BRITISH COLUMBIA

Ministry of Energy & Mines
Energy & Minerals Division
Geological Survey Branch

ASSESSMENT REPORT
TITLE PAGE AND SUMMARY

TITLE OF REPORT [type of survey(s)]: Analyses of VLF geophysical data: Fox Property, Nechako Basin

TOTAL COST: $9150.00

AUTHOR(S): Frederick A. Cook

SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):

YEAR OF WORK: 2013

STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S): Event 5473339: Dates: July 14-16; October 11-17; December 10-24

PROPERTY NAME: Fox

CLAIM NAME(S) (on which work was done): 750982, Fox1; 751002, Fox2

COMMODITIES SOUGHT: Precious metals

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN:

MINING DIVISION: Omineca

NTS: 93F

LATITUDE: 53 o 54 ' 51 "

LONGITUDE: 125 o 28 ' 16 " (at centre of work)

OWNER(S)

1) Kootenay Silver, Inc.

2)

MAILING ADDRESS

Suite 1820 - 1055 W. Hastings St.
Vancouver, BC V6E2E8

OPERATOR(S) [who paid for the work]

1) Kootenay Silver, Inc.

2)

MAILING ADDRESS

Suite 1820 - 1055 W. Hastings
Vancouver, BC V6E2E8

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

Quartz/silica veins in Eocene volcanic rocks

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS

(OVER)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic	VLF-EM data acquisition and processing	750982,751002	$ 6,750.00
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for ...)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY/PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other	Misc, (plotting) and Report		$ 2,400.00
		TOTAL COST	$ 9,150.00

Assessment Report:

Analyses of VLF Geophysical Data:

Fox Property,

Nechako Basin, central British Columbia

MTO event 5473339

North 53° 54' 51"; West 125° 28' 16"

UTM Zone 10 337700E, 5976750N

NTS map sheet 093F

Omineca Mining Division

by

F. A. Cook, Ph.D., P.Geo.
Salt Spring Imaging, Ltd.
128 Trincomali Heights
Salt Spring Island, B.C.

and

Brian A. Belton, B.A.
Box 2061
Rossland, B.C., V0G 1Y0

For

Property Operator: **Kootenay Silver Inc.**
Suite 1820-1055 W. Hastings St.
Vancouver, B.C. V6E 2E8

Property Owner: **Kootenay Silver, Inc.**
Suite 1820-1055 W. Hastings St.
Vancouver, B.C. V6E 2E8

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1.0 Summary

Acquisition and processing of a Very Low Frequency (VLF-EM) geophysical data across part of the Fox property in central British Columbia has allowed quasi three-dimensional imaging of subsurface electrical conductors to approximately 150 m depth. The data were acquired in a series of eight (8) east-west lines that were gridded into a 0.7 x 0.8 km grid in the approximate centre of the property and the lines were processed using two-dimensional finite element inversion. The results from each of the inverted profiles were plotted to provide cross sections of the near-surface conductivity structures. The information was then displayed in a three dimensional representation of key conductivity isosurfaces.

2.0 Introduction

Salt Spring Imaging Ltd. was retained by Kootenay Silver Inc., a British Columbia company, to analyse VLF data on the Fox property in the Nechako Basin of central British Columbia (Figure 1). The objective of the work is to evaluate information bearing on the subsurface physical properties, in this case the electrical conductivity. The approach includes application of two-dimensional finite element inversion, and subsequent projection of the inversion results into (quasi-) three-dimensional images. This report provides a brief description of the geological setting, a description of the field procedures, data processing and interpretation.

The lead author is familiar with the geology and geophysics of the region, having been responsible for acquiring geophysical data in British Columbia since 1983 and as the transect leader for the Lithoprobe Southern Canadian Cordillera transect from 1985-1995 and Transect co-leader for the Lithoprobe Slave-Northern Cordillera transect from 1995-2005.

Metric units are used throughout the report.

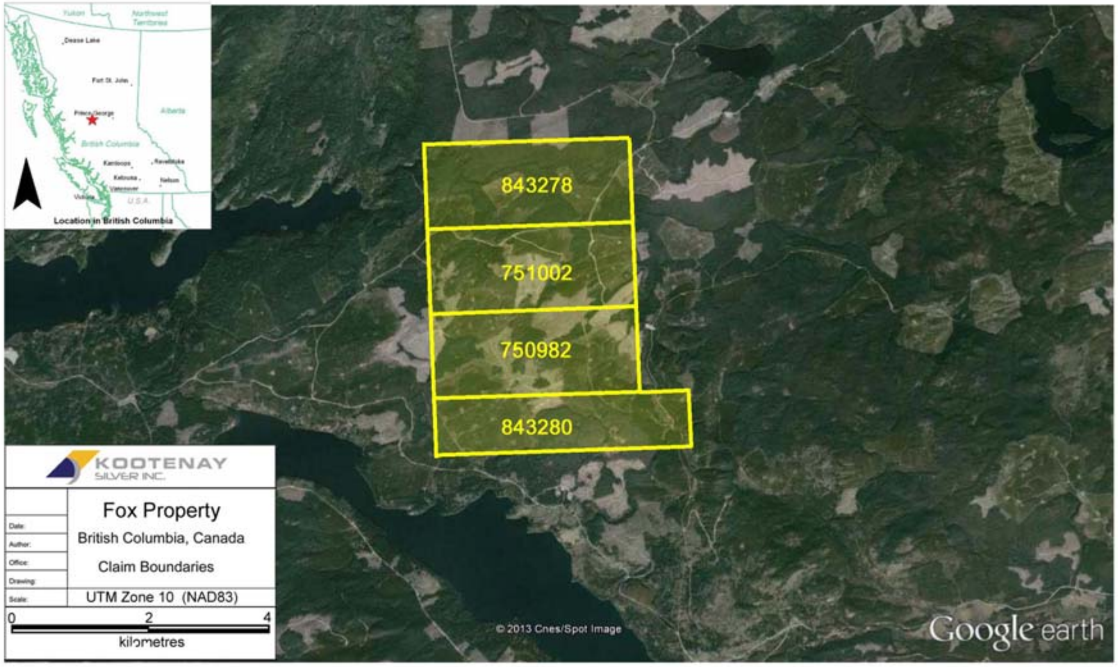

Figure 1. Digital satellite map with the Fox property indicated in yellow.

3.0 Property Description and Location

The Fox Property is a collection of claims that are located in central British Columbia (Figure 1) in the Nechako Basin. The approximate geographical limits of the property are the following: (degrees latitude, degrees longitude; UTM easting, UTM northing**):** northwest (53° 53' 30", 125° 29' 43"; 336021, 5974344); northeast (53° 56' 15", 125° 26' 43"; 339482, 5979327); southeast (53° 53' 30", 125° 25' 58"; 340127, 5974201); southwest (53° 53' 30", 125° 29' 43"; 336021, 5974344)**.**

The Fox property comprises four (4) mineral tenures containing approximately 1752 hectares (Table I). The mineral cell titles were acquired online and as such there are no posts or lines marking the location of the property on the ground.

