NORTHERN GEOLOGICAL & GEOPHYSICAL CONSULTANTS

AURORA GEOSCIENCES

YELLOWKNIFE - WHITEHORSE - JUNEAU

34A Laberge rd. Whitehorse, YT, Y1A 5Y9 (p) 867.668.7672

MEMORANDUM

To: Jack Dennett
EBA Engineering Consultants Ltd.

Date: Jan 10, 2013

From: Dave Hildes

Re: Partridge Creek ELF 3D Inversion

This memorandum describes the data inversion to model the resistivity from the Extremely Low Frequency Electromagnetic (ELF) survey performed in September and October 2011. Details of the survey were provided in the field report memorandum dated October 6, 2011.

1) Data Inversion

The ELF tipper data were modeled using the MT inversion code WSINV3DMT developed by the MT group at the Mahidol University of Thailand. The code was shown to be suitable for tipper-only data by Siripunvaraporn and Egbert, 2009[1]. WSINV3DMT takes the complex vector tipper data and produces a georeferenced model of conductivity using a reduced-basis, data-space Occam method. No prior geological knowledge was incorporated into the inversion process other than an assumed 300 Ohm-m homogeneous Earth initial model.

Topography was incorporated into the inversion using the DEM equivalent to the 1:50000 scale NTS sheet available from NRCAN's Geobase website. Topography was included throughout the survey area and at least 2 kilometers surrounding the survey area.

The predicted results from the recovered conductivity are shown in the figure *Partridge Creek ELF Predicted.pdf* and this can be compared with the observed data from the 2011 survey in the figure *Partridge Creek ELF Observed.pdf.* Both figures are found in the *Predicted vs Observed* folder and are plotted with the same colour scheme and format for easy comparison to assess the goodness of fit of the inversion, which is in general good. High spatial frequency trends (1440 Hz data for example) are

[1] WSINV3DMT: Vertical magnetic field transfer function inversion and parallel implementation, W. Siripunvaraporn and G. Egbert. Physics of the Earth and Planetary Interiors 173 (2009) 317-329

appropriately not reproduced by the model as these data are interpreted to be dominated by noise. Similarly, strong north-south lineaments along survey lines are assumed to be systematic data errors and are correctly not reproduced by the model.

2) Processing

The model was imported into the Geosoft Oasis Montaj package and the model coordinates were transformed back into NAD83, UTM zone 8N coordinates. Padding cells were removed and a 3D voxel produced using a 3D kriging algorithm. The model was then clipped to topography and windowed to include only the survey area. Streams, the surface warm spring and data collection sites were imported to facilitate viewing of the model. The processed voxels are included with this report in various formats (geosoft Voxels, packed maps and 3D PDFs).

3) Interpretation

The survey was centered around a warm spring and initial field interpretation of the data showed a conductive feature coincident with the warm spring. This is manifested in the recovered conductivity model as can be seen in Figure 1.

