controlled propylitization occurring as replacement of augite phenocrysts and mafic groundmass by chlorite-actinolite>epidote-carbonate (calcite  $\pm$  albite(?)  $\pm$  pyrite). Potassic alteration is generally very weak and when present, it is in form of fine grained biotite after augite phenocrysts and mafic matrix components. Silicification is also weak, occurring mostly as discrete, narrow, <0.5-1 cm wide, quartz  $\pm$  calcite  $\pm$  pyrite veinlets.

Andesite to gabbro and andesite tuff are occasionally intruded by narrow, <5 m wide, plagioclase-phyric monzonite to diorite dikes. These are light to medium grey and grey-green and commonly coarse grained, crowded porphyries consisting of euhedral, 1-5 mm on average, plagioclase phenocrysts (up to 40%). The groundmass is aphanitic to fine-grained matrix and consists dominantly of quartz, K-feldspar>plagioclase and subordinate hornblende, epidote, calcite and accessory pyrite disseminations and veinlets, and occasionally magnetite.

**Plagioclase monzonite porphyry (MZPP):** The western part of the property is underlain by small stocks of plagioclase monzonite porphyry (Figure 6.3), the most widespread intrusive rock observed both in outcrop and drill core (WC07-02 and -04). The porphyry is leucocratic, white to light grey, also light green to medium pink, massive to foliated, crowded (up to 50%), megacrystic plagioclase monzonite porphyry featuring euhedral, 2-5 mm, on average, rarely 10-15 mm, plagioclase phenocrysts in an aphanitic to fine grained groundmass of K-feldspar, plagioclase, quartz, minor hornblende and secondary chlorite, biotite, epidote and calcite. Another minor, finer grained phenocryst phase is hornblende (altered to biotite and/or chlorite), 1-3 mm (3% to 5%).

**Hornblende  $\pm$  plagioclase monzonite/diorite porphyry (HMZP):** Megacrystic monzonite is intruded by numerous, narrow, (1 to 10 m wide), fine to lesser medium grained, pale beige to medium grey and purple-brown, variably porphyritic hornblende  $\pm$  plagioclase monzonite to diorite dikes. These contain phenocrysts of dark brown euhedral hornblende (1-5mm, <5-25%,) >wispy biotite and remnant, pale grey subhedral/euhedral plagioclase (1-3 mm, 0 to 35%). Augite phenocrysts (1-3 mm) are extremely rare, <1-2%. Groundmass is aphanitic to fine grained consisting of a mixture of K-feldspar, plagioclase, quartz and lesser mafic minerals (biotite>chlorite, epidote).

**Xenolithic monzonite/diorite porphyry (XNMZ):** This lithotype occurs as rare, narrow (<5 m) dikes compositionally similar to plagioclase-hornblende monzonite/diorite. It is composed of <10% poorly sorted, <0.5 cm to >3 cm angular to partially assimilated andesite fragments set in a fine to medium grained plagioclase-hornblende phyric monzonite to diorite groundmass.

Intrusive rocks are generally weakly to lesser moderately potassically altered with weak overprinting propylitization. Potassic alteration is in the form of fine grained biotite replacement of mafic phenocrysts (minor plagioclase?) and matrix. Propylitization is typically weak and intermittent comprising of chlorite-carbonate (calcite)-epidote-albite(?)-pyrite assemblage and is found predominantly as fracture-controlled replacement. Silicification is weak and occurs as narrow (<0.5 to 1cm) veinlets of quartz ± calcite ± pyrite and as rare, pervasive silicification.

Pyrite occurs as fine grained disseminations, blebs and lesser fracture filling (<0.1 to 2.5%, averaging 1.5%). Associated with pyrite is disseminated and blebby pyrrhotite (trace to 0.5%). Sporadic and limited chalcopyrite mineralization occurs as disseminations, blebs and locally as pyrite-chalcopyrite vein fill, all of which are generally associated with propylitic alteration assemblages.

Several fault-lineaments are apparent on the Wildcat Property. These are interpreted structures trending northwest (monzonite porphyry-volcanic contact) and northeast (Rainbow Creek) with unknown dips. The drill logs indicate a rare brittle deformation along intrusive contacts.

### 6.2.1 Property Mineralization & Alteration

In part due to the till covered nature of the property, mineralization encountered to date on the property is limited to copper mineralization encountered in historical drilling. The most significant copper ± gold ± silver mineralization was encountered during the 2011 Cayden Resources drilling campaign. Significant intervals from this program include:

- DDH # WC11-07, 213.8 m to 214.52 m (0.72 m) @ 1.34% Cu, 0.626 g/t Au, 16.2 g/t Ag;
- DDH # WC11-08, 155.45 to 181.60 m (26.15 m) @ 0.14% Cu, 0.034 g/t Au, 0.74 g/t Ag;
  - *incl.* 170.95 m to 181.60 m (10.65 m) @ 0.21% Cu, 0.062 g/t Au, 1.1 g/t Ag.

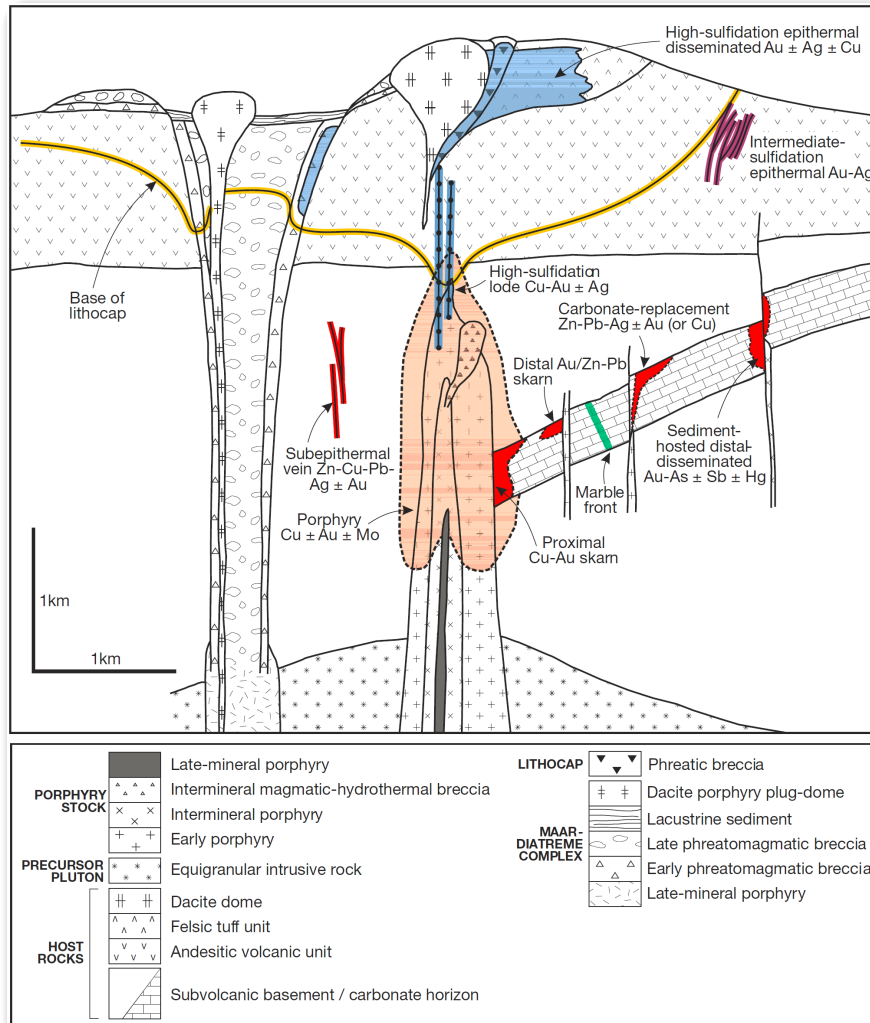
The aforementioned mineralized intercept from WC11-07 was associated with a roughly 0.5 cm quartz-pyrite-chalcopyrite shear hosted vein with strong epidote selvages, in what is otherwise propylitically altered diorite. The mineralized interval from WC11-08 consists of chalcopyrite and pyrite blebs and disseminations in a propylitically altered diorite, with sporadic quartz-calcite-pyrite ± chalcopyrite veins and localized strong chlorite alteration. The interval from WC11-08 includes a moderate to strongly sheared and chlorite altered mafic dike than contains significant pyrite and lesser chalcopyrite.

## 7 Deposit Types

### 7.1 Porphyry Copper-Gold Deposits

Porphyry deposits are large, low- to medium-grade deposits in which primary ore minerals are dominantly structurally controlled and which are spatially and genetically related to felsic to intermediate porphyritic intrusions (Sinclair, 2007). Their formation is related to magma emplacement at relatively high levels in the crust, where the circulation of hydrothermal fluids facilitates scavenging, mobilizing and deposition of metals.

Porphyry copper systems are defined as large volumes of hydrothermally altered rock centered on porphyry copper stocks that may also contain skarn, carbonate-replacement, sediment-hosted, and high- and intermediate-sulphidation epithermal base and precious metal mineralization (Sillitoe, 2010).



**Figure 7.1:** Anatomy of a telescoped porphyry Cu system (Sillitoe, 2010).

The metal content of this class of deposits is diverse, but within the scope of this report can be narrowed down to those grouped as Copper ± Molybdenum ± Gold (Cu ± Mo ± Au).

### 7.1.1 Importance

Porphyry copper deposits account for approximately two-thirds of global copper production and more than 95% of world molybdenum production. Porphyry deposits are also major sources of gold, silver, and tin; significant byproducts include Re, W, Pd, Pt, Te and Se.

### 7.1.2 Geographic Distribution

Porphyry deposits occur throughout the world in a series of extensive, relatively narrow, linear metallogenic provinces. They are predominantly associated with Mesozoic to Cenozoic orogenic belts in western North and South America, around the western margin of the Pacific Basin, and in the Tethyan orogenic belt in eastern Europe and southern Asia. However, major deposits also occur within Paleozoic orogens in Central

Asia and eastern North America and, to a lesser extent, within Precambrian terranes (Sinclair, 2007).

### **7.1.3 Geographic Distribution within British Columbia**

Late Triassic to Early Jurassic Cu-Au and Cu-Mo porphyry deposits of the Stikine and Quesnel terranes are collectively the most important group of deposits in British Columbia (Nelson and Colpron, 2007). They include such long time producers as Highland Valley, Gibraltar, Copper Mountain, Brenda, and Afton; projects such as Mt. Milligan, Red Chris, Schaft Creek, Brucejack, and Kerr-Sulphurets-Mitchell (KSM) are also moving towards production. Host intrusions range from 210 Ma (Galore, Highland Valley) to 183 Ma (Mt. Milligan). The abundance of porphyry and other deposits marks Stikinia and Quesnelia as remarkably rich metallotects, comparable to the modern arc setting of Papua New Guinea.