Tenure Number	Claim Name/Property	Issue Date	Good To Date	New Good To Date	# of Days For-ward	Area in Ha	Applied Work Value	Sub-mission Fee
750982	FOX 1	2010/apr/17	2015/jan/08	2015/Nov/27	323	457.22	$ 2384.33	$ 0.00
751002	FOX 2	2010/apr/17	2015/jan/08	2015/Nov/27	323	457.09	$ 2383.64	$ 0.00
843278	FOX 3	2011/jan/17	2015/jan/08	2015/Nov/27	323	456.96	$ 2382.95	$ 0.00
843280	FOX 4	2011/jan/17	2015/jan/08	2015/Nov/27	323	381.11	$ 1987.43	$ 0.00

Table 1. Description of Fox property mineral titles.

4.0 Geological Setting

The property is situated in the northern portion of the Nechako basin in central British Columbia (Figures 1 and 2). In this part of the basin, surface exposures are poor, and are dominated by glacial deposits and scattered outcrops of late (Eocene) basalts of the Ootsa Lake and Endako groups, Cretaceous plutonic rocks and Jurassic Hazelton Group meta-sedimentary rocks ((Figure 2).

Mineralization with anomalous gold and silver concentrations is found in quartz veins that generally strike northeast (similar to shear zones that are interpreted to be present east of the property; Figure 2) and have steep dips. Veining occurs in a feldspar porphyry as silicified fracture filling with associated pyrite.

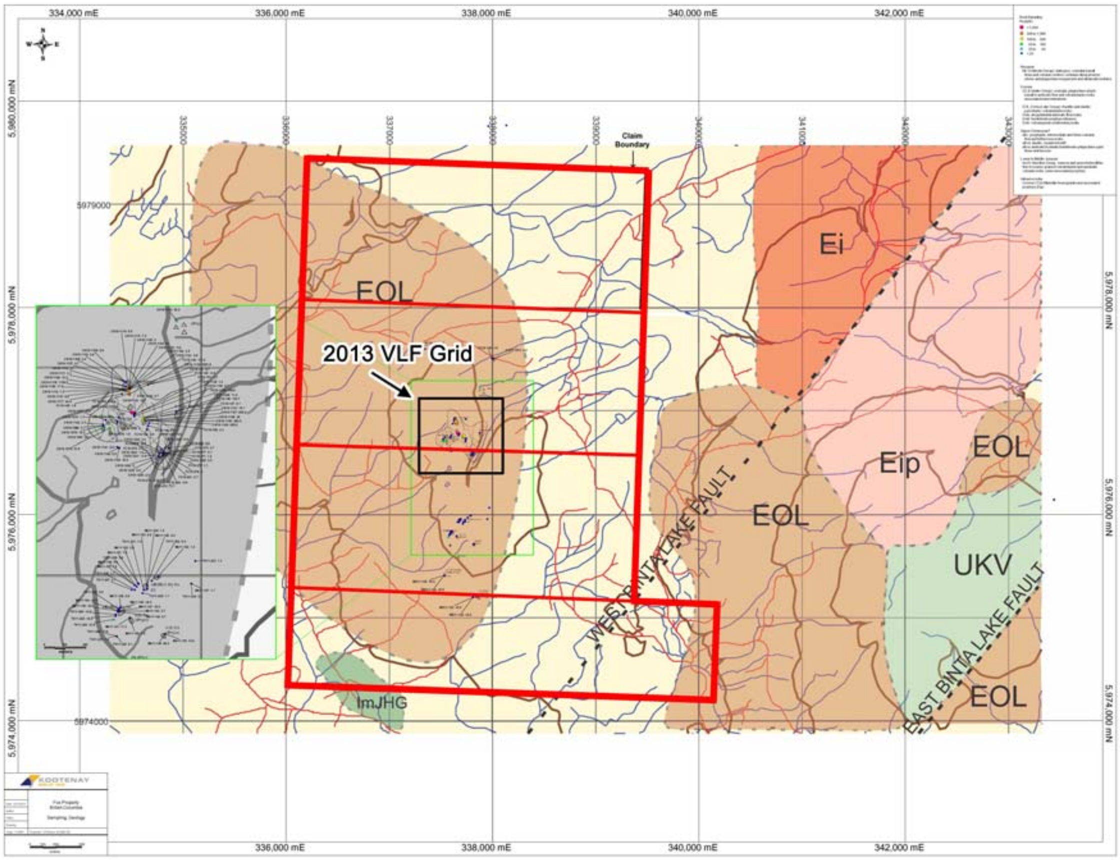

Figure 2. Geological map of the Fox property and surrounding area (S. Kennedy, personal communication, 2013). The VLF survey area is located within the small, black rectangle. Also shown are sample locations with the gray area on the left being an enlargement of the area in the green rectangle. EOL. Eocene OOtsa Lake; Ei, Eocene intrusive; Eip, Eocene intrusive porphyry; UKV, Upper Cretaceous volcanic rocks; lmJHG, Jurassic Hazelton Group.

5.0 VLF Geophysical Data

5.1 *Data Acquisition*

The VLF data set was recorded with a GEM Systems GSM-19 magnetometer/VLF in a series of eight east-west parallel lines (Figure 3a). Lines were spaced 100 m apart, with station spacing along each line of 12.5 m. GPS location and elevation readings were made every 100 m, and intervening GPS values were calculated during processing. Total field magnetic data were recorded along with the VLF data. A stationary base station provided a drift correction for each of the magnetometer readings. The GPS, VLF and magnetic data were uploaded as text files for data processing.

Readings were taken for two VLF stations simultaneously. Typically, the readings were for Cutler, Maine (24.0 kHz, NAA), Lualualei, Hawaii (21.4 kHz, NPM), and LaMoure, North Dakota (25.2 KHz, NML). The azimuths for these stations are shown in Figure 3.