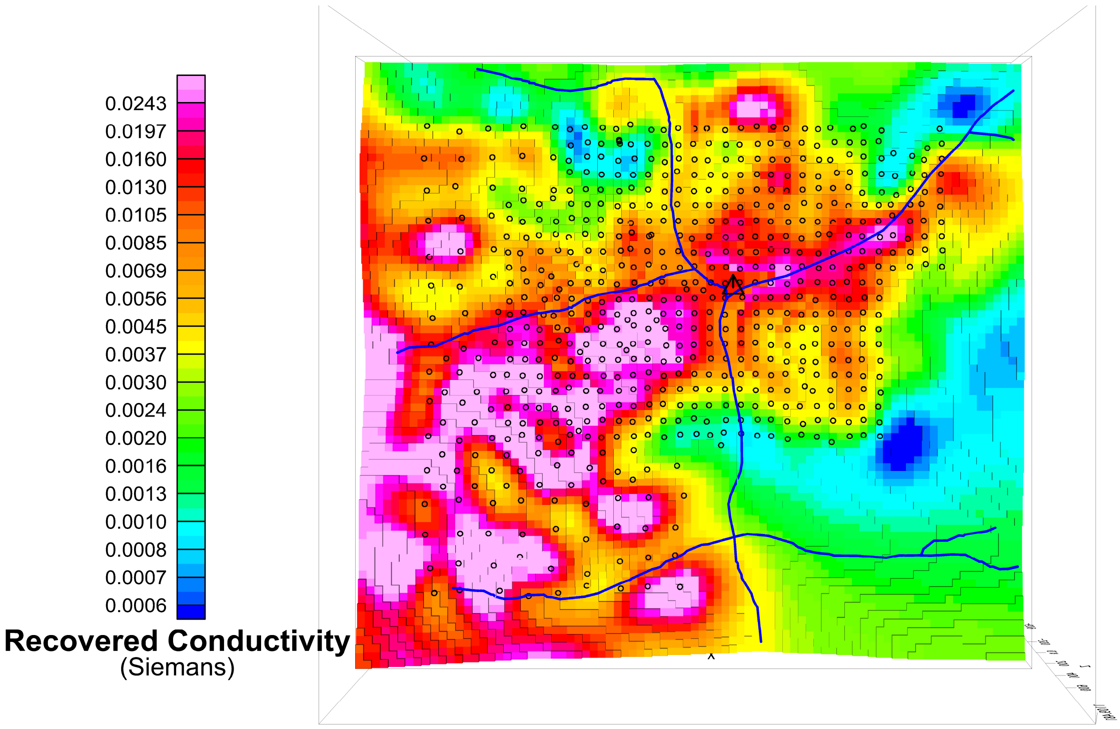

Figure 1 - Surface conductivity

Figure 1 shows the data locations with small circles, the warm spring location with a triangle, the streams and the recovered conductivity at surface. There is a weakly conductive feature that follows the stream to the east, passes through the warm spring, widening to the west. It is to the south of the central stream west of the warm spring.

The elevation of the central north-south creek is approximately 760 m and there is approximately 125 metres of topography between the central north-south creek (the lowest topographical area of the survey) and the highest land on the western edge of the survey.

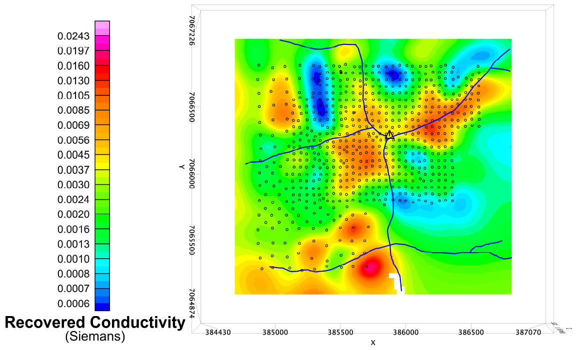

Figure 2 Elevation 750 conductivity

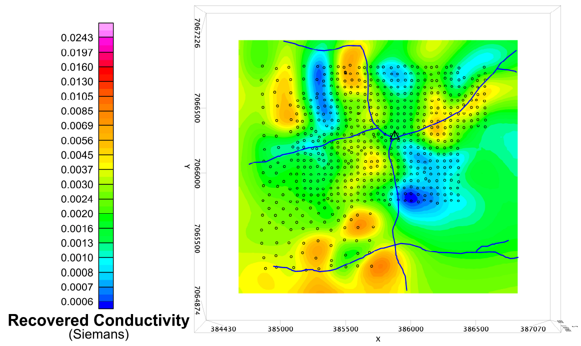

Figure 3 Elevation 725 conductivity

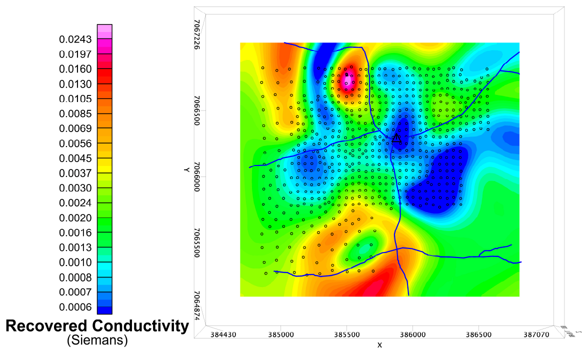

Figure 4 Elevation 650 conductivity

Figure 2 shows the conductivity at elevation 750, just below the lowest part of the area. The ENE trending conductive feature seen at surface is still visible, although only in the eastern part of the survey area. Another 25 metres down and the ENE trending feature diminishes in strength and a NS trending conductive feature immediately west of the central NS creek begins to appear, evident at elevation 725 in Figure 3. At elevation 650 as seen in Figure 4, only the NS conductive trend is still visible, although weakly. Although the conductive zones on the northern and southern extremes of this trend persist in the model for several hundred metres more in depth, there is no discernible trend connecting them. At the 100 elevation level (Figure 5), the SE and NW quadrants of the survey are imaged as being slightly more conductive than the SW and NE quadrants.

