Logistics Report Prepared

for

Greatland Pty Ltd.

Volterra-3DIP

on the

Firetower Property

Sheffield, Tasmania, Australia

Survey conducted by SJ Geophysics Ltd.
May-June 2018

Report prepared
July 2018

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1. Survey Summary

SJ Geophysics Ltd. was contracted by Greatland Pty Ltd. to acquire Volterra-3DIP data on their Firetower property. The 3DIP data was acquired on a survey grid consisting of 17 survey lines. Table 1 provides a brief summary of the project.

Client	Greatland Pty Ltd.
Project Name	Firetower
Project Number	SJ798
Location (approx. centre of grid)	Latitude: 41º 30' 06” S Longitude: 146º 21' 20 E 446200E 5405350N; GDA94 MGA Zone 55
Total Line Kilometres	22.4 km
Production Dates	May 31 – June 13, 2018

Table 1: Survey Summary

The Firetower property is being explored for gold and copper deposits. The property hosts Fossy Mountain Trough sedimentary and volcaniclastic rocks. Mineralization is associated with widespread alteration of the volcaniclastic rocks, within stockworks of fine quartz-carbonate veining. Alteration is dominated by silica, carbonate, and pyrite. The objective of the survey was to map the geophysical properties, resistivity and chargeability, of the subsurface rocks in order to improve the exploration model for the property.

2. Location and Access

The Firetower project is located in northern Tasmania, Australia. It is situated approximately 13 km south of Sheffield and 35 km south of Devonport (Figure 1).

Figure 1: Overview map of the Firetower project

The project area can be accessed from Sheffield by the following directions:

- Drive east on Sheffield Rd and turn right onto Spring St
- Drive approximately 4 km, then turn left onto Paradise Rd
- Continue on Paradise Rd for 7 km, then turn right onto Union Bridge Rd
- Continue for approximately 4 km, arriving on the north side of the grid

A map of the project area, along with road access, is shown in Figure 2.