### **7.1.4 Grade and Tonnage**

Porphyry deposits are large and range in size from tens of millions to billions of tonnes. In typical porphyry Cu  $\pm$  Mo  $\pm$  Au deposits, grades range from 0.2 to 1.0% Cu, <0.01 to 0.05% Mo, and 0.0 to 1.0 g/t Au. Some porphyry deposits exhibit exceptional size along with grade such as the Grasberg deposit in Indonesia, with a resource greater than 2.5 billion tonnes grading 1.1% Cu and 1.04 g/t Au (Freeport-McMoran Copper and Gold Inc., Annual Report).

### **7.1.5 Tectonic Setting**

Porphyry Cu systems are generated mainly in magmatic arc environments subjected to broadly contractional settings, marked by crustal thickening, surface uplift and rapid exhumation (Sillitoe, 2010). Porphyry Cu deposits are typically located in volcanic or sub-volcanic environments in subduction-related, continental and island-arc settings.

Fault and fault intersections are invariably involved in determining the formational sites and geometries of porphyry Cu systems and their constituent parts. Some investigators emphasize the importance of intersections between continental-scale transverse fault zones and arc-parallel structures for porphyry Cu formation (Richards et al., 2001).

### **7.1.6 Geological Setting**

Porphyry deposits occur in close association with porphyritic epizonal and mesozonal intrusions. There is a close temporal relationship between magmatic activity and hydrothermal mineralization. Commonly located in volcanic or sub-volcanic environments, host rocks typically include volcanics, intrusives (which may or may not be coeval with country rock) and volcano-sedimentary, epiclastic and pyroclastic rocks.

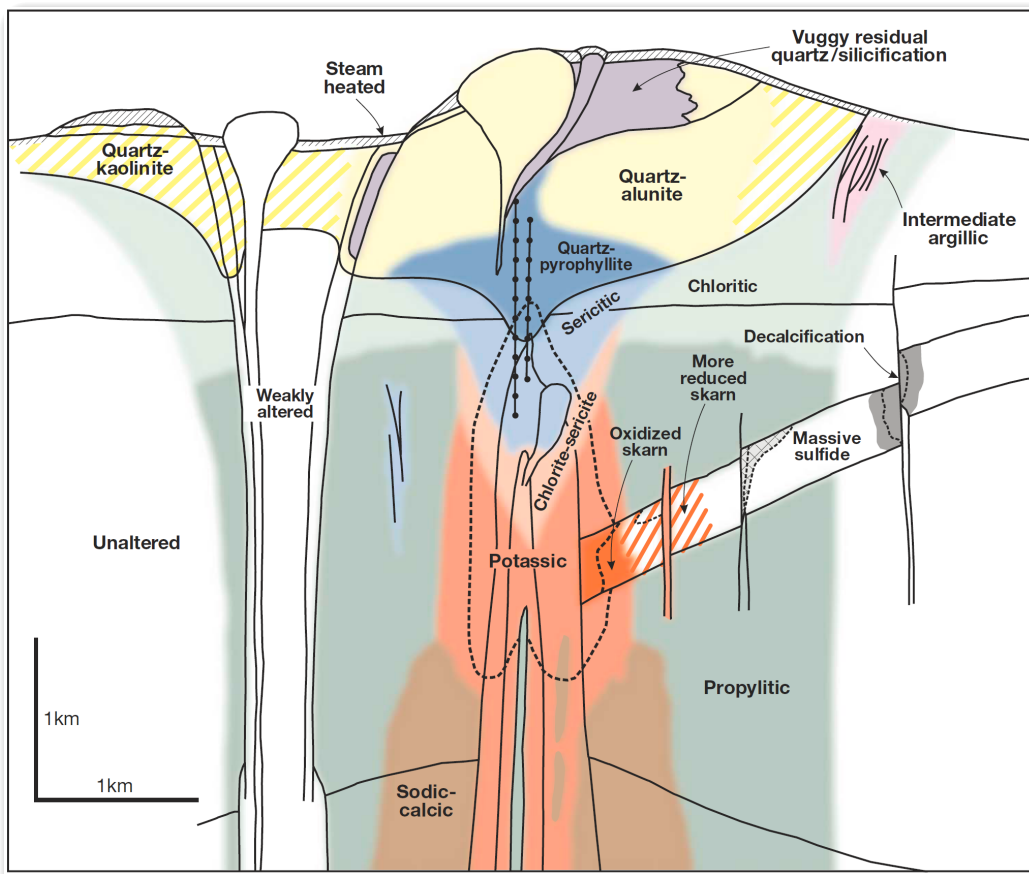
The composition of intrusions associated with porphyry deposits varies widely and appears to exert a fundamental control on the metal content of the deposits. Intrusive rocks associated with porphyry Cu-Au and porphyry Au deposits tend to be low-silica, relatively mafic and primitive in composition, ranging from calc-alkaline dioritic and granodioritic plutons to alkalic monzonitic rocks. Porphyry Cu and Cu-Mo deposits are associated with intermediate to felsic, calc-alkaline intrusive rocks ranging from granodiorite to granite in composition (Richards, 1990).



### 7.1.7 Alteration

Hydrothermal alteration is extensive and typically zoned on a deposit scale as well as around individual veins and fractures. Alteration zones on a deposit scale commonly consist of an inner potassic  $\pm$  sodic core characterized by K-feldspar and/or biotite ( $\pm$  amphibole  $\pm$  magnetite  $\pm$  anhydrite), and an outer, more extensive zone of propylitic alteration that consists of quartz, chlorite, epidote, calcite and, locally, albite associated with pyrite. Zones of phyllic (quartz + sericite + pyrite) and argillic alteration (quartz + illite + pyrite  $\pm$  kaolinite  $\pm$  montmorillonite  $\pm$  calcite) may be part of the zonal pattern between the potassic and propylitic zones, or can be irregular or tabular, younger zones superimposed on older alteration and sulphide assemblages (Moyle et al., 1990).

Alteration mineralogy is controlled in part by the composition of the host rocks, and by the composition of the mineralizing system. In mafic host rocks with significant iron and magnesium, biotite is the dominant alteration mineral in the potassic alteration zone, whereas K-feldspar dominates in more felsic rocks (Sinclair, 2007). In more oxidized environments, minerals such as pyrite, magnetite ( $\pm$  hematite), and anhydrite are common, whereas pyrrhotite is present in more reduced environments (Rowins, 2000).



**Figure 7.2:** Generalized alteration-mineralization zoning pattern for telescoped porphyry Cu systems (Sil-litoe, 2010).

### 7.1.8 Structure and Mineralization Styles

As mentioned above, faults and fault intersections are invariably involved in determining the formation and geometry of porphyry Cu systems. At the scale of ore deposits, associated structures can result in a variety of mineralization styles, including veins, vein sets, stockworks, fractures, “crackled zones”, and breccia pipes. Orientations of mineralized structures can be related to local stress environments around the tops of plutons or can reflect regional stress conditions.

### 7.1.9 Mineralogy

The mineralogy of porphyry deposits is highly varied, although pyrite is typically the dominant sulphide mineral in porphyry Cu  $\pm$  Mo  $\pm$  Au deposits. Principal ore minerals are chalcopyrite, bornite, chalcocite, tennantite, enargite, other Cu sulphides and sulphosalts, molybdenite, and electrum; associated minerals include pyrite, magnetite, quartz, biotite, K-feldspar, anhydrite, muscovite, clay minerals, epidote and chlorite.

### 7.1.10 Morphology and Architecture

The overall geometry of individual porphyry deposits is highly varied and includes irregular, ovoid, pipe-like or cylindrical shapes, which may or may not be “hollow”. Ore bodies are zoned, with often barren cores and crudely concentric metal zones, and may occur separately or overprint one another, vertically and laterally. Complex, irregular ore and alteration patterns arise from overprinting episodes of zoned mineralization and alteration of different ages.

### 7.1.11 Genetic Model

Porphyry Cu systems typically span the upper 4 km or so of the crust, with their centrally located stocks being connected downward to parental magma chambers at depths of perhaps 5 to 15 km. The water-rich parental magma chambers are the source of the heat and hydrothermal fluids throughout the development of the system. Large, poly-phase hydrothermal systems developed within and above genetically related intrusions are formed and are often long-lived ( $\approx$ 5m.y.).

Convection of hydrothermal fluids throughout the country rock and intruding stocks results in a focusing of metals along conduits and within permeability networks where hydro-fracturing has taken place. Effective scavenging of metals is facilitated by “organized” hydrothermal systems in a state of convection, while efficient metal deposition is enhanced by pore-fluid over-pressurization resulting in catastrophic failure and rapid remobilization and de-pressurization of metalliferous hydrothermal fluids.

### 7.1.12 Porphyry Copper Subtypes

**7.1.12.1 Alkalic Copper-Gold Porphyry** Alkalic Cu-Au porphyry deposits are known in only a few mineral provinces worldwide, with British Columbia being the type area for such deposits (Chamberlain et al., 2006). Relatively unique, alkalic porphyry deposits are an especially Au-rich variety of porphyry deposits that still maintain good copper grades. Alkalic Cu-Au porphyry deposits differ from Cu or Cu-Mo dominant porphyry deposits in the following ways:

#### **Tonnage and Grade**

Tonnages of alkalic porphyry deposits are generally less than their Cu  $\pm$  Mo counterparts, while grades

can be significantly higher, especially Au tenors. The Grasberg deposit, in Indonesia, with a resource greater than 2.5 billion tonnes grading 1.1% Cu and 1.04 g.t Au (Freeport-McMoran Copper and Gold Inc., Annual Report 2000), indicates that this deposit type can contain major Au as well as Cu resources. Mineralization related to alkaline magmatism in arc terranes includes a disproportionately large share of the worlds giant gold deposits when the small volume of alkaline relative to calc-alkaline rocks is taken into account (Sillitoe, 2002).

### **Alteration**

Alkalic porphyry deposits have smaller and more cryptic alteration footprints (Figure 7.3). On the deposit scale, phyllic alteration is typically restricted to fault zones that penetrate late in the hydrothermal system. Furthermore, alkalic deposits lack advanced argillic alteration in most cases (Chamberlain et al., 2006).

### **Tectonic and Geological Setting**

Porphyry deposits associated with alkaline intrusions typically form in an island-arc setting, possibly during periods of extension. Geological compositions vary between silica-saturated (diorite and monzonite) or silica-undersaturated (pyroxenite and syenite) complexes (Chamberlain et al., 2006). The volcano-plutonic suites are generally considered more primitive and less felsic than those associated with Cu  $\pm$  Mo porphyry deposits.

### **Architecture**

Alkalic systems often consist of numerous discrete bodies that can exhibit complex and variable geometries, from high-level breccia-hosted bodies (Mt. Polley) to deeper level intrusive-centered sulphide accumulations (Mt. Milligan or Lorraine). Orebody geometries commonly mimic associated pipe-like intrusions (Deyell and Tosdal, 2004).