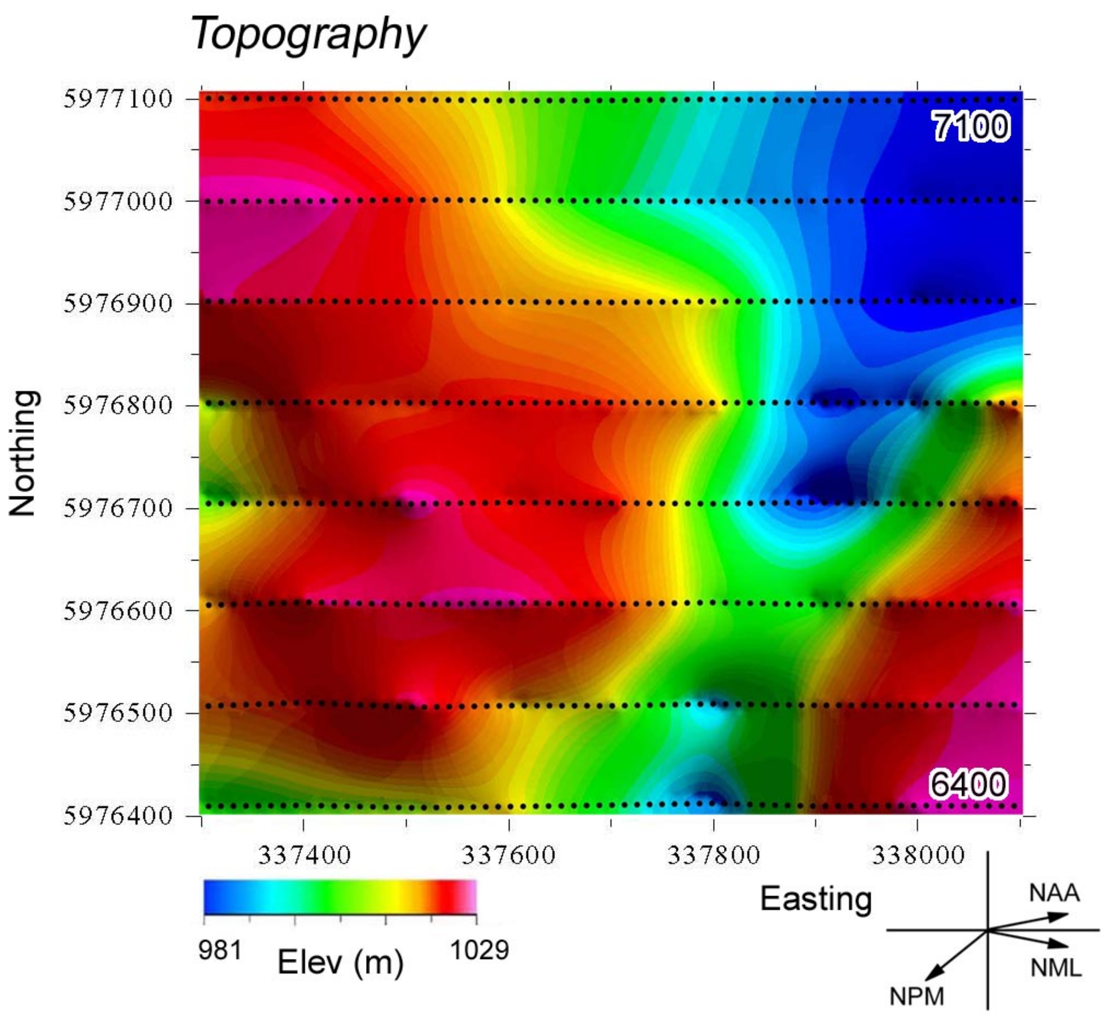

Figure 3a. Topography data acquired during the Fox VLF survey. In the lower right of the diagram, the azimuths of the three transmitters (Cutler, Maine =NAA; LaMoure, North Dakota = NML, Lualualei, Hawaii=NPM) that were used for the survey are shown.

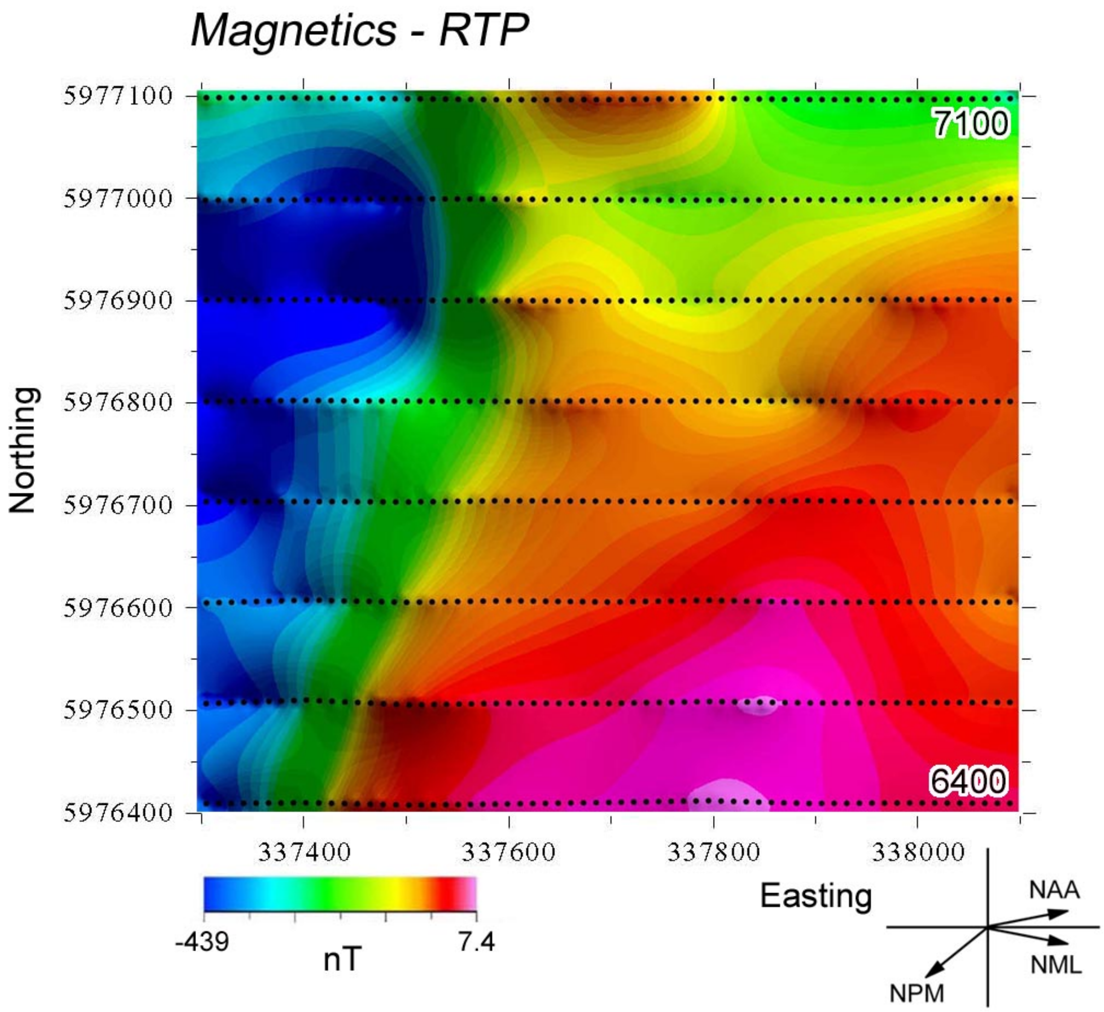

Figure 3b. Magnetic data acquired during the Fox VLF survey. Reduction of the magnetic data was made by calculating the IGRF at a single central location and applying the result to the entire survey. The data were then reduced to the pole. In the lower right of the diagram the azimuths of the three transmitters (Cutler, Maine =NAA; LaMoure, North Dakota = NML, Lualualei, Hawaii=NPM) that were used for the survey are shown.

5.2 *Data Processing*

The data were processed in the following manner. First the 100 m GPS measurements were converted to UTM (zone 10, NAD83) coordinates. UTM values and elevations were then calculated for each of the 12.5 m stations. Following this, the magnetic data were reduced using calculated values of the International Geomagnetic Reference Field (IGRF) for the dates and location (e.g., centre point) of the grid. For the data acquisition time (2 days) and limited size of the grid, the values of the IGRF varied by a small amount, less than 1.0 nT over the grid, whereas the magnetic anomalies varied by several hundred nT (Figure 3b). The magnetic data were then reduced to the pole using the declination and inclination for the centre point. Results from the elevation and magnetic calculations were plotted with the station locations for quality control (Figure 3) and if any errors were found, they were remedied. The results (Figure 3b) exhibit a strong magnetic high in the southeast quadrant of the survey area.

Data processing methods for the VLF data included examining the Karous-Hjelt transform and taking appropriate action to minimize noise. An example is shown in Figure 4a. Here, the raw in-phase and quadrature data from Line 6800 are shown above filtered versions of the same data. The filtering was accomplished by applying Empirical Mode Decomposition (EMD; Jeng et al. 2007). The justification for applying the filtering is to minimize the short wavelength (e.g., station to station) variations in the signal. Examination of the filtered version (Figure 4a, lower) shows that the general shape of the curves is maintained while the short wavelength variations are minimized.