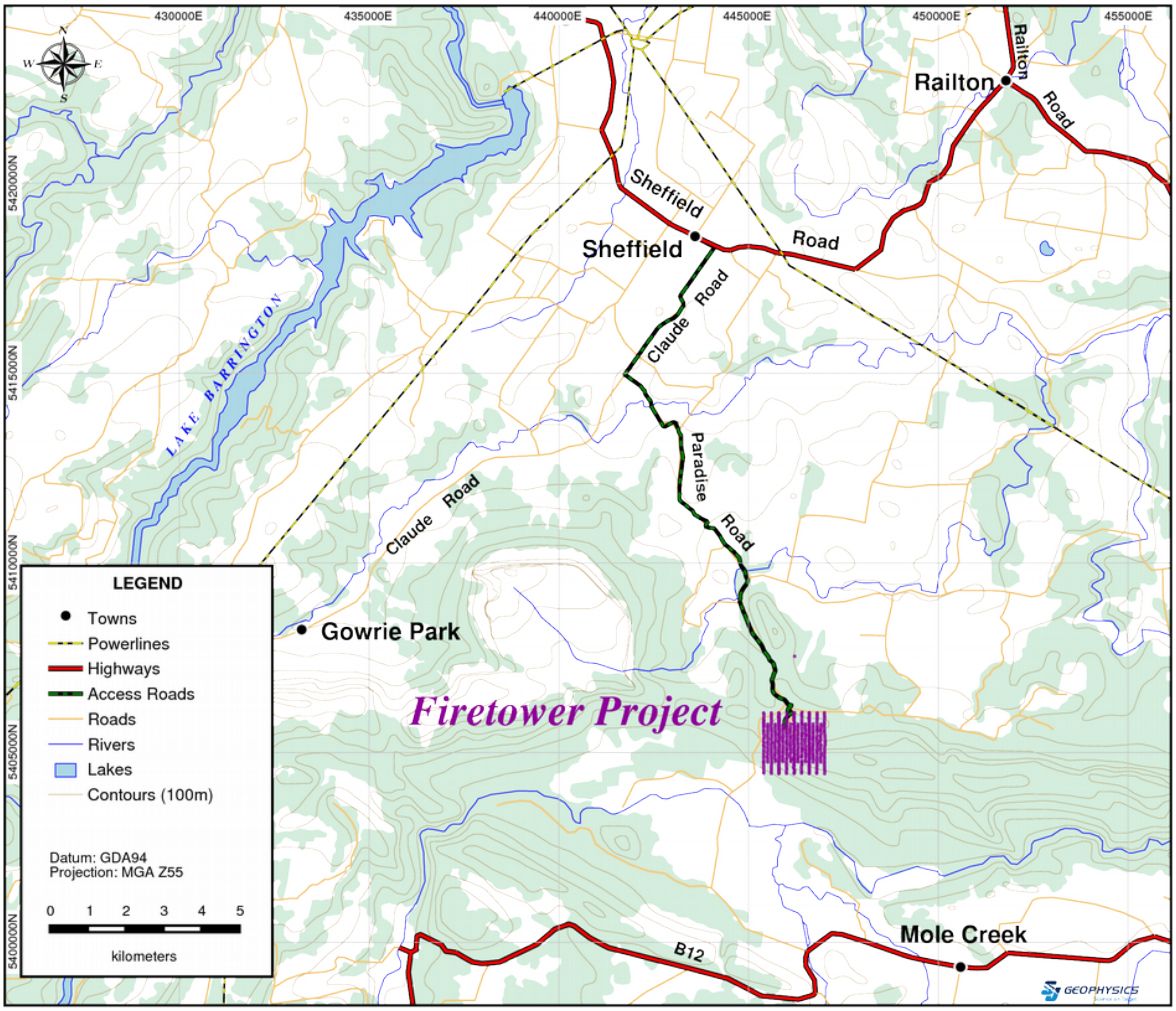

Figure 2: Location map for the Firetower project

3. Survey Grid

The Firetower grid consisted of 17 survey lines with a line spacing of 100 m. The lines alternated between 1600 m and 1000 m in length. Line cutting was completed by the client in advance of the geophysical survey. Stations were not flagged or marked by the client along the cut lines. All survey stations were located in the field in real-time using hand-held GPS units. The survey grid parameters are summarized in Table 2 and displayed in Figure 3.

Grid	Firetower
Number of Surveyed Lines	17 lines
Survey Line Azimuth	90º
Line Spacing	100 m
Station Spacing	50 m

Table 2: Grid parameters

The line and station labels for the grid were based on the UTM coordinates. The line labels were represented by the last four digits of the UTM easting and the station labels represented by the last four digits in the UTM northing. Please refer to Appendix A for a detailed breakdown of the survey lines.