## **7.1.13 Telescoped Intrusion Centered Ore Deposits**

Telescoping is the process of juxtaposing or overprinting early, deep mineralization, commonly of the porphyry type, and late, shallow, generally epithermal styles of precious- and base-metal mineralization. Telescoping is attributed to synhydrothermal degradation of volcanic paleosurfaces, as a result of either rapid erosion under pluvial conditions or sector (and, less probably, caldera) collapse of the volcanic edifices. Paleosurfaces may be lowered easily by 1 km during the  $\sim$  1 m.y. total life spans of hydrothermal systems, leading to the vertical compression of any contained ore deposits by at least 1 km.

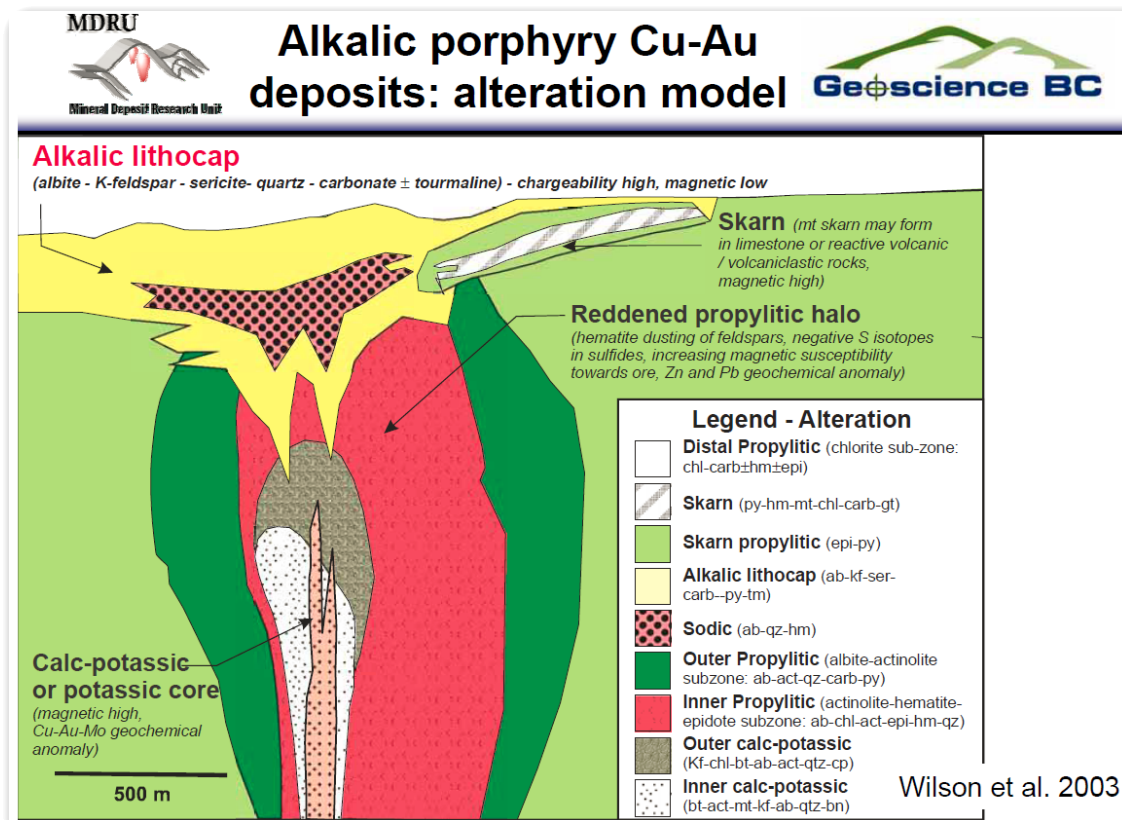
Sector collapse may be triggered by volcanic tumescence (Sillitoe, 1994) due to synmineralization intrusion, and it may be facilitated by hydrothermal weakening of volcanic edifices. Sector collapse causes extensive ingress of meteoric and/or ocean water to the magmatic environment and a decrease in confining pressure. The latter may induce hydrothermal brecciation, boiling and possible epithermal gold precipitation, and even accelerated efflux of magmatic fluids.

Telescoped systems (Figures 7.1 & 7.2) are believed to possess greater potential for the existence of both porphyry-type deposits at shallower than normal depths and giant ore deposits (Sillitoe, 1994).

## **7.1.14 Exploration Models**

**7.1.14.1 Geophysical Targeting** Several geophysical techniques can be effectively utilized while exploring for porphyry Cu  $\pm$  Mo  $\pm$  Au deposits. Most notably, magnetic, electromagnetic and Induced Polarization surveys are considered highly effective tools for detection of characteristic anomalies.

At a regional scale, airborne magnetic surveys are useful for mapping out the geological framework and for identifying magmatic arcs and their constituent elements. At a local scale, both airborne and



**Figure 7.3:** Generalized alteration and mineralization zoning associated with alkalic systems in British Columbia.

ground magnetic surveys can be effective at targeting intrusions and associated mineral deposits. Primary magnetite typically forms as an accessory mineral within intrusive bodies, and secondary magnetite may result from hydrothermal alteration and/or hornfelsing. It should be noted, however, that some deposits are characterized by magnetic lows due to the destruction of magnetite in phyllic alteration zones (Sinclair, 2007).

Electromagnetic airborne and ground surveys can be effective at delineating resistive, porphyritic intrusions as well as associated alteration haloes. In the search for porphyry deposits, large circular or ovate resistivity highs are considered to be sources of potential interest (Lane, 2007, AR#29339). A circular-like high resistivity anomaly directly coincides with the Mt. Milligan porphyry and might therefore reflect the potassic alteration halo (Devine, 2012; Geotech Ltd., 2009).

At a local scale, ground Induced Polarization surveys have proved to be the most effective at detecting metalliferous bodies. At Copper Mountain, this technique was responsible for the discovery or extension of several new zones, with resulting chargeability anomalies having a shape that generally corresponds with the known shape of the ore bodies (Stanley et al., 1995).

Chile is host to some of the world's most spectacular porphyry copper deposits. The aeromagnetic signature of porphyry copper systems in northern Chile was investigated by Behn et al., 2001. The authors proposed that transverse magnetic anomalies (lows) were responses to the loci of emplacement of intrusive bodies, and that all known porphyry copper deposits in northern Chile are spatially related to these transverse magnetic anomalies.

**7.1.14.2 Geological Targeting** Volcanic arc complexes are high priority exploration targets for intrusion related ore deposits. In British Columbia, the Stikine Terrane and the Quesnel Terrane represent Triassic-Jurassic volcanic arc complexes that were emplaced during the Jurassic and collectively represent the foundation for further geological targeting. Within these terranes, unconformities and contact faults represent prospective locations for the identification of mineralization. Due to the size of porphyry Cu deposits their associated alteration haloes, alteration zonation patterns over 10's to 1,000's of metres provide a possible method of vectoring towards areas of highest priority.

The presence of glacial cover in across large portions of BC make direct observation of alteration patterns in outcrop challenging. In these areas, local scale geological mapping is of limited effectiveness. At regional scales, however, regional mapping can be useful at narrowing in on prospective terranes and their constituent lithologies, and inferences can be made when used in conjunction with geophysical data.

**7.1.14.3 Geochemical Targeting** Regional silt sampling programs have been successful in narrowing in on prospective areas for porphyry associated mineralization, although the data is often too coarse for targeting at a local scale. Areas with glacial cover will not be conducive to silt sampling as water courses may not be cutting through and re-mobilizing any of the underlying rock.

At a local scale, soil geochemistry can be utilized as a means of direct detection of metalliferous bodies, though its effectiveness is invariably related to presence and thickness of cover and/or soils. New techniques in sampling and analysis have allowed for detection of buried deposits. By lowering thresholds with partial extractions of selectively sampled soil components, soil geochemistry can be effective in detecting porphyry Cu mineralization through transported glacial overburden of up to 100's of meters (Heberlein et al., 2010).

Traditional soil sampling (B-Horizon) performed over the Mt. Milligan deposits outlined numerous copper and gold anomalies within the area encompassing the vast majority of the deposits. However, extensive cover partially masked and dispersed the bedrock geochemical response, while geochemical values of colluvium samples were much higher (Sketchley et al., 1995).

## 8 Exploration

### 8.1 PEMC - 2017

Following the signing of an option agreement whereby PEMC can earn a 100% interest in the Wildcat Property, PEMC completed an IP survey consisting of four lines totaling 15.2 line-km. This survey was successful in identifying a large area of anomalous chargeability in the northern portion of the property. This was followed up with an additional IP survey consisting of three 4.2 km lines, to further delineate the zone of anomalous chargeability (Figure 8.1). Results from these surveys, which totaled 27.8 line-km, are presented in Figures 8.2 and 8.3.

The large, heterogeneous anomalous IP chargeability suggest the presence of sulphides and/or the presence of clay rich or graphitic horizons in the area. The coincidence of high resistivity values with large portions of high chargeability anomaly suggest that the IP response is not likely, at least not entirely, resultant from clay or graphite rich lithologies. The fact that there is no direct correlation between chargeability high values and magnetic high values, suggests that the IP chargeability response is not likely, at least not entirely, resultant from high disseminated magnetite concentrations in the underlying rock. The area of anomalous chargeability, coincident with variable magnetic and resistivity responses, seems to suggest that the presence of a hydrothermal sulphide-bearing system is possible.