The effect of the filtering on the inversions is shown in Figure 4b. Figure 4b (upper) is a plot of the Karous-Hjelt transform of the raw (unfiltered) data to show concentrations of current density. Although it appears that there are concentrations of high current density near the centre of the section on both the real and imaginary components, the results are affected by prominent, angular, linear trends that are caused by the short wavelength variations in the recorded signal. Figure 4b (lower) illustrates the same data after application of an equivalent mode decomposition filter (Jeng et al, 2007). Here, the high current density zones are much clearer.

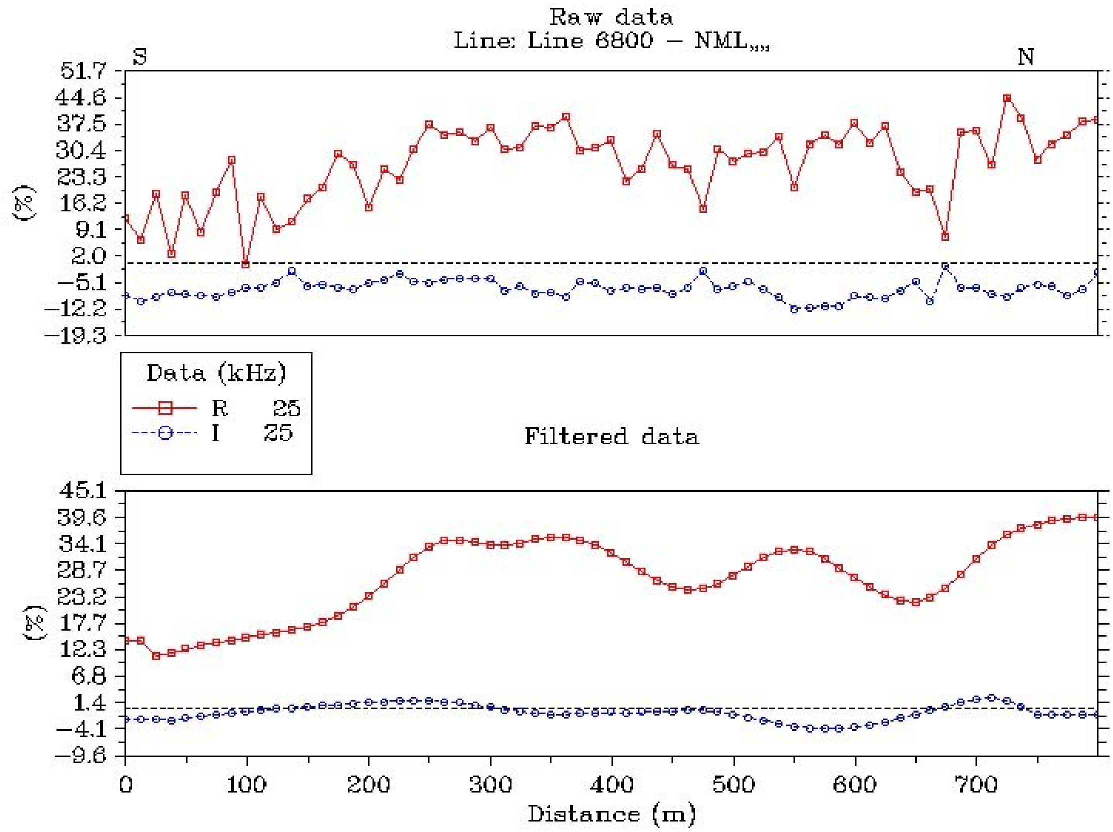

Figure 4a. Recorded data (top) and EMD filtered data (bottom) for Line 6800 (transmitter = LaMoure, ND). Note that short wavelength variations that are evident in the recorded data are attenuated in the filtered version. Red lines are for the in-phase (real) component and blue lines are for the quadrature (imaginary) components.

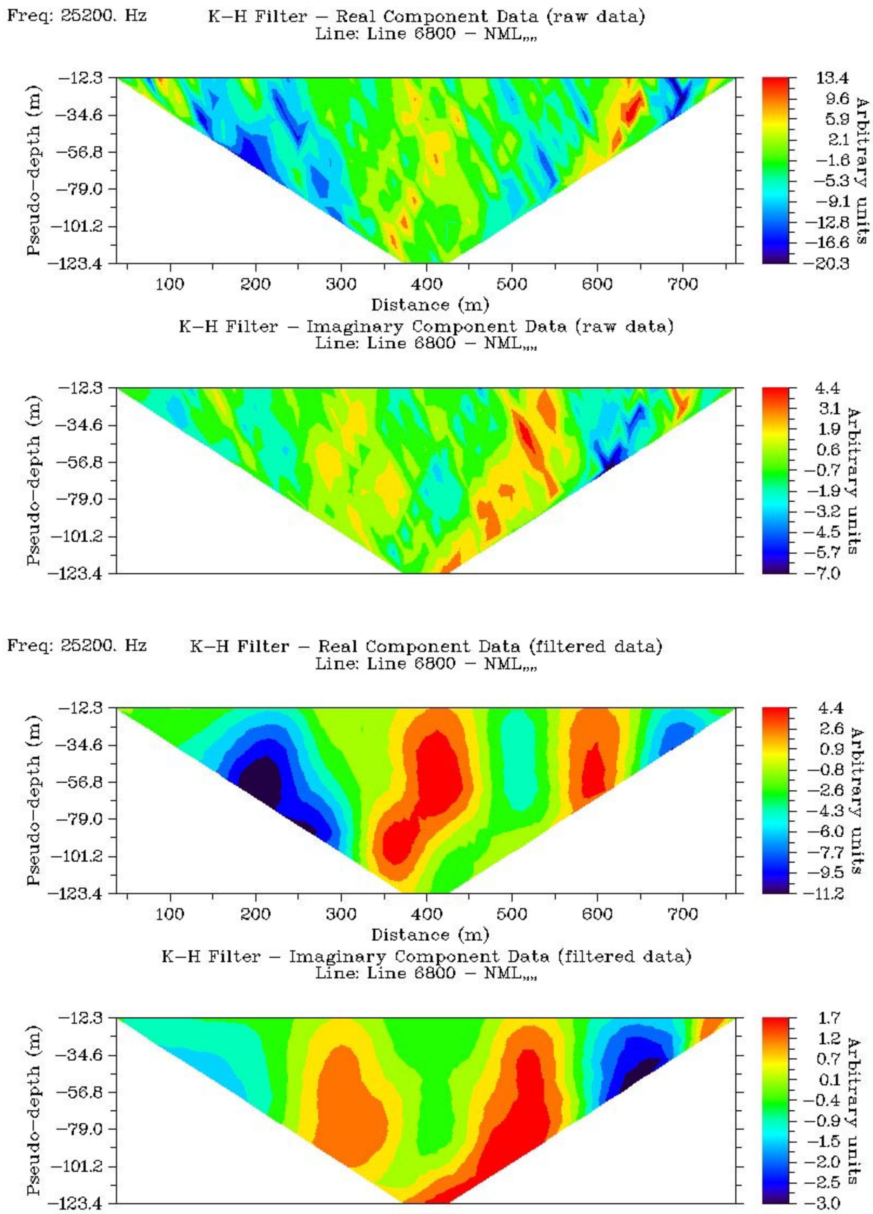

Figure 4b. Karous-Hjelt (K-H) transforms of the recorded data along Line 6800. The top two sections are K-H transforms for the recorded data (real component at the top and the imaginary component next lower), whereas the lower two sections are for the EMD filtered versions of the same data. The angular patterns are likely due to the short wavelength variations in the recorded signal.