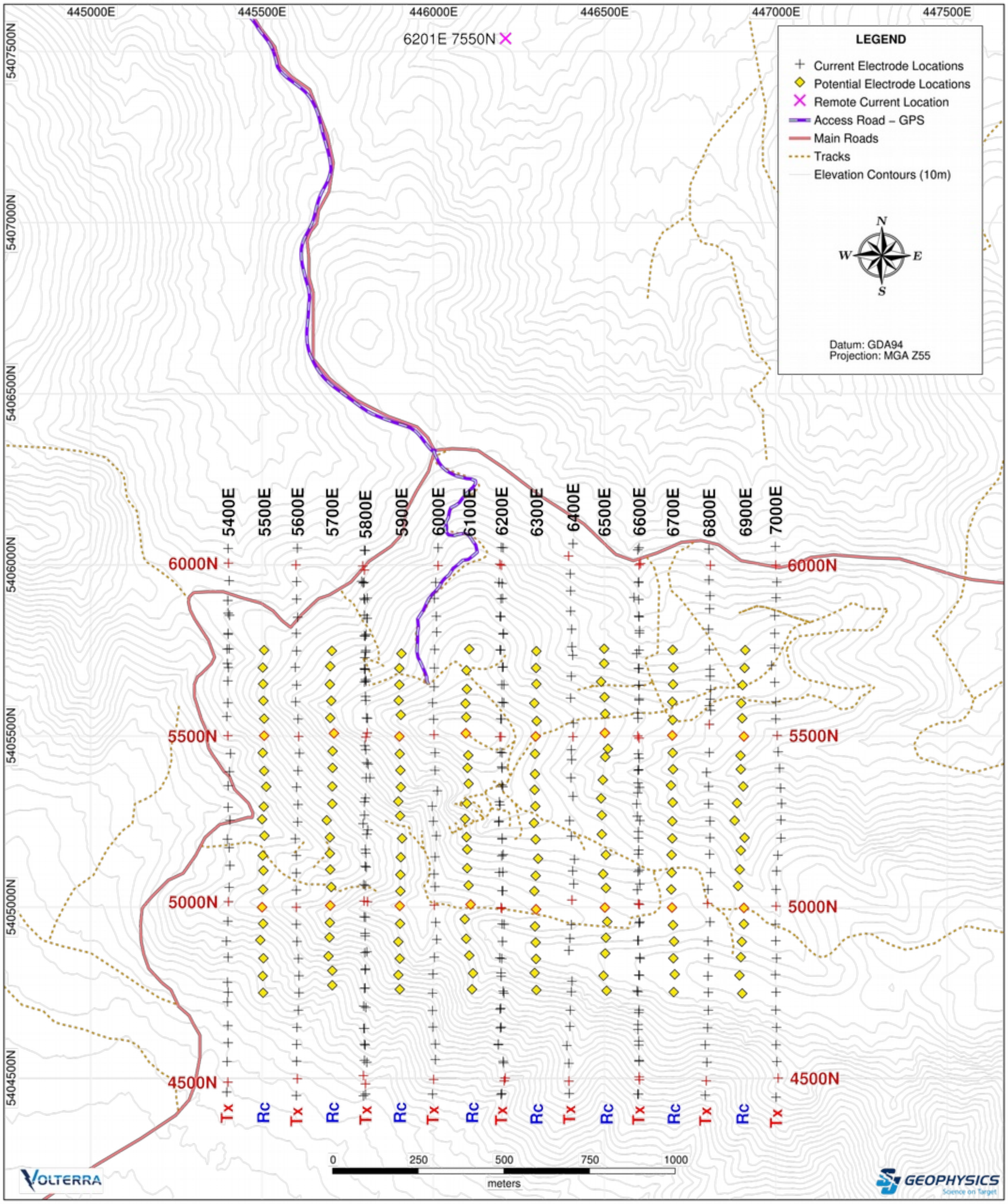

Figure 3: Grid map showing the Firetower grid

4. Survey Parameters and Instrumentation

4.1. Volterra Distributed Acquisition System

The Volterra Distributed Acquisition System was utilized to acquire the geophysical data. Each four-channel Volterra acquisition unit records the full waveform signal from a series of dipoles. The full-waveform data is then passed through proprietary signal processing software to calculate the relevant geophysical attributes; apparent resistivity and chargeability.

The current injections were controlled using a GDD TxII transmitter. The full instrument specifications are listed in Appendix B.

4.2. Volterra-3DIP Survey Design

The Volterra-3DIP survey was acquired using 5-line acquisition sets consisting of three current and two receiver lines in an alternating pattern. The current lines were 1600 m in length and the receiver lines were 1000 m in length. The current lines extended beyond the receiver lines to increase the depth of investigation of the survey. Upon completion of each acquisition set, the five lines were shifted over four lines to the next acquisition set, repeating one current line. Current injections occurred every 50 m along each current line. For each current injection all receiver dipoles for that acquisition set were active.

The Volterra-3DIP survey utilized an in-line array consisting of 50 m dipoles. Along each receiver line, potential electrodes were set up every 50 m. A Volterra acquisition unit was setup in the centre of each set of four dipoles, corresponding to a unit every 200 m, as shown in Figure 4.