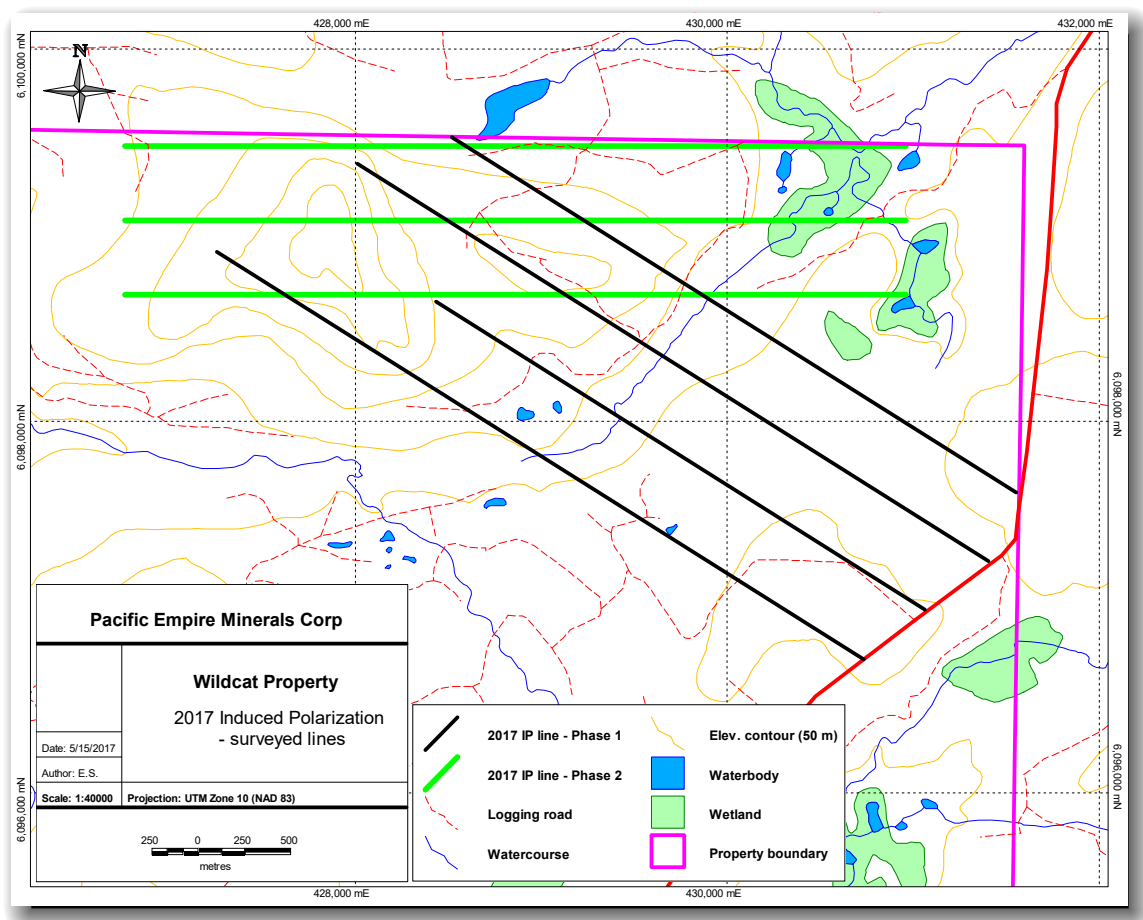


Figure 8.1: 2017 PEMC Induced Polarization survey lines.

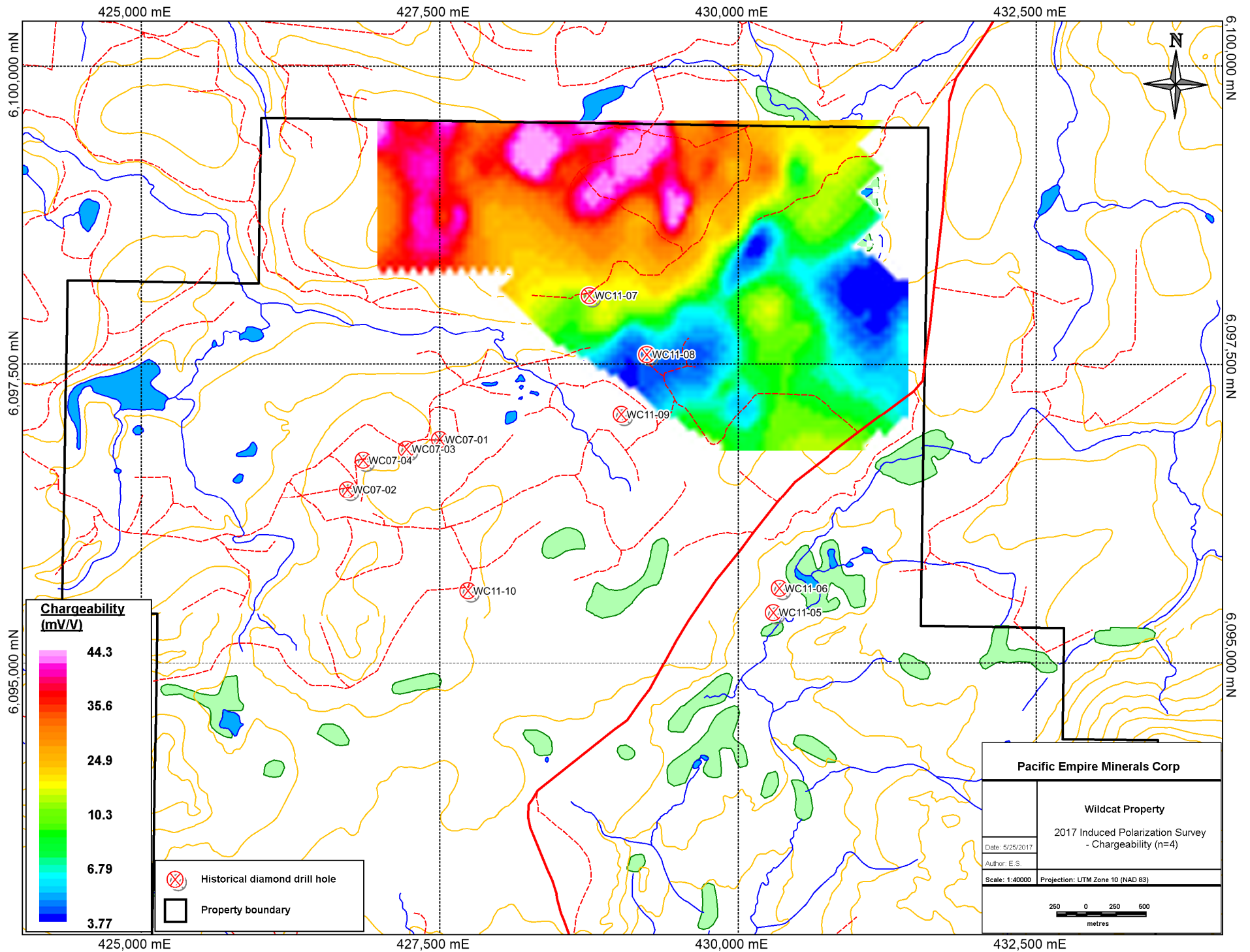


Figure 8.2: 2017 IP Chargeability

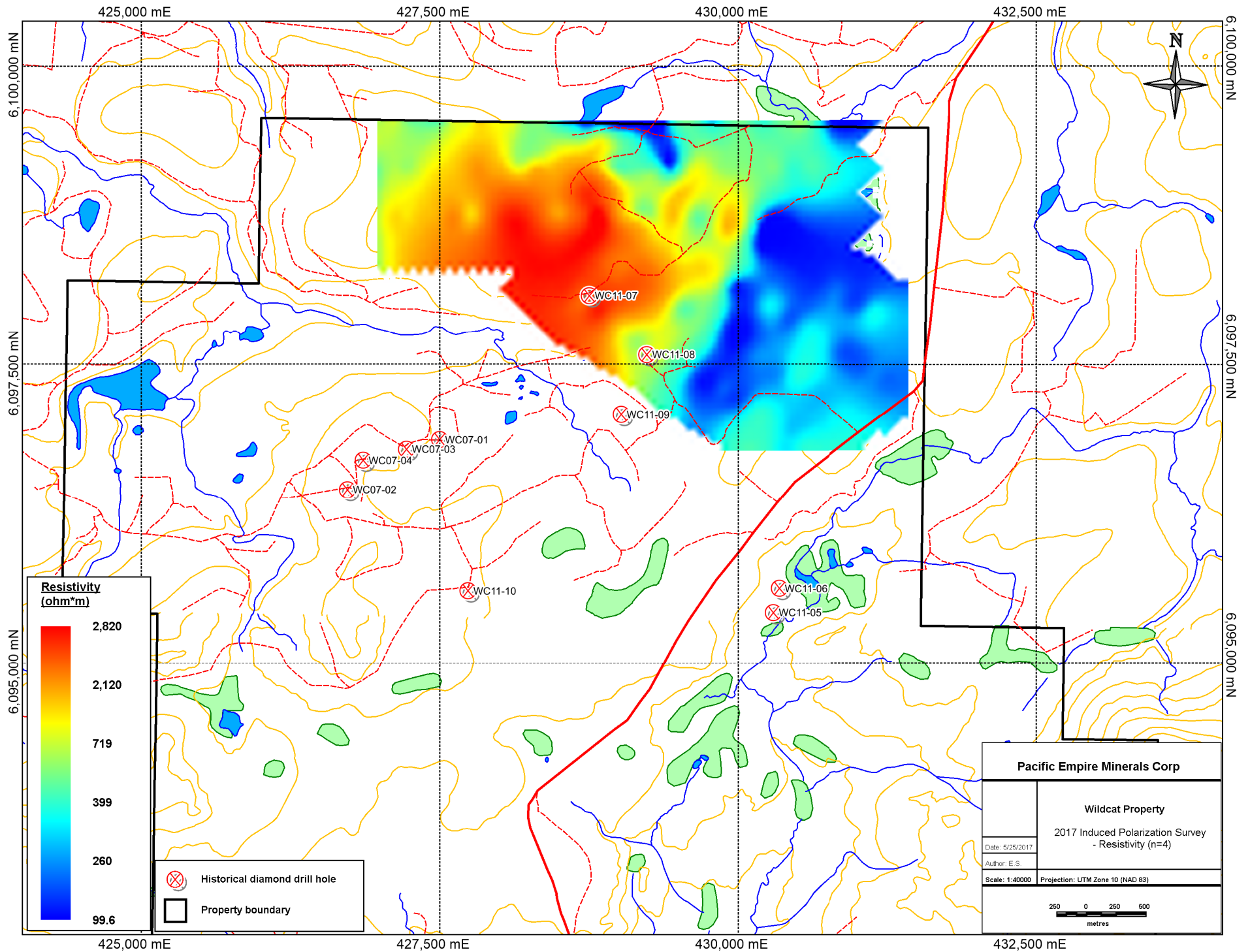


Figure 8.3: 2017 IP Resistivity



## 9 Interpretation & Conclusions

The Wildcat Property is an early exploration-stage property with potential for copper-gold mineralization, specifically, copper-gold porphyry deposits. The property is well situated to benefit from nearby infrastructure should there be exploration resulting in the outlining of a potential deposit of economic significance. Historical exploration, namely diamond drilling, has provided insight to the underlying geology and has intersected anomalous copper  $\pm$  gold mineralization and alteration assemblages that might be a distal expression of a potentially mineralized hydrothermal system that may exist on the property.

Although not necessarily indicative of mineralization on the Wildcat Property, the porphyry deposits at the Mt. Milligan Copper-Gold Mine that exist within similar geology as that on the Wildcat Property, lend geologic support to the copper-gold porphyry potential on the property. Multiple phases or pulses of magmatism of varying ages have persisted to form the Mt. Milligan copper-gold deposits, and due to spatial proximity alone, there exists potential for magmatism of variable ages on the Wildcat Property that may have resulted in a hydrothermal system or hydrothermal systems.

IP geophysical surveys recently completed by PEMC have outlined a large area of anomalous chargeability response, partially coincident with resistivity and magnetic high anomalies. Although the majority of the bedrock on the property is obscured by glacial overburden, what outcrop has been seen by the author suggests that the anomalous chargeability outlined could very well be directly related to sulphide mineralization. Mineralization of economic interest has not been encountered to date, though significant anomalous copper  $\pm$  gold has been encountered to a limited extent in 2011 diamond drill holes WC11-07 and WC-11-08. Of the historical drilling completed to date, these two holes are closest to the area of anomalous chargeability recently outlined by PEMC in the northern portion of the property (Figure 9.1).