The data for each profile were then inverted using a finite element program based on Monteiro-Santos et al. (2006). The program has recently been modified to include elevation variations. For each inversion calculation, the background resistivity is assumed to be 500 Ohm-m. Following inversion, each calculated result was converted to conductivity values and plotted. The results of the inversion were a series of parallel two-dimensional sections so that it is relatively easy to follow zones of anomalous conductivity from one profile to another.

5.3 *Inversion results*

Inversions of the data were accomplished on a line-by-line basis and are two-dimensional calculations. They are displayed in Figures 5 and 6 as a series of sequential profiles in two columns. In general they are grouped according to the azimuth of the transmitter. Thus, in the left column, I have used NAA and NML (Cutler, Maine and LaMoure, North Dakota, respectively). For the right column, all of the profiles used the transmitter at Lualualei, Hawaii (NPM) except the last two (NAA; Cutler, Maine). Cutler, Maine does not have a similar azimuth to that of Hawaii; however, for those profiles, signals were acquired from only NAA and NML, and NML was already used in the left column.

The results indicate that there are a number of high conductivity zones of varying sizes (Figures 5 and 6). From lines 6400 through 6900 (NAA/NML transmitters) there appears to be a west-dipping zone of high conductivity that projects from near the surface on the east side of the lines to near 100 m depth (elevation about 900 m) on the west. This dipping zone is situated, in part, beneath the locations of anomalous metal samples collected on the surface (Figure 2), but it is not known at this time if this spatial correlation is significant.

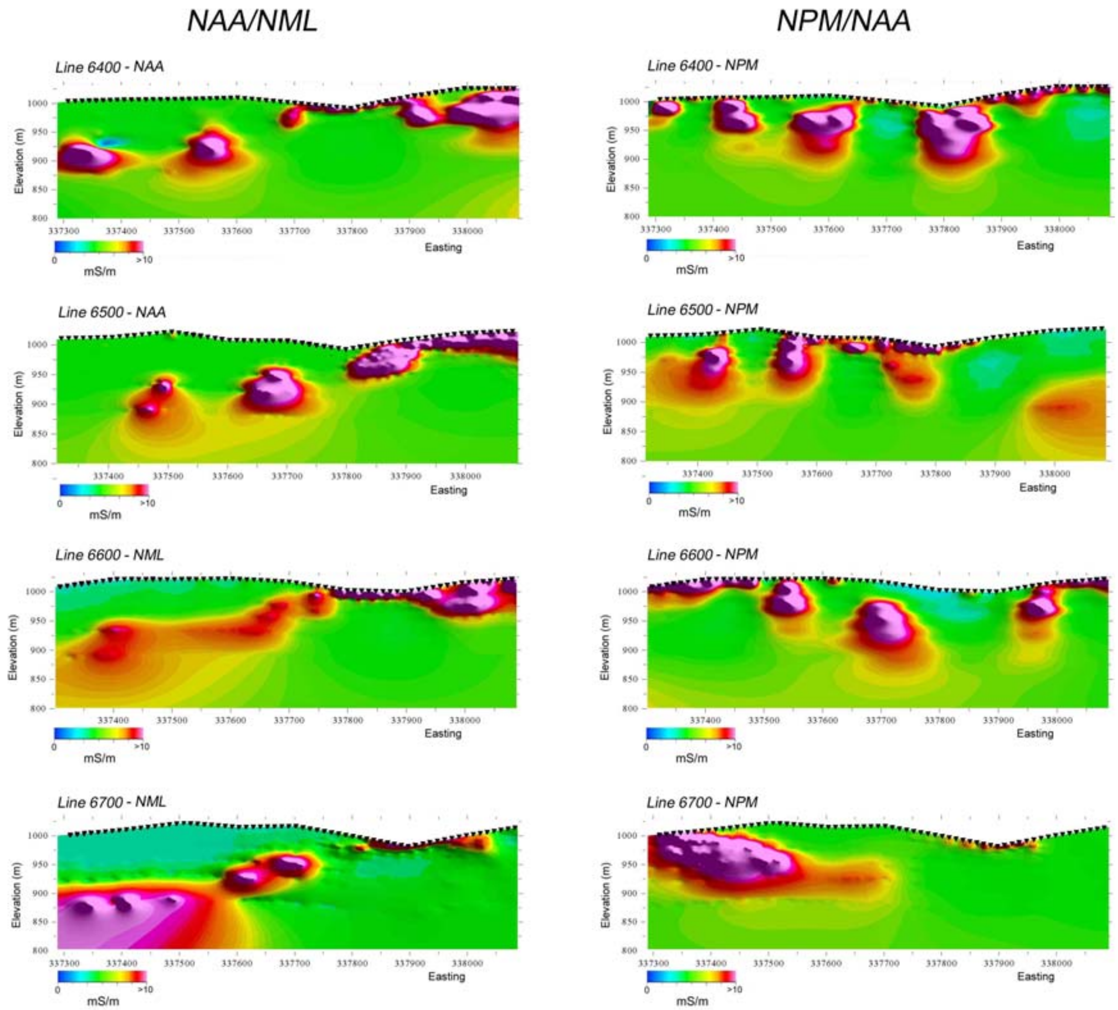

Figure 5. Display of Lines 6400 to 6700 after inversion. Results are shown for each transmitter, with the Cutler, Maine (NAA) transmitter and the LaMoure, North Dakota (NML) transmitter results in the left column and the Lualualei (NPM) transmitter results shown in the right column. The southernmost line (Line 6400) is in the upper row, and the northernmost line (6700) is in the lowest row. East is on the right in all images.

