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Α

VLF EM-16 Surveying Report

On The

Longlac East Property

Klotz Lake Area (G0295) NTS 42F

District of Thunder Bay, Ontario

Lines 64W to 142W

Prepared For: Prodigy Gold

By: Shaun Parent

Superior Exploration Adventure and Climbing Co. Ltd.

March 29, 2017

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Executive Summary

The ground VLF survey was completed in the Klotz Lake Township, District of Thunder Bay in Northern Ontario. The property is located approximately 35 km. east of Longlac, Ontario and is adjacent to Highway 11.

The survey was carried out in October and November 2016, using a VLF EM-16 unit and a handheld Garmin GPS-60CSX. The two transmitter stations read were: NAA - Cutler, Maine and NML - La Moure, North Dakota. A total of 92.2 Km of VLF were completed over 40 VLF Lines, spaced 200 meters apart.

The objective of the 2016 VLF EM-16 survey was to determine if the VLF Survey could delineate the location of structures such as the Klotz Lake Fault as well as ground truth airborne EM conductors that crossed the survey area that might correlate with Gold bearing conductive horizons, shears, contacts and lake Bottom Sediments that had anomalous gold values.

Deposit Types

Three deposit types are common within the Onaman–Tashota Belt. They include; vein type deposits; chemical metasedimentary type deposits; and shear disseminated type deposits. (Speed and Craig 1992)

Within the vein type deposits, gold occur in association with quartz (carbonate) veins hosted by felsic to intermediate metavolcanics and are often located at the margins of felsic intrusions (dikes or stocks) (Mason and White, 1986)

In chemical metasedimentary type deposits, gold is hosted within the chemical metasediments. (chert, iron formation).

Shear disseminated type deposits represent shear zones which contain disseminated pyrite, pyrrhotite and/or chalcopyrite with related gold mineralization. These shear zones are hosted by felsic metavolcanic rocks, mainly crystal tuffs, lapilli tuffs, volcanic breccias, rhyolite, dacite and/or feldspar/quartz porphyry (Mason and White, 1986).

Over three million ounces of gold have been produced from mines in the Geraldton gold camp and are most often associated with regional deformation zones (i.e. Barton Bay Deformation Zone) and iron formation. Three major mineralization styles have been described for the Beardmore/Geraldton Gold Belt in the literature which include:

- 1. Narrow but high grade quartz veins and stringers with minor sulphides and variable carbonate and sericite alteration in all host lithologies (except iron-formation).
- 2. Irregular, massive sulphide-quartz lenses and replacement zones in sulphidized banded iron formation.
- 3. Quartz stringer zones in wackes or lean iron-formation, generally spatially associated with the contacts of the Hard Rock Porphyry (Speed and Craig, 1992).

Introduction

A VLF-EM16 survey is a relatively simple and economic geophysical survey that is used to better understand shallow, vertical and sub vertical bedrock conductors.

This report describes the findings and results of the VLF EM-16 survey utilizing the VLF2DMF processing software of which the author of this report has assisted in its development since 2007. It enables the processing and inversion of electromagnetic (EM) induction data acquired along a survey area using a Very Low Frequency (VLF) (Santos 2013)

This software generates profiles of Raw Data, Fraser Filtered Data, KH, Resistivity and (2-D) Modelled Inversions, as well as plan maps and slices of Fraser, KH and Inversion models of separate or combined VLF survey lines. Individual line profiles and models for L100W and L104W are included in the Appendix at the end of this report

VLF data collected in the surveyed area was also compiled onto plan maps of contoured Fraser Filter data and Resistivity data (figures 8-13)

The Location of the VLF survey was chosen based on areas of high priority which were decided upon using data results from the Airborne EM and Magnetic survey as well as Geology data provided by Hayden Butler. (Figure 5 and 6)

"The magnetic interpretation was designed to find the under structure of the belt. As such, it was designed to help you reduce the number of claims based on an interpretation of the location of deformation zones and possible ("alteration") zones or zones of complexity. The interpretation suggests that the known geology on OGS maps does not give a complete picture of the belt's structure because the OGS does not use geophysics to extrapolate outcrop stratigraphy through covered areas - unlike in Australia where this has been the normal procedure for 50 years. As for the conductors, they are a guide mostly to stratigraphy or mineralization of various kinds which may or may not include gold. Structure is the key to locating gold and the mag interpretation is designed to find structure." (Butler 2016)

Personnel

The VLF EM-16 operator and GPS field navigator responsible for the collection of raw data was Shaun Parent, P.Geo who was assisted by field Assistant Sandra Slater. VLF2DMF Processing & Interpretation was completed by Shaun Parent and Sandra Slater.