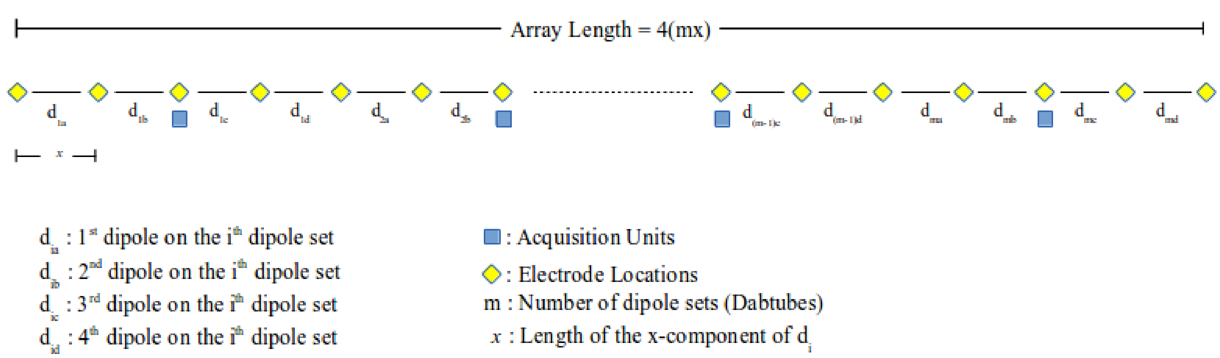

Figure 4: Schematic representation of the in-line array

Receiver dipoles were set up using 50 cm long and 10 mm diameter stainless steel electrodes hammered into the ground and connected into the array by single or double conductor wire. The electrodes used for current injections were 100 cm long and 15 mm in diameter with two to four electrodes used at each injection site to improve ground contact. Current electrodes were connected to the current transmitter by single conductor wire.

4.3. Acquisition Parameters

The recording and processing parameters used for the survey are described in Table 3.

IP Transmitter	GDD TxII (SN# 334, 335)
Duty Cycle and Waveform	50%; Square
Cycle and Period	2 sec on / 2 sec off; 8 second
IP Signal Recording	Volterra Acquisition Unit (Dabtube 7000 Series)
Reading Length	120 seconds
IP Signal Processing	CSProc (SJ Geophysics proprietary software)
Vp Delay, Vp Integration	1200 ms, 600 ms
Mx Delay, # of Windows Width (Window Width)	50 ms, 26 26, 28, 30, 32, 34, 36, 39, 42, 45, 48, 52, 56, 60, 65, 70, 75, 81, 87, 94, 101, 109, 118, 128, 140, 154, 150 (50–1950 ms)
Mx Integration (Inversion)	50–1950 ms (windows 1–26)
Properties Calculated	Vp, Mx, Sp, Apparent Resistivity and Chargeability

Table 3: IP transmitter and reading parameters

One remote electrode station was utilized over the course of the survey. The location of the remote current electrode is listed in Table 4 below.

Name	Label	Easting	Northing
North Remote	6201E 7550N	446211	5407538
GDA94 MGA Zone 55			

Table 4: Location of IP remote site

4.4. GPS

Garmin GPSMap 62s and 64s handheld GPS units were used to collect location data at each survey station. The GPS data was collected in the GDA94 MGA Zone 55 coordinate system.

5. Field Logistics

The SJ Geophysics field crew consisted of one field geophysicist and one technician to perform the day-to-day operations of the survey. This team oversaw all operational aspects including field logistics, data acquisition and initial field data quality control. Table 5 lists the SJ Geophysics crew members on this project. Four local helpers were hired by the client to assist the geophysical crew in the operation of the survey.

Crew Member Name	Role	Dates on Site
Nathan Anderson	Field Geophysicist	May 31 – June 13, 2018
Brandon Neufeld	Field Technician	May 31 – June 2, 2018
Raymond Dickof	Field Technician	June 6 – June 13, 2018

Table 5: Details of the SJ Geophysics crew on site

The SJ Geophysics crew mobilized to Brisbane, Australia on May 19 and May 20 and to Tasmania on May 25. They demobilized from the project site to the next job on June 14. Prior to the survey beginning on May 31, the crew shipped the equipment to Tasmania from Brisbane and carried out equipment preparations. The crew took a number of days off during this period while they waited for the equipment to arrive in Tasmania.

The SJ Geophysics' crew was accommodated by the client at Sheffield Cabins located in the town of Sheffield. Accommodations consisted of self contained cabins with bedrooms, kitchens, and washrooms. Communication with the office occurred by telephone and email. The survey grid was accessed each day by pickup truck. The client provided two pickup trucks for the crews use, a Mitsubishi Triton and Nissan Navara. The drive from Sheffield to the survey grid occurred on paved (sealed) roads. On the grid, the roads were gravel and deeply rutted in places. When it rained the gravel roads became very muddy and were almost impossible to drive.