The coincidence of what appears to be hydrothermal alteration in limited outcrops with high chargeability, and variable resistivity and magnetic values, suggests that a hydrothermal system, potentially copper  $\pm$  gold bearing, may underlie the IP chargeability anomaly in the northern portion of the property. It is of the opinion of the author that the Wildcat Property merits further exploration.

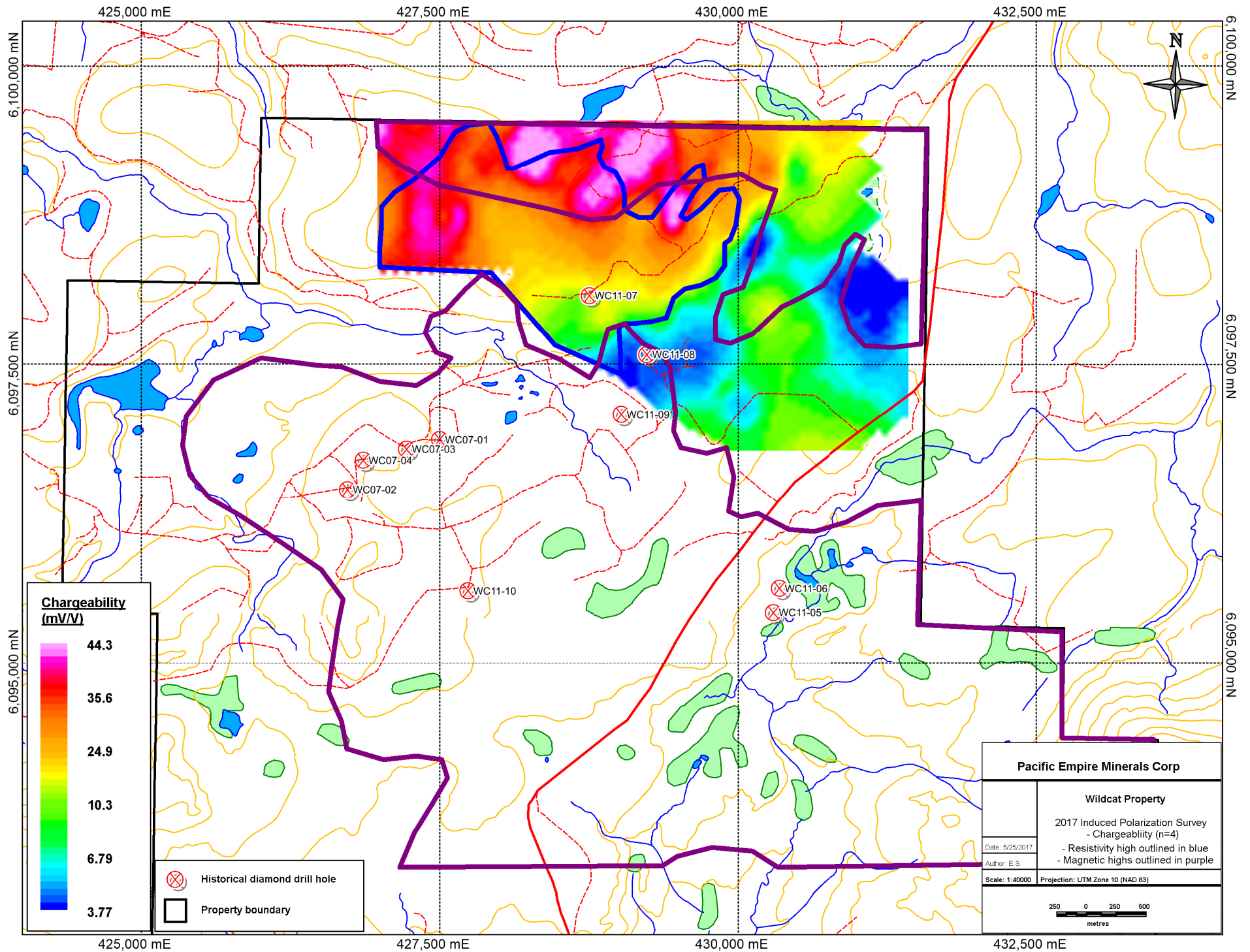


Figure 9.1: Compilation showing Wildcat Property targeting.

## 10 Recommendations

Given that there is exploration potential on the property, one must then consider how best to proceed with regard to exploration methods in order to evaluate the priority target area of high chargeability. The property is generally covered by glacial overburden, and as such, an appropriate method of exploration would be Reverse Circulation drilling. The accessibility of the property and the existing network of logging roads are conducive to exploration in this manner. Low-cost RC drilling would allow for greater lateral coverage while effectively testing subsurface bedrock. Given the size of the area of anomalous chargeability, it may take tens of RC holes to vector towards the center of a potential mineralized porphyry system. Using geological and analytical information from the RC drilling, high priority targets for diamond drill testing may be defined which will help to reduce unnecessary diamond drilling costs.

A two-phase exploration program is recommended for the Wildcat Property. Phase 1 exploration involves testing of the Induced Polarization chargeability anomaly with an extensive RC drill program, in order to cost effectively test an area of significant surficial extent. Phase 2, which would be contingent on results from the initial RC drilling program, should consist of diamond drilling prospective areas identified from the Phase 1 exploration program, in order to gather information to depth. The logistical advantages on this property in particular should allow for relatively cheap drilling, in general. The total cost of the proposed Phase 1 and 2 exploration programs is estimated at CDN\$418,000 (see Table 10.1).

**Table 10.1:** Proposed Exploration Program & Budget

<b>Item</b>	<b>Cost (CDN\$)</b>
<b>Phase 1</b>	
Reverse Circulation Drilling (4000 m)	\$100,000
Analytical	\$80,000
Accomodation & Support	\$36,000
<b>Total Phase 1</b>	<b>\$216,000</b>
<b>Phase 2</b>	
Diamond drilling (1000 m)	\$150,000
Analytical	\$20,000
Support & Accommodation	\$32,000
<b>Total</b>	<b>\$202,000</b>
<b>Total Phase 1 &amp; 2</b>	<b>\$418,000</b>

## 11 Statement of Expenditures

**Table 11.1:** Statement of Expenditures

<b>Work type</b>	<b>Personnel</b>	<b>Comment</b>	<b>Days</b>	<b>Rate</b>	<b>Totals</b>
IP survey #1 (April 2017)	Walcott geophysical crew	6-man crew	8	\$4,460.00	\$35,680
IP survey #1 (April 2017)	Walcott geophysical crew	Mob/Demob	2	\$2,100.00	\$4,200.00
Accommodation (April 2017)	Calder Lake Lodge	IP crew	48 man-days	\$170.00	\$8,160.00
IP survey #2 (May 2017)	Walcott geophysical crew	6-man crew	9	\$4,250.00	\$38,250
IP survey #2 (May 2017)	Walcott geophysical crew	Mob/Demob	1	\$10,000	\$10,000.00
Accommodation (May 2017)	Calder Lake Lodge	IP crew	54 man-days	\$170.00	\$9,180.00
Report preparation	Brad Peters / Rory Ritchie		3	\$400.00	\$1200.00
<b><i>TOTAL Expenditures</i></b>					<b>\$106,670.00</b>

## 12 Statement of Qualifications

I, Rory R. Ritchie, do hereby certify that:

1. I am sole proprietor of Rory Ritchie Geological Consulting located at 1553 Woods Drive, North Vancouver, B.C., Canada;
2. I have an H.B.Sc. degree in Chemistry from The University of Western Ontario, 2005. I fulfilled APEGBC requirements in Earth Sciences at Simon Fraser University, 2008. I am a Licensed Professional Geoscientist with the Association of Professional Engineers and Geoscientists of British Columbia;
3. I have engaged in mineral exploration since 2007, for junior exploration companies and as an independent geologist;
4. I have co-authored the report entitled “Geophysical Report on the Wildcat Property”. This report is based Induced Polarization geophysical surveys completed in April and May of 2017;
5. I am not independent using the definition in Section 5.1 of National Instrument 43-101;
6. I am the Vice President of Exploration for Pacific Empire Minerals Corp.;
7. As of the effective date of this Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Signed and dated at Vancouver, British Columbia, on the 30<sup>th</sup> day of June 2017.

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Rory R. Ritchie H.B.Sc., P.Geo.

I, Brad J. Peters, do hereby certify that:

1. I am sole proprietor of BJP Consulting located at 411-801 Klahanie Drive, Port Moody, BC, Canada;
2. I have a Bachelor of Science Degree from the University of British Columbia (Geology);
3. I have engaged in mineral exploration since 2007, for junior exploration companies and as an independent geologist;
4. I have co-authored the report entitled “Geophysical Report on the Wildcat Property”. This report is based Induced Polarization geophysical surveys completed in April and May of 2017;
5. I am not independent using the definition in Section 5.1 of National Instrument 43-101;
6. I am the President of Pacific Empire Minerals Corp.;
7. As of the effective date of this Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Signed and dated at Vancouver, British Columbia, on the 30<sup>th</sup> day of June 2017.

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Brad J. Peters B.Sc.