Figure 3 VLF Grid West Side









Work Performed

The VLF EM-16 survey consisted of surveying along 40 VLF Lines, 200 meters apart, in a direction of 00-180 degrees true azimuth using a VLF EM-16 unit and a handheld Garmin 60-CSX GPS. Two Frequencies were read at 20 meter stations. Each VLF station was located based on a northerly azimuth and distance from the start of the survey line. Sea Kayaks were used on the lakes when needed.

The following parameters were used throughout the survey.

VLF Transmitters Used:	NAA-24.0 KHz. Cutler, Maine (East)
	NML-25.2 KHz. La Moure, North Dakota (West)

VLF survey direction: The VLF Em-16 receiver was facing 00 degrees (True North) along all lines. All lines began with station 0+00 located at south end of each line.

VLF survey stations: All readings were taken at approximately 20 meter stations along the survey line.

Parameters of Measurement: In-phase and Quad-phase components of vertical magnetic field as a percentage of horizontal primary fields. (Tangent of tilt angle and ellipticity) (McNeil and Labson 1991) VLF transmitter NAA was to the east, while transmitter NML was to the west. The transmitters are chosen so that the direction to the transmitting station is as close to the orientation of the bedrock strike.

VLF Data Collection Process

Field data was collected as follows on each surveyed line

- Each station was saved onto the Handheld Garmin 60CSX GPS Unit (including local features such as power lines, fences and geological structures)
- VLF readings for each station were recorded in a notebook as In-Phase and Quadrature corresponding to the line number and station number. (See example in Table 1)
- Field information was transferred to a Garmin map source program where line and station information could be viewed.
- Garmin and VLF data were compiled onto an excel spreadsheet and formatted for input into the VLF2DMF processing software. For this survey all UTM Values are NAD 83

Line 0+00	NAA In phase	NAA Quadrature	NML In phase	NML Quadrature	Notes
2+00N	10	6	4	5	swamp
2+20N	8	4	2	4	OC

Table 1Sample of Field Data Collected

VLF2DMF Data Processing

All 40 lines (64W – 142W) were processed and interpreted separately for TX NAA and TX NML, however, only profiles for 100W and 104W are included in the appendix at the end of this report. These two lines were identified as relevant due to the coincident lake bottom gold anomalies. All VLF lines surveyed are shown as contoured maps of Fraser Filter and Resistivity values for both TX NAA and TX NML.

VLF2DMF Profiles & Models

Raw and Filtered Data Profiles

The raw data for each frequency was plotted for each line surveyed. No filtering or smoothing of the raw data was done.

Fraser Filter Profile with Fraser Peaks

Raw data was run through the Fraser Filter. This filter transforms In-Phase cross overs and inflections into positive peak anomalies (Fraser 1969). In-Phase inflections and cross overs are usually plus to minus, while Quadrature responses are negative to positive giving a negative peak anomaly when the Fraser Filter is applied. VLF anomaly trends are chosen based on the location of the peaks on the Fraser Filter profile.

K-H Profiles

Raw data was run through the Karous-Hjelt (K-H) filter. The filter is applied to obtain a section of current density. The higher values are in general associated with conductive structures (Karous, Hjelt 1983). If there is depth extent, this is shown on the In-phase profile as dark blue.

Resistivity Profiles - 4000 Ohm's

The apparent resistivity was calculated. The resistivity can be calculated if the mean environmental resistivity is known at the beginning of the VLF profile. A mean resistivity of 4000 ohm's was used for all lines.

Model - 4000 Ohm's

A resistivity of 4000 Ohm's was used to build an initial model used in the inversion to obtain a realistic cross section of the line surveyed. <u>Conductive zones are red/yellow</u> <u>while resistive zones are blue.</u> A depth scale is found on the left side of model profiles. Surface conductive zones show little depth extent, have a horizontal display and are limited in depth. Using a resistivity of 4000 Ohms, the depth of the model is determined to be 204 meters for TX NAA and 198 meters for TX NML. The vertical exaggeration used for all models is 1.0.

Model - 4000 Ohm's with Drill Hole Locations

On VLF lines 100W and 104W where there was a correlation of a VLF Conductor and anomalous Lake Bottom Sediment, several drill holes were spotted. These drill holes were plotted on the model section to show their intercept location into the priority VLF targets and below the anomalous lake bottom gold samples.