During the course of the geophysical survey, the SJ Geophysics crew conducted weekly safety meetings as well as daily tailgate meetings. The safety meetings included a comprehensive review of safe work practices specific to our geophysical surveys and field operations. At the tailgate meetings, personnel discussed issues related to weather conditions (including ramifications on the survey/personal safety), encounters with or sightings of potentially problematic wildlife, efficient organization of daily tasks, and any other work-related questions or concerns.

The crew began setting up wire on May 31 on the west side of the survey grid. They began surveying the first acquisition set, consisting of lines 5400E to 5800E, on June 2. Acquisition continued on June 3 and was completed on June 4. During these first few days the helpers were trained on survey procedures and setup of the data acquisition units.

The survey then proceeded to the east. The second acquisition set was setup on June 5 and was acquired on June 6. The third acquisition set was setup on June 7 and was acquired on June 8 and 9. The forth acquisition set was setup on June 10 and was acquired on June 11 and 12, completing acquisition of the survey grid. All wire was picked up on June 13 and prepared for demobilization the following day.

The survey overall progressed smoothly. A few minor issues were experienced early in the survey. On the first survey day (June 1) it was determined that the IP transmitter power cable plug was not compatible with the power sockets on the generators. An appropriate plug was purchased at a local hardware store the next morning which resolved the issue. A minor incident occurred in the afternoon. One employee injured their ankle and required minor assistance to return to the trucks. The employee was unable to continue on the project with the injured ankle. As a result, the employee was demobilized from the project back to Canada on June 3 and a replacement arrived in Sheffield on June 5.

During the Volterra-3DIP survey, each acquisition day began with the setup of the Volterra acquisition units along the receiver lines and the setup of the transmitter site. Prior to field data acquisition, a contact resistivity test was performed using a small waveform generator attached in parallel to a given Volterra acquisition channel. This was done for each dipole in the array, and allowed the operator to identify breaks in the wire or areas of poor ground contact which could degrade input signal quality. Furthermore, this test allowed the operator to inspect the raw signal, ensuring that the Volterra acquisition units were functioning correctly and the receiver was synchronizing with the correct GPS time.

Upon completion of these tasks, acquisition would begin. During acquisition stages, a dedicated 'transmitter' Volterra acquisition unit and a current monitor were used to measure the current being injected at each station. An Android tablet with an in-house Volterra software app was used to record the current injection start time and duration.

6. Data Quality

6.1. Locations

The location data collected was of good quality. The GPS signals were strong across the grid. Stations acquired using the GPSMap 64s units were observed to be more reliable than those acquired using the GPSMap 62s model. For the 3D inversion a client supplied Lidar DEM was utilized rather than the acquired GPS elevations.

6.2. Volterra-3DIP Data

The IP data was of high quality. Signal strength, as indicated by the voltage potential (Vp), varied between approximately 10 mV and 1000 mV. The Vp’s were consistent across the survey grid with no notable decreases in quality observed. Injected currents were good and varied between 200 mA and 1500 mA, generally averaging between 500-800 mA.

The IP decay curves were processed using the SJ Geophysics time gates with the chargeability calculated over the time window 50-1950 ms. Quality was very good and decay curves were observed to be clean and repeatable. Figure 5 shows an example of good quality data and Figure 6 shows an example of slightly noisy data.