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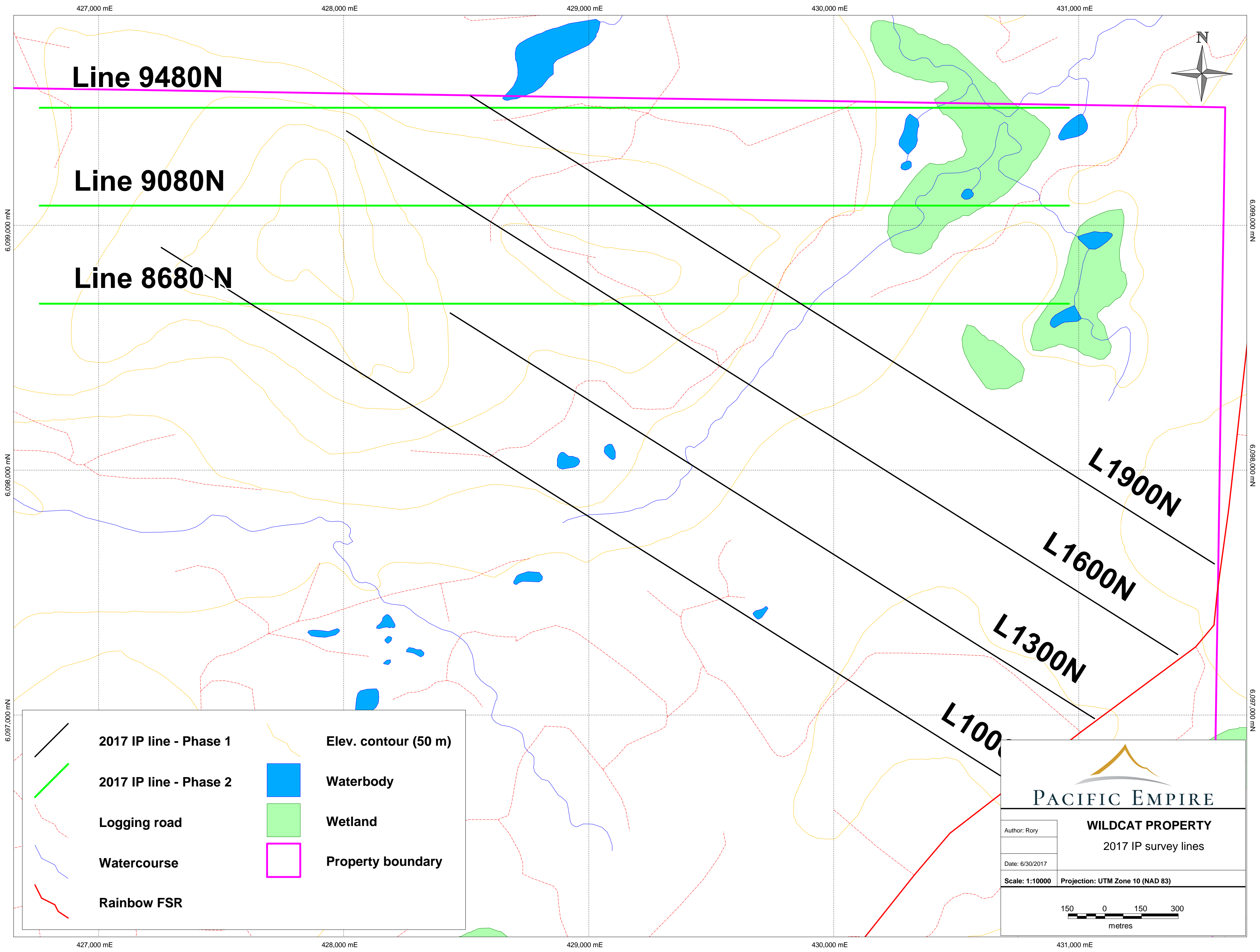
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## A 2017 Induced Polarization surveys - Survey lines



**Line 9480N**

**Line 9080N**

**Line 8680 N**

**L1900N**

**L1600N**

**L1300N**

**L1000N**

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	Logging road		Wetland
	Watercourse		Property boundary
	Rainbow FSR		

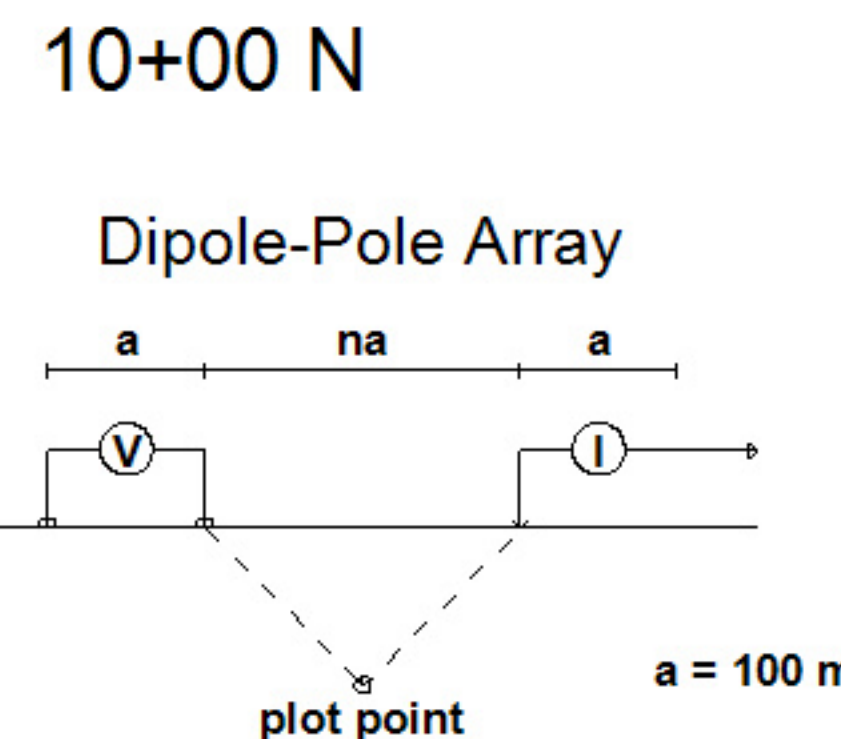
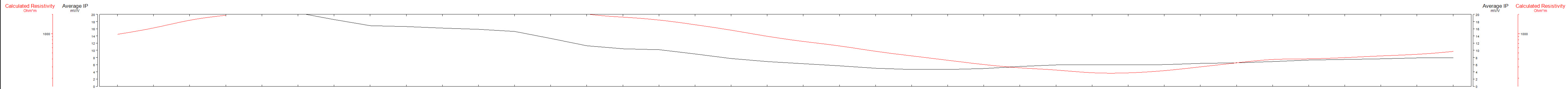
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**WILDCAT PROPERTY**  
2017 IP survey lines

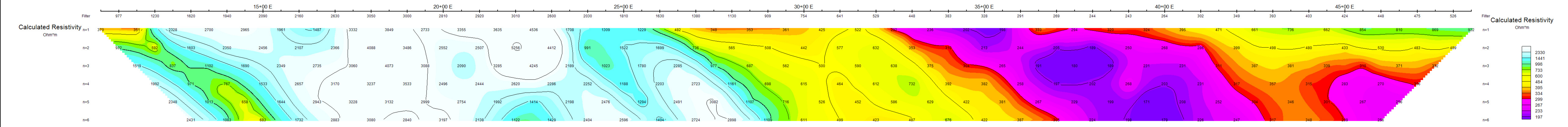
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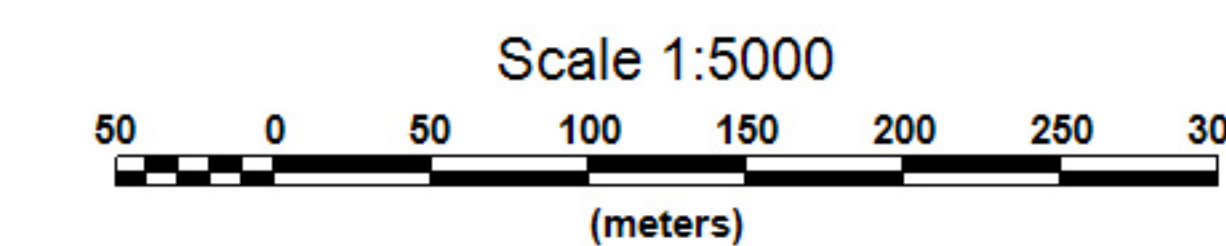
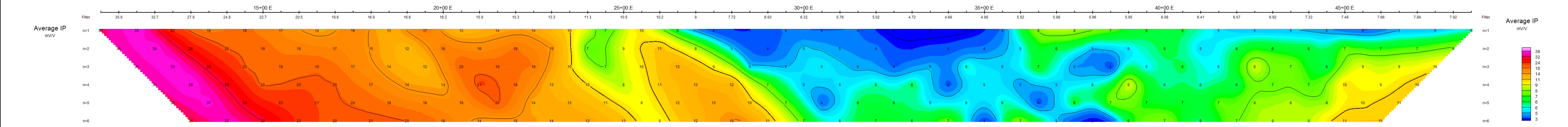


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PACIFIC EMPIRE MINERALS CORP.  
 WILDCAT PROJECT

PRELIMINARY  
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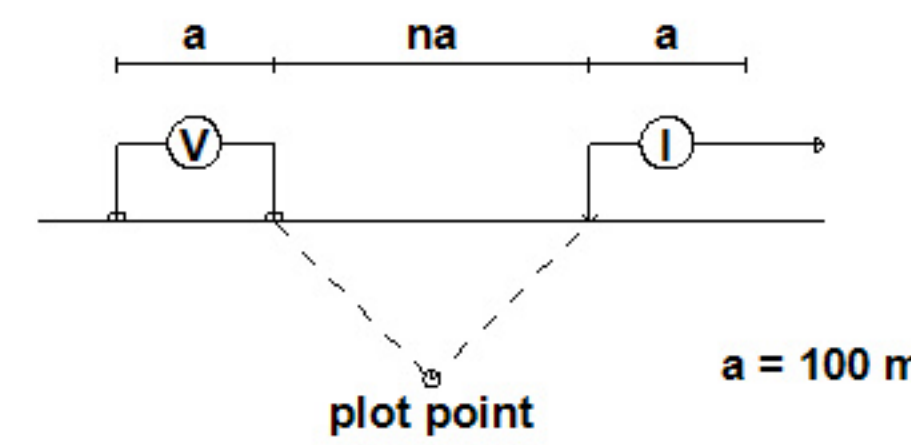
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PETER E. WALCOTT & ASSOCIATES LIMITED

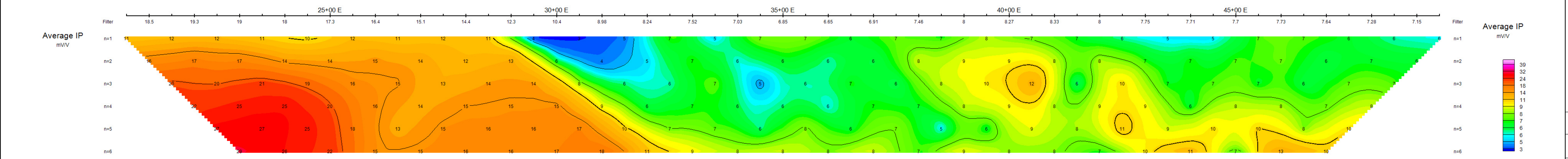
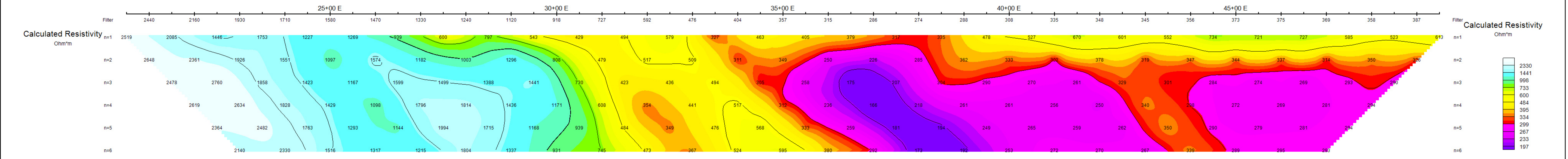
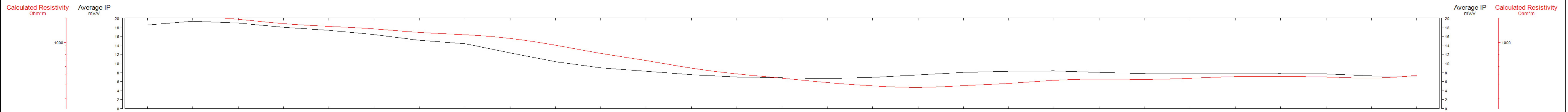
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Dipole-Pole Array