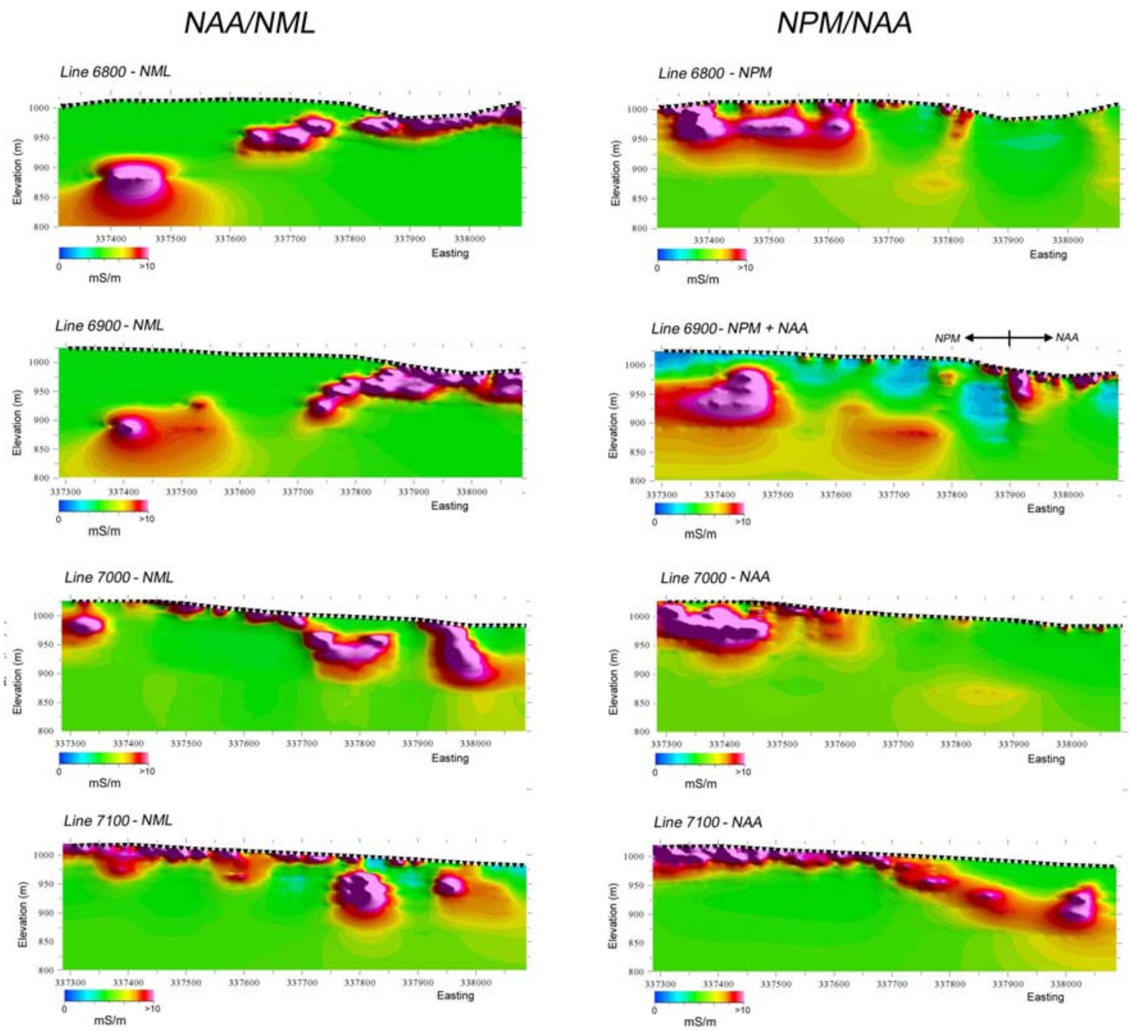

Figure 6. Display of Lines 6800 to 7100 after inversion. Results are shown for each transmitter, with the LaMoure, North Dakota (NML) transmitter results in the left column and the Lualualei (NPM) and Cutler, Maine (NAA) transmitter results shown in the right column. The northernmost line (7100) is in the lowest row. East is on the right in all images. Note also that the version of Line 6900 in the right column was recorded partially with the Lualualei (NPM) transmitter, and partially with the Cutler, Maine (NAA) transmitter. The segments were merged after inversion.

5.4 ***Quasi – Three Dimensional Geometry***

The systematic regular geometry of the VLF grid is conducive to calculating the geometry in quasi-three dimensions. To accomplish this, the calculated results from each of the profile inversions were added into a 3D volume so that contours of isosurfaces for different values of conductivity could be calculated. An example of the volume space with the 10, 15 and 20 mS/m isosurfaces is shown in Figure 7. The results are considered quasi-3D because the inversion calculations were made for two-dimensional profiles, and were then extended and contoured in a 3D volume space. A true 3D image would require three-dimensional inversion.

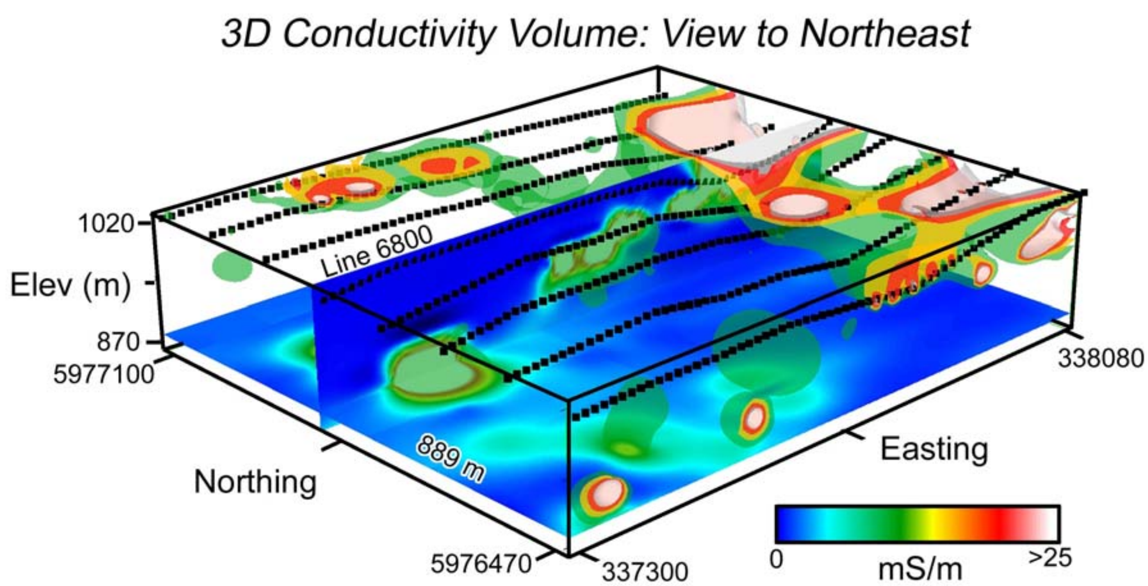

Figure 7. Quasi-three dimensional view of the results of the inversion for the VLF grid (NAA/NML transmitters only; lest column of sections in Figures 5 and 6). The view is to the northeast and isosurfaces are shown for 10 mS/m (green surface), 15 mS/m red surface) and 20 mS/m (white surface). Also shown is a horizontal surface at 889 m elevation and a vertical section along Line 6800.

A horizontal plane at 889 metres elevation is also shown in Figures 7 and 8a (with appropriate colours for the conductivity values along the plane), and a vertical plane is shown along Line 6800 in Figure 7. Because the this horizontal section is taken at 889 m, it is at an appropriate depth for intersecting the deep conductors in the west and these are shown as light blue, green, red, yellow and white contours on the map in Figure 8. The deep conductors are located beneath and slightly to the west of a region on the surface where significant anomalous gold values were obtained (Figure 9a).