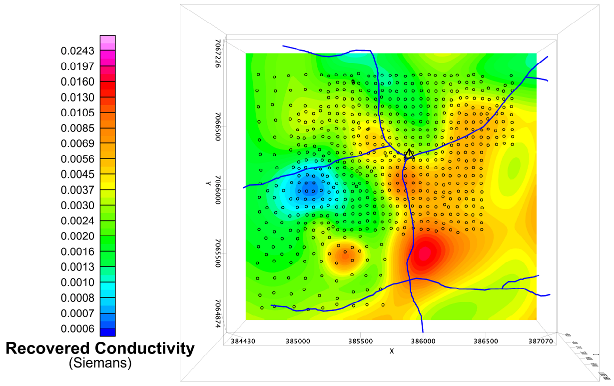

Figure 5 Elevation 100 conductivity

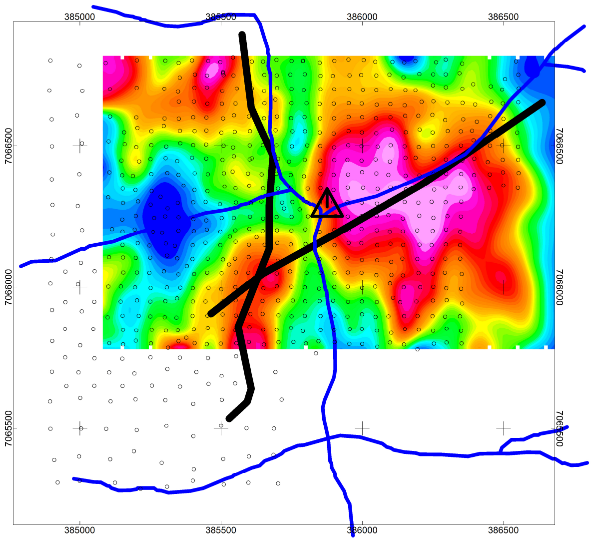

Figure 6 Total magnetic field and lineaments from the conductivity model.

Figure 6 shows the total magnetic field data with the black lines indicating the conductive lineaments discussed above extracted from the recovered conductivity model. The magnetic relief in this area was very low and the range of the colour scale is only approximately 30 nT. There is no good correlation with any of the conductivity features.

The strongest conductivity feature is a weak surficial conductor coincident with the warm spring and nearly coincident with the central ENE trending creek. However, this conductive feature is modelled as being shallow and does not extend generally beyond 50 metres below surface. There is the suggestion of a more deeply seated NS tending feature, but it is weakly conductive, not strongly laterally continuous and does not extend at depth. The magnetic signature of the area is very flat and no conclusions can be drawn from the magnetic data set.

The limited geophysics surveyed to date do not indicate a deep-seated conductor. This would generally be the expected response from a deep heat source with extensive proximal fracturing to create sufficient permeability for geothermal power generation. However, the ELF is a reconnaissance tipper-only technique and such data can be significantly enhanced with the addition of other geophysical data. In particular, if drilling should follow, downhole conductivity and a downhole TDEM survey could be particularly useful in both giving resolution at depth and providing further data to allow a constrained inversion and a re-interpretation of the ELF survey.

4) Recommendations

If other lines of exploration indicate that this is a prospective target, the best place to locate a drill hole to test the geophysics would be a hole on the NS trend, into the feature that is most persistent at depth. This hole should be vertical and collared at 385500E, 7066600N NAD83, UTM Zone 8N coordinates.

5) Products

The following files are included with the digital version of this report

\3D PDF	3D PDF of the recovered resistivity models
\MAP	Packed 3D Geosoft map containing voxels and other data used to make the figures in this report.
\ Pred vs Obs	Predicted and observed figures. ASCII file of inversion response.
\Voxel	Final models in Geosoft voxel format and ASCII format.
Partridge Creel ELF - 3D Inversion Report.pdf	A copy of this report

Respectfully submitted,

AURORA GEOSCIENCES LTD
Dave Hildes, Ph. D., P. Geo.