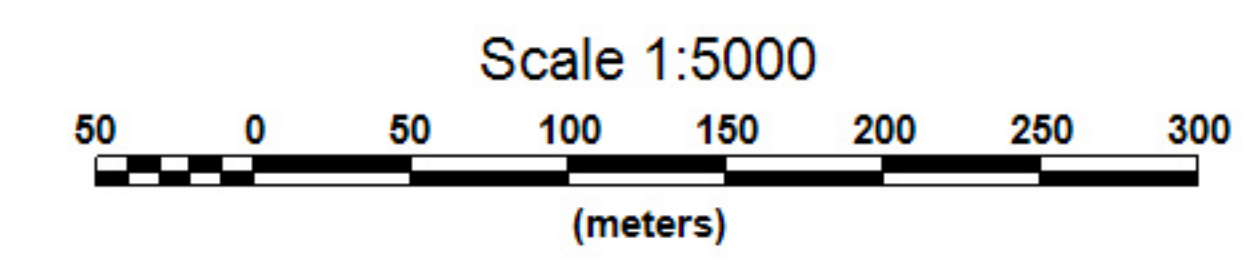
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PACIFIC EMPIRE MINERALS CORP.  
 WILDCAT PROJECT

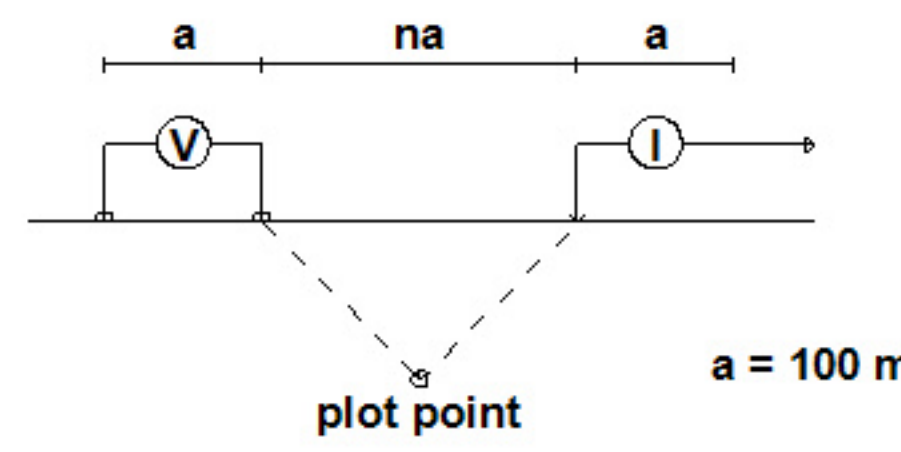
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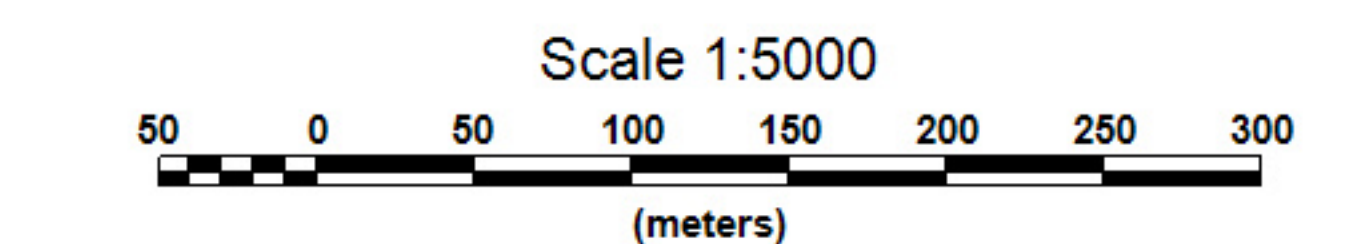
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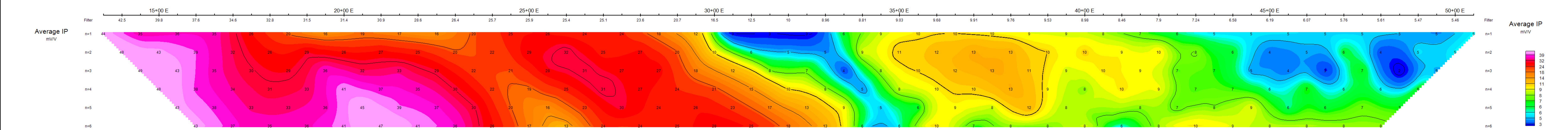
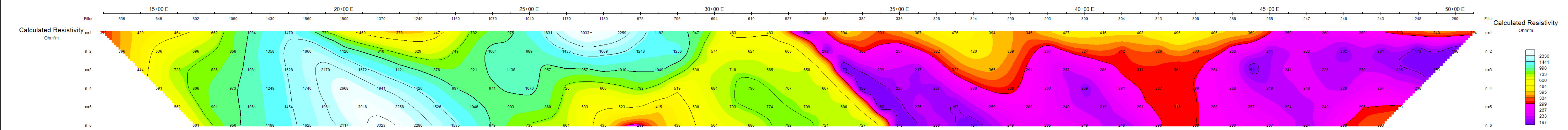
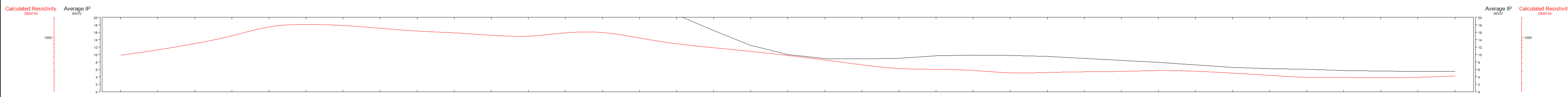


PACIFIC EMPIRE MINERALS CORP.  
 WILDCAT PROJECT

PRELIMINARY  
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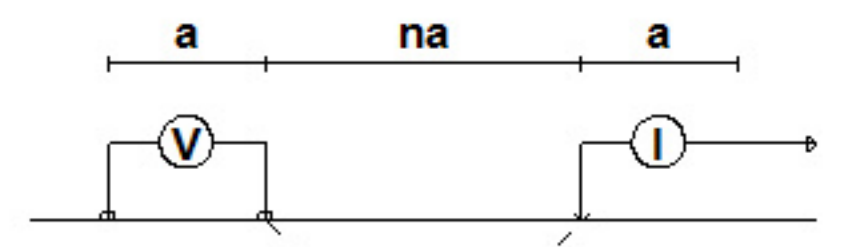
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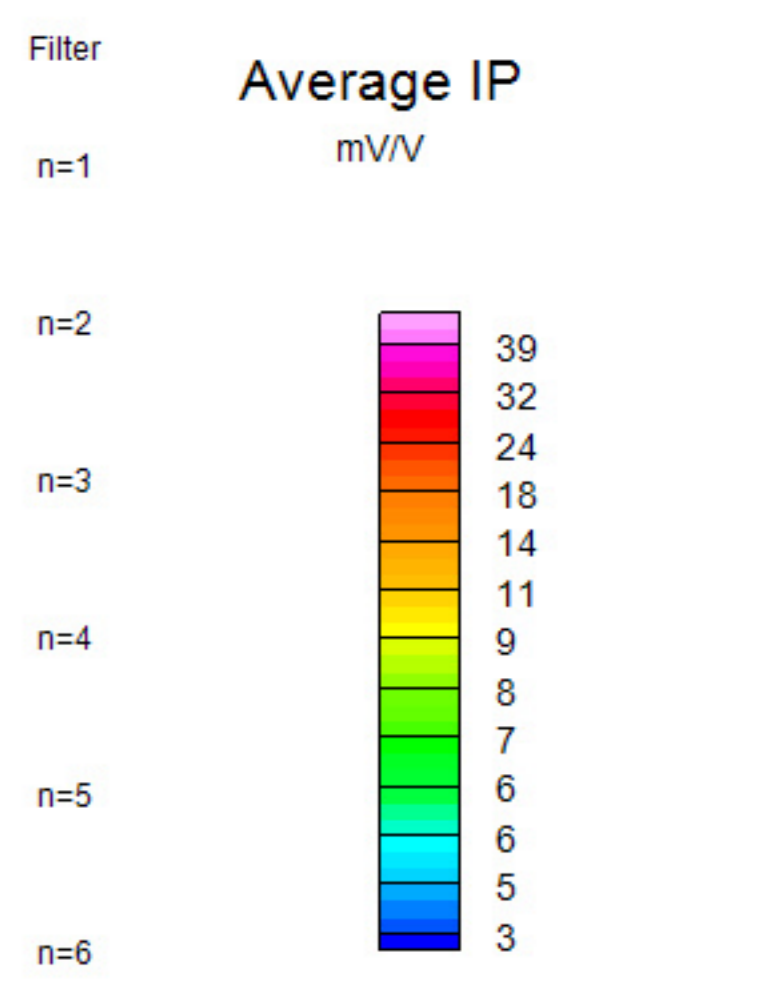
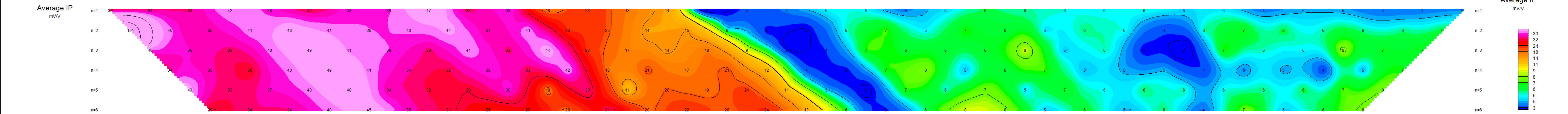
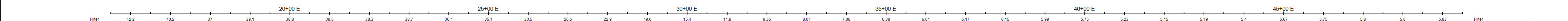
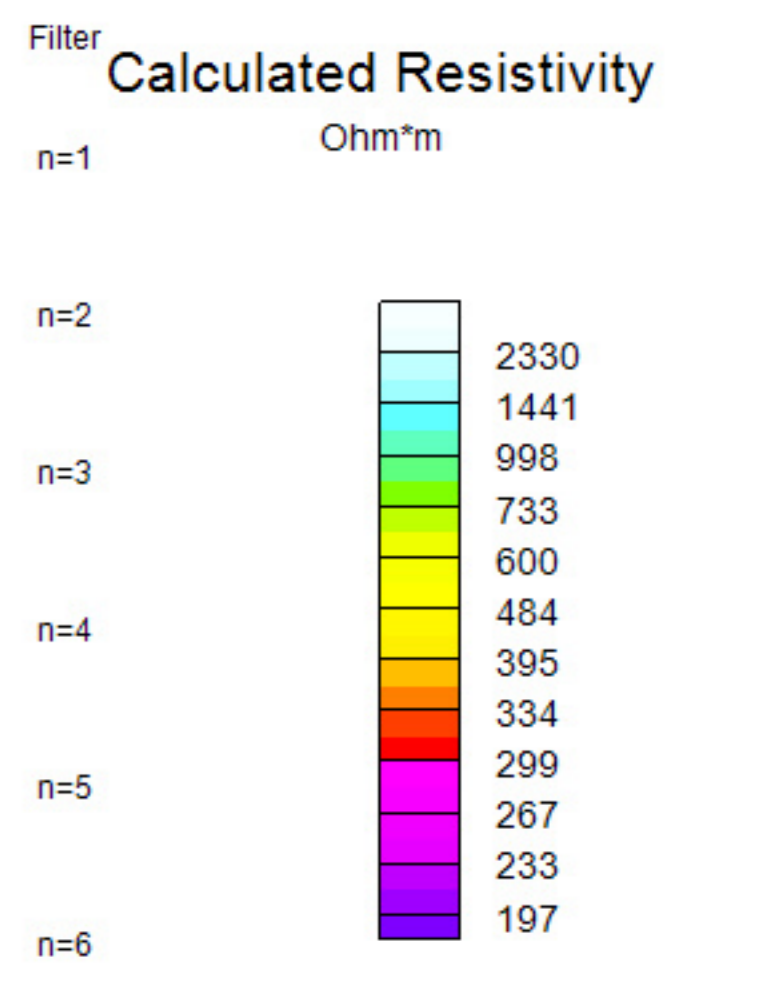
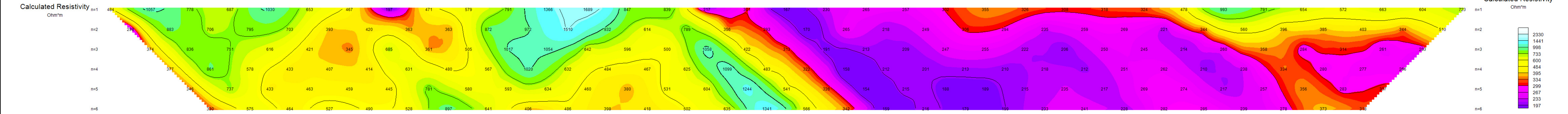
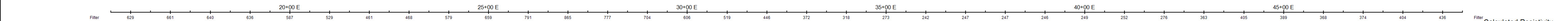
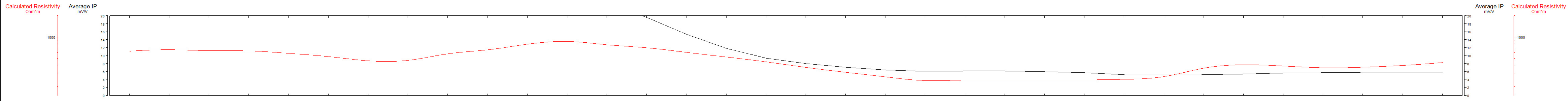
19+00 N