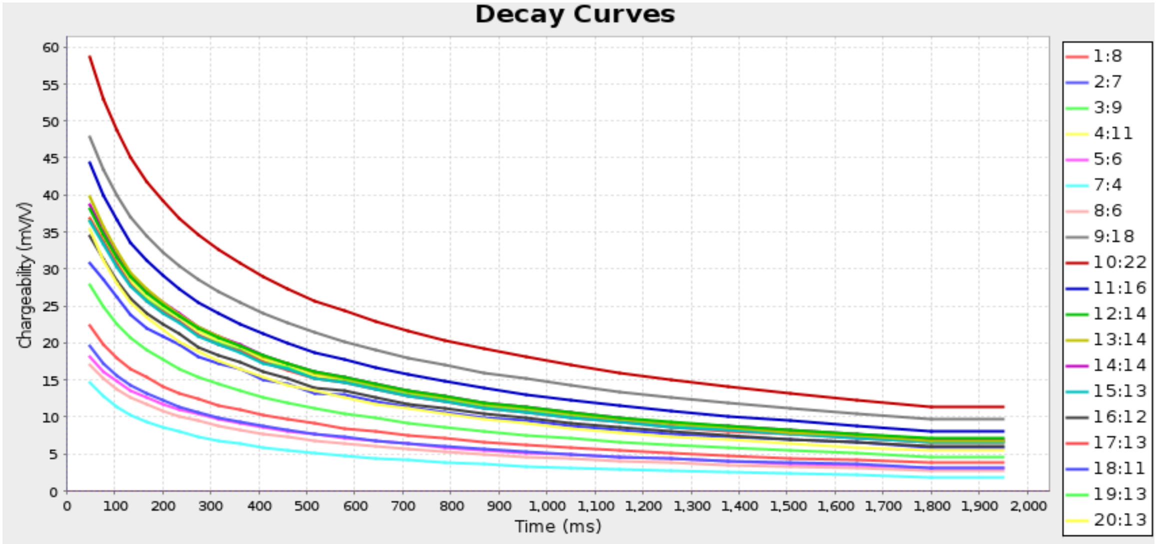

Figure 5: Example of clean decay curves

Receiver Line 6700E, current line 6600E station 5000N

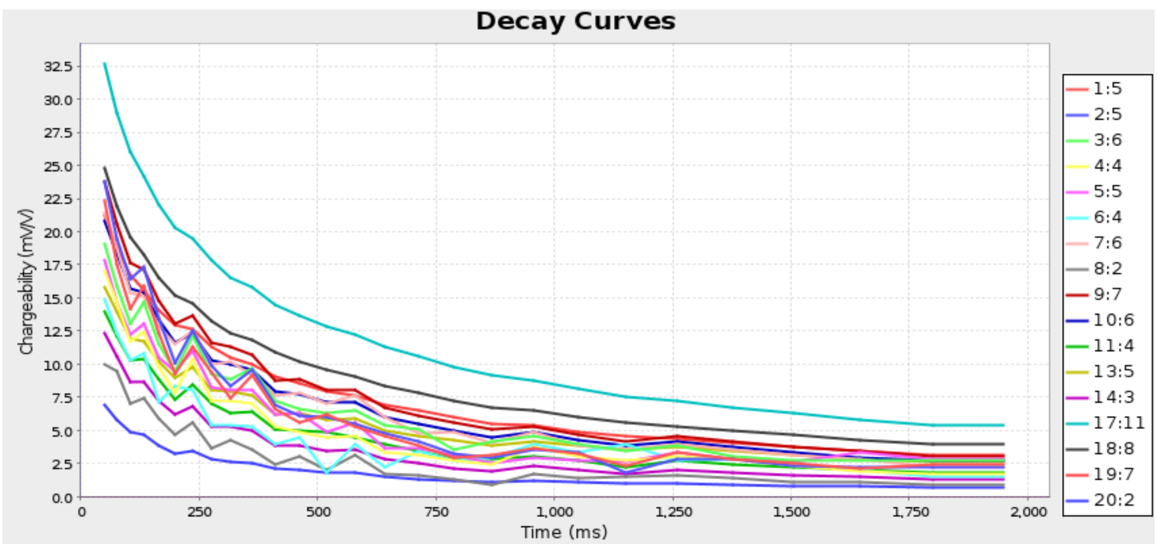

Figure 6: Example of relatively noisy decay curves

Receiver Line 5500E, current line 5800E station 6050N

7. Deliverables

This logistics report and maps are provided as two paper copies and digitally in PDF format. The geophysical survey data is provided digitally on the included CD. A brief description of the provided data is below.