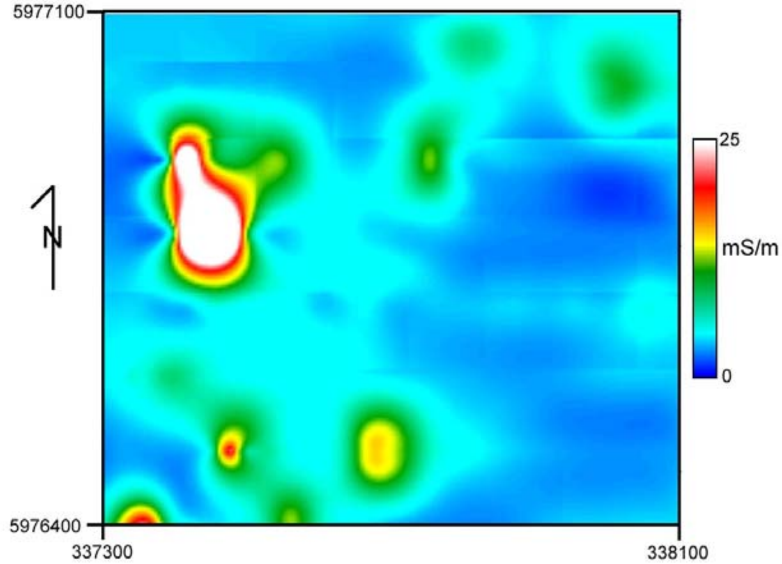

Figure 8a. Horizontal section of the quasi-3D results at 889 m elevation. A significant conductor appears to be present in the northwest region of the survey area.

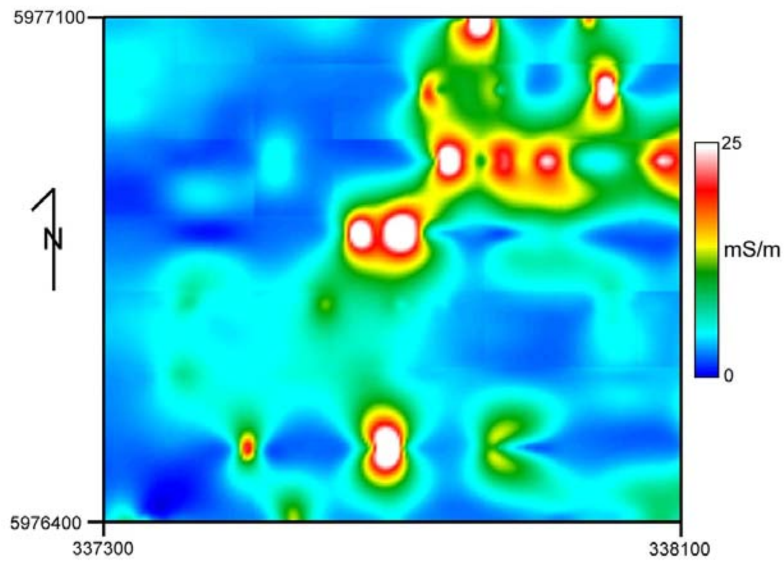

Figure 8b. Horizontal section of the quasi-3D results at 941 m elevation. Note that the deep conductor in the northwest is not present here, but a number of smaller, more eastward conductors are present along lines 6500, 6800 and 6900.

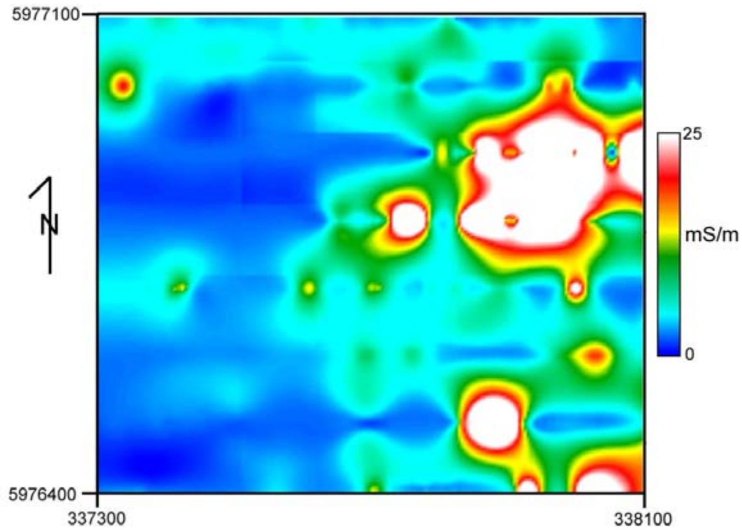

Figure 8c. Horizontal section of the quasi-3D results at 976 m elevation. A number of significant conductors appear to be present in eastern portion of the survey area.

Horizontal sections are also shown at 941 m (Figure 8b) and 976 m (Figure 8c). As noted previously, it is apparent on these diagrams zones of high conductivity are increasingly shallow to the east; that is, they appear to dip toward the west.

Figures 9a through 9d show the same results plotted on the geological map from Figure 2. In Figure 9a, the portion of the map in the vicinity of the VLF survey is enlarged. Sample locations are indicated by the coloured dots, and the samples that exhibit anomalously high values of gold are clustered near the centre of the VLF grid (Figure 9a). It is in this area that many of the anomalous conductors are also found (e.g., Figures 9b, 9c).

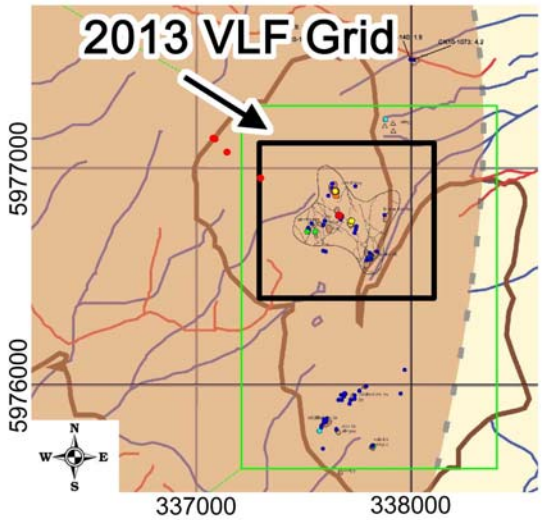

Figure 9a. Enlargement of a portion of the map in Figure 2 in the vicinity of the VLF grid. The coloured dots represent surface sample locations. Red, >1000 ppb Au; Orange, 500-1000 ppb Au; yellow, 100-500 ppb Au; green, 50-100 ppb Au; light blue, 50-100 ppb Au; dark blue, < 20 ppb Au. Red dots to the northwest of the grid area are additional samples > 1000 ppb Au that were found in 2013.

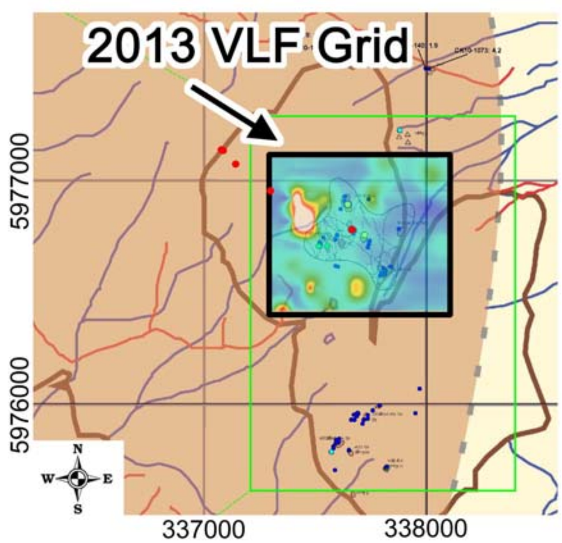

Figure 9b. Same map as in Figure 9a, with the 889 m horizontal section superimposed at 50% opacity.