Dipole-Pole Array

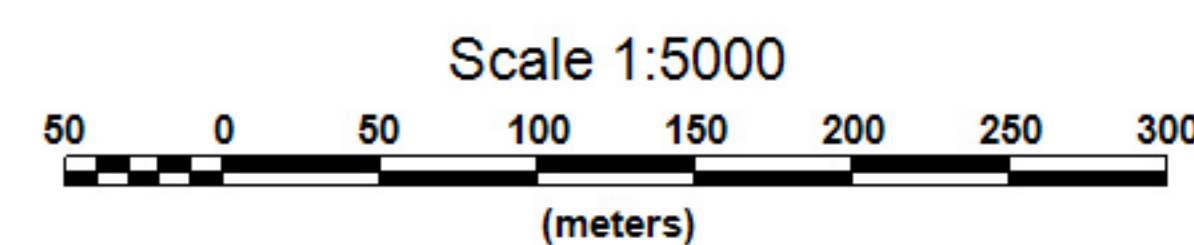


Filter  
 \*  
 \*\*  
 \*\*\*  
 \*\*\*\*  
 \*\*\*\*\*  
 \* \* \* \* \*

a = 100 m



HUNTEC 7.5 kw Tx, GDD 8 Rx  
 Frequency: 0.125 Hz.  
 Operators: M.W., T.K., M.M., J.C.  
 Logarithmic Contours  
 1, 1.5, 2, 3, 5, 7.5, 10, ...



PACIFIC EMPIRE MINERALS CORP.  
 WILDCAT PROJECT

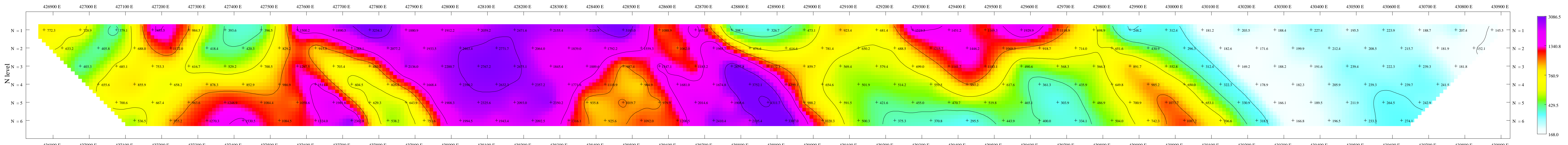
**PRELIMINARY**  
 INDUCED POLARIZATION SURVEY

Date: APRIL 2017  
 Interpretation:

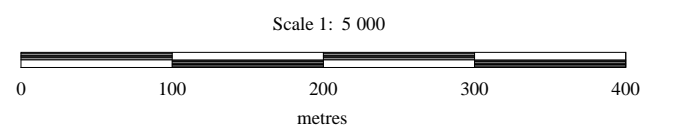
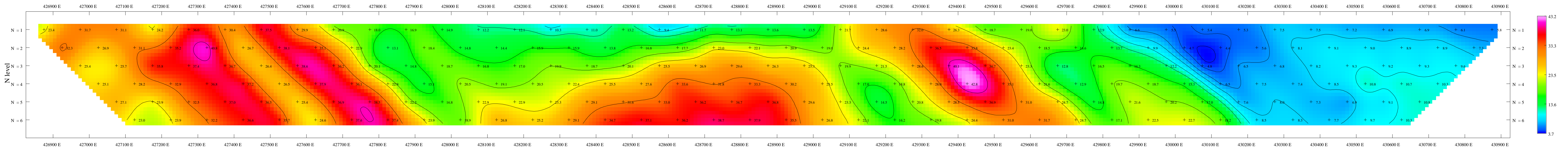
PETER E. WALCOTT & ASSOCIATES LIMITED



Apparent Resistivity (obs) (ohm.metres)

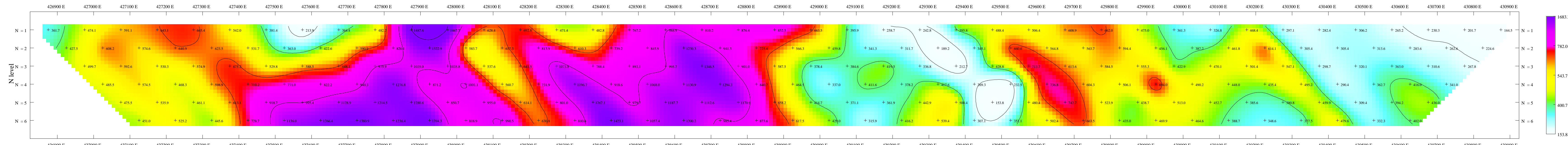


Chargeability (obs) (mV/V)

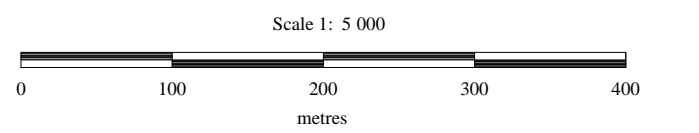
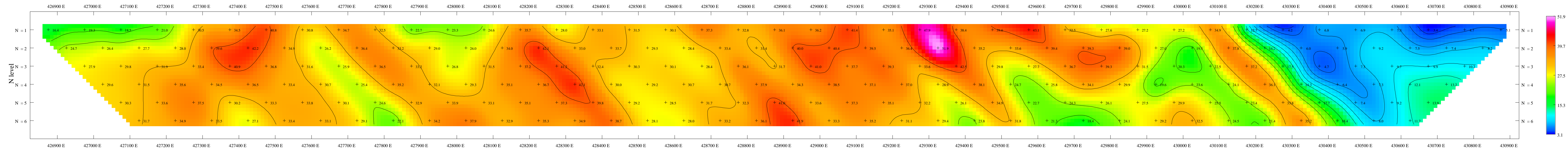


<b>Peter E. Walcott &amp; Associates Limited</b>	
Line 8680N	
Author : Tom Kocan	Ref :
Drawn :	Report No :
Date : 17-May-2017	Plan No :
Scale 1: 5 000	

Apparent Resistivity (obs) (ohm.metres)

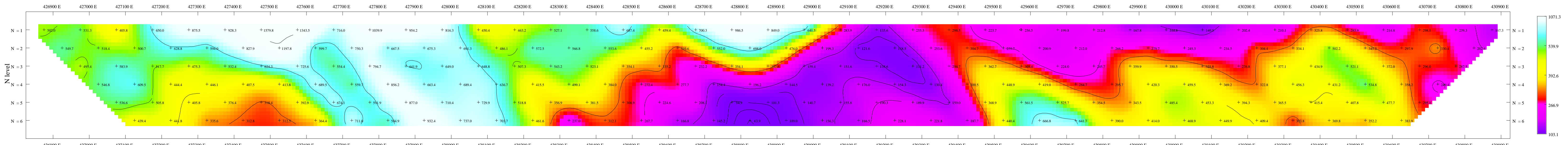


Chargeability (obs) (mV/V)

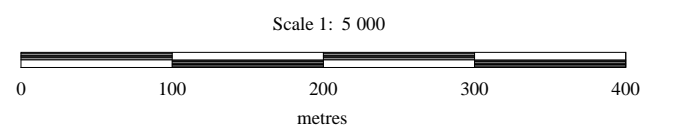
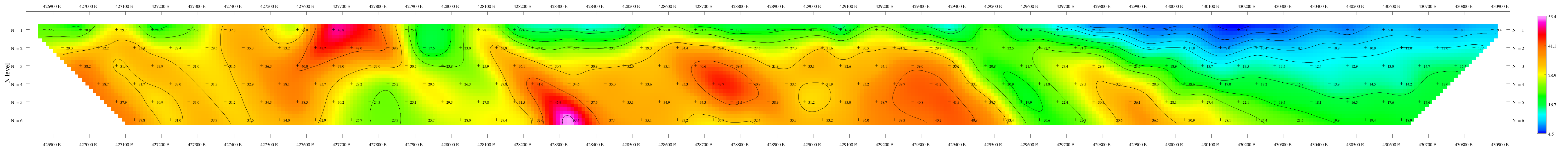


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Line 9080N	
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Drawn :	
Date : 17-May-2017	Report No :
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Apparent Resistivity (obs) (ohm.metres)



Chargeability (obs) (mV/V)



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