- 3DIP Data – Raw DCIP data export as an ASCII .txt file
- Locations – Locations of survey stations with DEM elevations
- Maps (Location and grid maps)
- Logistics report
- 3D Inversions Models
    - UBC – Inverted models in UBC-GIF standard format (UTM coordinates)
    - UBC – Inverted modesl in UBC-GIF standard format (Local coordinates)
    - XYZ – ASCII format of models converted from UBC-GIF inversion models. The value at the centre of each model cell is given
    - VTK – Inverted models in open-source vtk format: chg, con, res, and sen files
- 3D Inversion Maps
    - Resistivity and chargeability plan maps at constant depth below topography
    - Plan maps in GeoTiff format
    - Section maps along survey lines

Respectfully submitted,

Ross Polutnik, P.Geo
Geophysicist
SJ Geophysics Ltd.

Appendix A: Survey Details

Firetower Grid

Line	Series	Type	Start Station	End Station	Survey Length (m)
5400	E	Tx	4450	6050	1600
5500	E	Rc	4750	5750	1000
5600	E	Tx	4450	6050	1600
5700	E	Rc	4750	5750	1000
5800	E	Tx	4450	6050	1600
5900	E	Rc	4750	5750	1000
6000	E	Tx	4450	6050	1600
6100	E	Rc	4750	5750	1000
6200	E	Tx	4450	6050	1600
6300	E	Rc	4750	5750	1000
6400	E	Tx	4450	6050	1600
6500	E	Rc	4750	5750	1000
6600	E	Tx	4450	6050	1600
6700	E	Rc	4750	5750	1000
6800	E	Tx	4450	6050	1600
6900	E	Rc	4750	5750	1000
7000	E	Tx	4450	6050	1600

Total Linear Metres = 22,400

Rc = Receiver Line, Tx = Transmitter Line

Appendix B: Instrument Specifications

Volterra Acquisition Unit (Dabtube 7000 Series)

Technical:

Input impedance:	20 MΩ
Input overvoltage protection:	5.6 V
ADC bit resolution:	24-bit
Internal memory:	Storage Capacity 16 GB
Number of inputs:	4
Synchronization:	GPS
Selectable Sampling Rates (samples/second):	128000, 64000, 32000, 16000, 8000, 4000, 2000, 1000
Common mode rejection:	More than 80 dB (for Rs=0)
Voltage sensitivity:	Range: -5.0 to +5.0 V (24 bit) Custom Gain available

General:

Dimensions:	Diameter: 5.5 cm, Length: 60 cm
Weight:	0.85 kg
Battery:	3.6 V internal
Operating temperature range:	-40 ºC to 40 ºC

GDD Tx II IP Transmitter

Input voltage:	120V / 60 Hz or 240V / 50Hz (optional)
Output power:	3.6 kW maximum
Output voltage:	150 to 2400 V
Output current:	0.030 to 10 A
Time domain:	1, 2, 4, 8 second on/off cycle.
Operating temp. range:	-40^{0}C to +65^0 C
Display:	Digital LCD read to 0.001A
Dimensions (h w d):	34 x 21 x 39 cm
Weight:	20kg

Appendix C: Geophysical Techniques

IP Method

The time domain IP technique energizes the ground by injecting square wave current pulses via a pair of current electrodes. During current injection, the apparent (bulk) resistivity of the ground is calculated from the measured primary voltage and the input current. Following current injection, a time decaying voltage is measured at the receiver electrodes. This IP effect measures the amount of polarizable (or "chargeable") particles in the subsurface rock.

Under ideal circumstances, high chargeability corresponds to disseminated metallic sulfides. Unfortunately, IP responses are rarely uniquely interpretable as other rock materials are also chargeable, such as some graphitic rocks, clays, and some metamorphic rocks (e.g., serpentinite). Therefore, it is prudent from a geological perspective to incorporate other data sets to assist in interpretation.

IP and resistivity measurements are generally considered repeatable to within about five percent. However, changing field conditions, such as variable water content or electrode contact, reduce the overall repeatability. These measurements are influenced to a large degree by the rock materials near the surface or, more precisely, near the measurement electrodes. In the past, interpretation of a traditional IP pseudosection was often uncertain because strong responses located near the surface could mask a weaker one at depth. Geophysical inversion techniques help to overcome this uncertainty.

Volterra-3DIP Method

Three dimensional IP surveys are designed to take advantage of recent advances in 3D inversion techniques. Unlike conventional 2DIP, the electrode arrays in 3DIP are not restricted to an in-line geometry. This means that data can be collected from a large variety of azimuths simultaneously leading to a highly sampled dataset containing more information about the Earth's physical properties. In an ideal world, a 3DIP survey would consist of randomly located current injections and receiver dipoles with random azimuths. Unfortunately, logistical considerations usually prohibit a completely randomized approach.