Discussion of Results

Individual line data results were merged and contoured into Plan Maps for:

- Elevation data calculated from raw data files to produce an elevation map (Figure 7) of the surveyed area.
- Individual line data results for Fraser Filter (both In-phase and Quadrature) and Resistivity values were combined and contoured as In Phase and Quadrature and Resistivity values on (Figures 8 to 13). VLF anomaly trends are highlighted in red on the VLF contour maps.
- 3 Drill holes are recommended on the property based on Anomalous lake bottom gold samples. (Table 2)
- Anomalous lake bottom gold values occur on lines 100W, 102W and 104W and these locations are shown on all VLF Plan maps as well as on VLF profiles for lines 100W and 104W. The location of these gold anomalies are found on (Table-3)



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Table 2 Recommended Drill Holes on VLF Grid

DDH Number	Line Location	Drill Location UTM	Azimuth	Dip	Length
100W-1 L100W	35+40N	560494 / 5514734	180	-45	200M
104W-1 L104W	31+80N	560151 / 5514372	180	-45	200M
104W-2 L104W	28+60N	560150 / 5514060	180	-45	200M

Table 3Anomalous Lake Bottom Sediment Samples (OGS Open File Report 6035)

Sample Number	Line Number	Station	UTM	Value in PPB
S 993	100W	34+00N	560528 / 5514599	13 PPB
S 994	104W	30+80N	560227 / 5514282	6 PPB
S 995	104W	27+80N	560152 / 5513976	10 PPB

Conclusions

The Ground VLF EM-16 Survey was successful for a variety of reasons.

- a) VLF TX NAA and NML trends correspond well with recommended trends in Hayden Butlers Airborne interpretations.
- b) The delineation of the main East/West Klotz Lake Fault.
- c) VLF anomalies and trends correlated well with Geological contacts and several splays off the Klotz Lake Fault.
- d) VLF TX NAA and NML resistivity maps show different rock units across the property.
- e) The processing of raw VLF NAA and NML data using the VLF2DMF Software program was successful in identifying bedrock conductors within the granite batholith that correspond with Gold Lake bottom sediment samples on lines 100W and 104W.

Recommendations

- 1) Ground proofing and prospecting along VLF trends that are in close proximity to the Klotz Lake Fault and appear to be splays both North and South of this fault.
- 2) Ground proofing and prospecting along the strong VLF trends that are closely related to strong EM and magnetic responses.
- Ground proofing and prospecting along the VLF trends in the areas of Line 100W to 104W.
- 4) Drilling of 3 holes (Table-2) where there is a correlation between the lake bottom sediment anomalies (Table-3) and a VLF conductor within the granite batholith. This conductor might indicate a significant shear zone carrying sulphides with gold.
- 5) Fill in 100 meter spaced VLF lines in areas where there is successful prospecting.
- 6) Further processing of VLF data into a 3D model after a compilation of prospecting, geological and drill hole data.
- 7) Comparison of VLF profiles of lines 64W to 142W with VLF surveys carried out across similar geophysical and geological environments that have had known drilling carrying gold mineralization. Examples: Milestone East, Golden Mile, Titan, Teardrop or Theresa Mine properties.

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Certificate of Qualifications

I, Shaun Parent, P. Geo (LTD.) residing at 282 B Whispering Pines Road, Batchawana Bay, Ontario do certify that:

- 1. I am a consulting Geoscientist with Superior Exploration, Adventure & Climbing Co. Ltd.
- 2. I graduated with a Geological Technician Diploma from Sir Sandford Fleming College in 1986.
- 3. I graduated with a BSc. from the University of Toronto in 1986
- 4. I am a member in good standing with the Association of Professional Geoscientists of Ontario #1955 and a member of the Prospectors and Developers Association of Canada.
- 5. I have been employed continuously as a Geoscientist for the past 31 years since my graduation from University.
- 6. The nature of my involvement with this project was to carry out the VLF Survey and the interpretation of the VLF data using the EMTOMO VLF2D MF Software of which I have been developing with Dr. Fernando Santos of Lisbon, Portugal.

Dated this 29^h day of March 2017

Shaun Parent, Dipl-Geo, BSc. P. Geo (Limited)

APPENDIX



Figure 15 Line 100W TX NAA Fraser Filter Profile



VLF-EM raw data Line: Prodigy Longlac Project Line 100W

Figure 16 Line 100W TX NAA KH Profile



K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 100W



Figure 17 Line 100W TX NAA Resistivity 4000 Ohm Profile





Transmitter: NAA

Vertical Exaggeration: 1.0

Figure 19 Line 100W TX NAA Model 4000 Ohm with Drill Hole



Transmitter: NAA

Vertical Exaggeration: 1.0

Figure 20 Line 100W TX NML Raw Data Profile

VLF-EM raw data

Line: Prodigy Longlac Project Line 100W stations 16+00N 26+00N 31+00N 35+80M+00N 21+00N 26.0 +18.0 -10.0 -2.0 --6.0-14.0R -22.0 -30.0-38.0-46.0-54.0-1000 0 500 1500 2000 Freq.(kHz) Distance (m) 25.2 ---⊖--- I 25.2 \mathbf{NML}