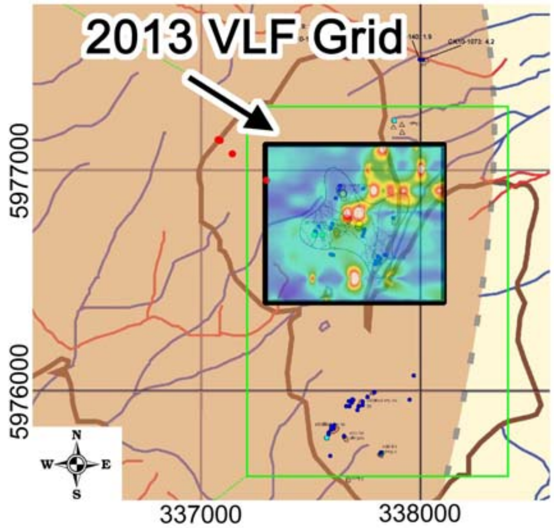

Figure 9c. Same map as in Figure 9a, with the 941 m horizontal section superimposed at 50% opacity.

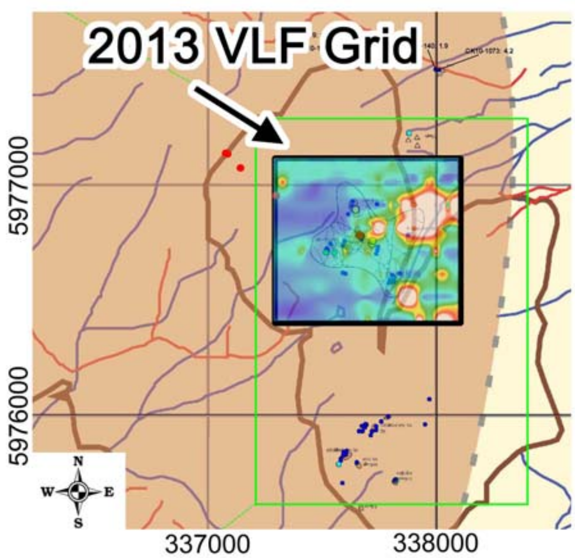

Figure 9d. Same map as in Figure 9a, with the 976 m horizontal section superimposed at 50% opacity.

6.0 Interpretations

It is encouraging that zones of elevated electrical conductivity in the subsurface occur in the vicinity of anomalous concentrations of metals at the surface. However, as with most remote sensing geophysical techniques, there are several possible interpretations for the cause(s) of the anomalies. These zones could have high levels of fluids (particularly saline water), carbon (e.g., graphite, coal), or metals. While it seems unlikely that graphite or coal is the cause of the conductive zones, fluids or fluid-rich clays can not be ruled out at this time. Nevertheless the observations of high electrical conductivity beneath part of the region with anomalous gold values at the surface raise the possibility that the spatial correlation is more than just coincidence. Accordingly, one approach to enhancing the interpretation is to correlate the results presented here to the geological information in the depth domain (i.e., drilling).

7.0 Conclusions

Application of the VLF electromagnetic method for mapping subsurface variations of electrical properties in the Fox property of central British Columbia has produced evidence of significant zones of high electrical conductivity. The data were processed using recently developed inversion and mapping techniques, and the results were combined with 3D graphics to provide some quasi - three-dimensional information of conductivity variations within the grid area. Although VLF has been a popular geophysical tool for many years, the ability to enhance the results with images of high conductivity zones at depth makes it an attractive tool for reconnaissance exploration.

8.0 Recommendations

As with most geophysical data, the interpretations of the VLF sections are enhanced by detailed knowledge of the geology. For rocks such as these, elevated conductivity may be caused by fluids, carbon (e.g., graphite, coal) or metals. The origin(s) of these conductive zones will not likely be known until tested by drilling.

9.0 References

Jeng, Y., Lin, M. J., Chen, C. S., and Wang, Y. H. 2007. Noise reduction and data recovery for a VLF-EM survey using a non-linear decomposition method. Geophysics, v. 72, 223-235.

Monteiro Santos, F.A., Mateus, A. Figueiras, J., and Gonçalves, M. A. 2006. Mapping groundwater contamination around a landfill facility using the VLF-EM method – a case study. Journal of Applied Geophysics, 60, 115-125.

10.0 Statement of Costs

Property:	Fox	
Event #	**5473339**	
Start - End Date:	July 14-16, 2013	
Tenure work done on:	750982, 751002	
Type of work done:	Geophysical	
Mike Kennedy	July 14-16, 2013	
VLF/Mag survey	3 Man days @ 350	$ 1,050.00
	3 Truck days@ 150	450.00
BA Belton	July 14-16, 2013	
	3 Man days @ 400	1,200.00
Travel & L/O		1,200.00
ATV rental		450.00
Fred Cook	Data Interpretation & Analysis	2,400.00
	Report	2,400.00
	Total	$ 9,150.00

11.0 Statement of Qualifications

I, Frederick A. Cook do hereby certify that:

1) I attained the degree of Doctor of Philosophy (Ph.D.) in geophysics from Cornell University in Ithaca, New York in 1981.
2) I have a B.Sc. in geology (1973) and an MSc. in Geophysics (1975) from the University of Wyoming in Laramie, Wyoming.
3) I am a registered member of the Association of Professional Engineers and Geoscientists of British Columbia (P. Geo. 2009). Previously, from 1984-2009, I was registered with the Association of Professional Engineers, Geologists and Geophysicists of Alberta as both a P. Geol. and a P. Goph.
4) I am a member of the American Geophysical Union and the Geological Society of America.
5) I have worked as a geophysicist/geologist for a total of 36 years since my graduation from university.
6) I have worked for the Continental Oil Company (1975-1977) and the University of Calgary (1982-2010).
7) I was the Director of the Lithoprobe Seismic Processing Facility at the University of Calgary from 1987-2003.
8) I have recently (2011) been appointed an International Consultant for the Chinese SinoProbe project.
9) I have a thorough knowledge of the geology of southern British Columbia based on extensive geological and geophysical field work.
10) I have authored more than 125 scholarly publications in peer-reviewed journals and books.
11) I was retained by Kootenay Silver Inc. to undertake analyses of the geophysical data in the vicinity of the Fox property.
12) I am one of the authors of this report.
13) I am not aware of any material fact or material change with respect to the subject matter of this report, which is not reflected in this report.
14) I have no interest, direct or indirect, in the property.

“signed and sealed” at Salt Spring Island, B.C.

Frederick A. Cook, P. Geo.
Salt Spring Imaging, Ltd
128 Trincomali Heights
Salt Spring Island, B.C.

Dated at Salt Spring Island, B.C. this 20th day of December, 2013
Registration License No. 34585
Association of Professional Engineers and Geoscientists of British Columbia

I, Brian Alexander Belton, hereby do declare that:

1. I graduated with a Bachelor's degree in Geography (Environmental Studies, Resource Management, Regional Development) from the University of Victoria, Victoria, British Columbia in 1996.
2. I graduated with a Bachelor of Education degree (Environmental Studies) from the University of British Columbia, Vancouver, British Columbia in 1998.
3. I have completed course work in the Geographic Information Systems program (covering GIS Applications I, Cartography and Mapping Fundamentals, Remote Sensing, GIS Professional Development, Multimedia, GPS) at Selkirk College, Castlegar, British Columbia, 2003.
4. I have worked in geological exploration and geoscience as an independent consultant and contractor since 2002.
5. I was in charge of both running and cutting grid lines for the geophysical survey and conducted the geophysical survey in the field.

Dated this 20th day of December, 2013

B. A. Belton