The Volterra-3DIP distributed acquisition system is based on state-of-the-art 4-channel, full-waveform, 32-bit Volterra acquisition units. The system is highly flexible and can utilize any number of Volterra units. The Volterra-3DIP system's untethered, distributed design, eliminates the need for specialized receiver cables and a centralized receiver control station. The dipoles can be in any orientation, can have varying lengths, and completely avoid inaccessible areas if necessary.

A typical Volterra-3DIP configuration establishes alternating current and receiver lines in sets of 5, but can be customized based on the project. The current lines are located on adjacent lines to the receiver line and current injections are performed sequentially at fixed increments (25 m, 50 m, 100 m, 200 m) along each current line. By injecting current at multiple locations along each current line, the data acquisition rates are significantly improved over conventional surveys. Customized receiver arrays are utilized to provide greater cross-line focus for a better azimuthal distribution of the data. Cross-dipoles are frequently used to maximize signal coupling and improve the surface resolution.

Appendix D: Field Data Processing & Quality Assurance Procedures

Volterra-3DIP Data

The Volterra-IP data go through a series of quality assurance checks both in the field and in the office to ensure that the data are of good quality. At the end of each acquisition day the recorded signal was downloaded from the Volterra acquisition units to a personal computer. The signals were then clipped to the GPS time windows of each current injection, lightly filtered for noise, and imported into SJ Geophysics' proprietary QA/QC software package called JavIP. This software package integrates location data with DCIP data in order to calculate the apparent resistivity and apparent chargeability values. JavIP contains interactive quality control tools to allow the field geophysicist to display decay curves, view a dot plot of the calculated parameters, and manually reject bad data points.

The majority of the data points flagged for removal were due to null-coupling, a phenomena typical in IP surveys related to the survey configuration. Null-coupling occurs when a receiver dipole is sub-parallel to lines of constant potential, leading to a significant decrease in signal strength and corresponding poor data quality. Additional data can also be deemed untrustworthy due to low signal quality or dipoles being inadvertently disconnected (usually due to animal activity).

After the first data quality review in the field, the database was delivered to SJ Geophysics' head office for a second review. The data were then carefully checked to ensure that erroneous data points had been removed and were not passed along to the final stage of processing: the inversion.

Appendix E: Geophysical Inversion

The purpose of geophysical inversion is to estimate the 3D distribution of subsurface physical properties (density, resistivity, chargeability, and magnetic susceptibility) from a series of geophysical measurements collected at the surface. Unfortunately this is a challenging problem – the subsurface distribution of physical properties is complex and only a finite number of measurements can be collected. These complications lead to an under-determined problem. As a result, there are many different possible 3D physical property models that can be obtained which mathematically fit the observed data. Utilizing known geological and geophysical information to evaluate the model allows the best or most geologically realistic model to be selected and leads to a better understanding of the subsurface.

Geophysical inversions are commonly performed for every survey carried out by SJ Geophysics. Several inversion programs are available, but SJ Geophysics primarily uses the UBC-GIF algorithms (e.g. DCIP2D, DCIP3D, MAG3D, GRAV3D) which were developed by a consortium of major mining companies under the auspices of the University of British Columbia's Geophysical Inversion Facility.

In general, multiple inversions are carried out for each dataset and the resultant inversion models are compared with known information to evaluate the model. For example, known geology, drill assays, the estimated depth of investigation, and the quality of the input data are all used during the evaluation. The most geologically reasonable model that fits the data is then chosen as the best model. When available, additional information such as geological boundaries and down-hole geophysical data can be incorporated into the inversion in order to constrain the inversion model.

Once the final inversion model is selected, the model is gridded and mapped for interpretation. Typically, cross-sections and plan maps are created, sliced at different depths beneath the surface. The inversion results can be visualized in 3D using open source software packages such as Mayavi and Paraview in both 2D and 3D views. Additional data can then be overlain to aid in interpretation and help facilitate the identification of potential drilling targets.