Figure 21 Line 100W TX NML Fraser Filter Profile



Figure 22 Line 100W TX NML KH Profile



K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 100W



Figure 23 Line 100W TX NML Resistivity 4000 Ohm Profile





Transmitter: NML

Vertical Exaggeration: 1.0

Figure 25 Line 100W TX NML Model 4000 Ohm with Drill Hole



Transmitter: NML

Figure 26 Line 104W TX NAA Raw Data Profile



Figure 27 Line 104W TX NAA Fraser Filter Profile



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Figure 28 Line 104W TX NAA KH Profile



K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 104W



Figure 29 Line 104W TX NAA Resistivity 4000 Ohm Profile





Transmitter: NAA

Vertical Exaggeration: 1.0

Figure 31 Line 104W TX NAA Model 4000 Ohm With Drill Holes



Transmitter: NAA

Figure 32 Line 104W TX NML Raw Data Profile



VLF-EM raw data Line: Prodigy Longlac Project Line 104W

Figure 33 Line 104W TX NML Fraser Filter Profile



Figure 34 Line 104W TX NML KH Profile



K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 104W



Figure 35 Line 104W TX NML Resistivity 4000 Ohm Profile



Figure 36 Line 104W TX NML Model 4000 Ohm



Transmitter: NML

Vertical Exaggeration: 1.0

Figure 37 Line 104W TX NML 4000 Ohm With Drill Holes



Transmitter: NML



Fraser Filter - from raw data Line: Prodigy Longlac Project Line 100W

 $16+20 \mathrm{N} \ 18+40 \mathrm{N} \ 20+40 \mathrm{N} \ 22+60 \mathrm{N} \\ 24+60 \mathrm{N} \\ 26+60 \mathrm{N} \ 28+80 \mathrm{N} \\ 30+80 \mathrm{N} \ 32+80 \mathrm{N} \ 34+80 \mathrm{N} \ 36+80 \mathrm{N} \\ 36+80 \mathrm{N} \ 36+80 \mathrm{N} \ 36+80 \mathrm{N} \\ 36+80 \mathrm{N} \ 36+$







K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 100W





Transmitter: NAA

Vertical Exaggeration: 1.0

Calculated Model- nit= 15 rms= 1.5 Line: Prodigy Longlac Project Line 100W

Calculated Model- nit= 15 1.5 rms= Line: Prodigy Longlac Project Line 100W



Transmitter: NAA

VLF-EM raw data Line: Prodigy Longlac Project Line 100W







Fraser Filter - from raw data Line: Prodigy Longlac Project Line 100W

16+20N 18+40N 20+40N 22+60N24+60N26+60N 28+80N30+80N32+80N 34+80N 36+80N









Calculated Model- nit= 15 rms= 1.5 Line: Prodigy Longlac Project Line 100W



Transmitter: NML

VLF-EM raw data Line: Prodigy Longlac Project Line 100W







Calculated Model-nit= 15 rms= 1.5 Line: Prodigy Longlac Project Line 104W



Transmitter: NAA



Fraser Filter — from raw data Line: Prodigy Longlac Project Line 104W

10+40N13+00N 15+80N 18+60N 21+40N 24+00N 26+80N 29+80N32+20N 35+00N37+60N











Calculated Model- nit= 15 rms= 1.5 Line: Prodigy Longlac Project Line 104W



Transmitter: NAA

VLF-EM raw data Line: Prodigy Longlac Project Line 104W









K-H Filter - Imaginary Component Data (raw data) Line: Prodigy Longlac Project Line 104W



Calculated Model- nit= 15 rms= 1.8 Line: Prodigy Longlac Project Line 104W







Calculated Model- nit= 15 rms= 1.9 Line: Prodigy Longlac Project Line 104W



Transmitter: NML



Fraser Filter — from raw data Line: Prodigy Longlac Project Line 104W

10+40N13+00N 15+80N 18+60N 21+40N 24+00N 26+80N 29+80N32+20N 35+00N37+60N



VLF-EM raw data Line: Prodigy Longlac Project Line 104W

25.2

NML

10+00N 15+00N 20+00N 25+00N 30+20N 35+00N 38+00N 51.3 -40.0 -28.8 17.5 6.3 8 -5.0 -16.3-27.5-38.8-50.0-61.3500 1000 2000 2500 1500 0 Freq.(kHz) Distance (m) 25.2R

stations













