Logistics Report Prepared

for

Bonanza Mining Corporation

Volterra-3DIP

on the

Shag Property

Radium Hot Springs, BC, Canada

Survey conducted by SJ Geophysics Ltd.
September 2021

Report prepared
November 2021

Table of Contents

Index of Figures

Index of Tables

1. Survey Summary

SJ Geophysics Ltd. was contracted by Bonanza Mining Corporation to acquire Volterra 3D induced polarization (3DIP) data on their Shag Property. The survey grid covered an approximately 1.8 km^2 region within the Albert River Valley. In addition to the 3DIP, ground magnetic data was collected along the section of Albert River FSR crossing the survey grid. Table 1 provides a brief summary of the project.

Client	Bonanza Mining Corporation
Project Name	Shag
Project Number	SJ901
Location (approx. centre of grid)	Latitude: 50º 39' 12” N Longitude: 115º 32' 26” W 603170E 5612290N; WGS84 UTM Zone 11N
Total Line Kilometres	3DIP: 11.9 km Mag: 4.3 km
Production Dates	September 19 – September 30, 2021

Table 1: Survey Summary

The Shag Property is located within the East Kootenay region of British Columbia. The property contains multiple zinc and lead showings, with mineralization interpreted as belonging to the Mississippi Valley type (MVT) model of sedimentary zinc deposits (Shag Property Geological Summary, 2018, www.bonanzamining.com).

The Volterra-3DIP survey was conducted to characterize the resistivity and chargeability properties of the subsurface rocks to assist with exploration on the property.

2. Location and Access

The Shag Property is located in the Rocky Mountains of southeastern British Columbia (Figure 1). The property is situated 36 km east of the town of Radium Hot Springs and 58 km northeast of Canal Flats.

Figure 1: Overview map of the Shag Property

The project area was accessed from Radium Hot Springs by the following directions:

- Drive east on highway BC-93N for 20 km.
- Turn right (east) onto Settler's Rd and continue for 20 km.
- Turn left (east) onto Cross River FSR and drive 2 km.
- Turn right (south) onto Kootenay-Palliser FSR and drive 22 km.
- Turn left (east) onto Kootenay River FSR and drive 4 km.
- Turn left (north) onto Albert River FSR, continue for 14 km, to arrive at survey area.

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

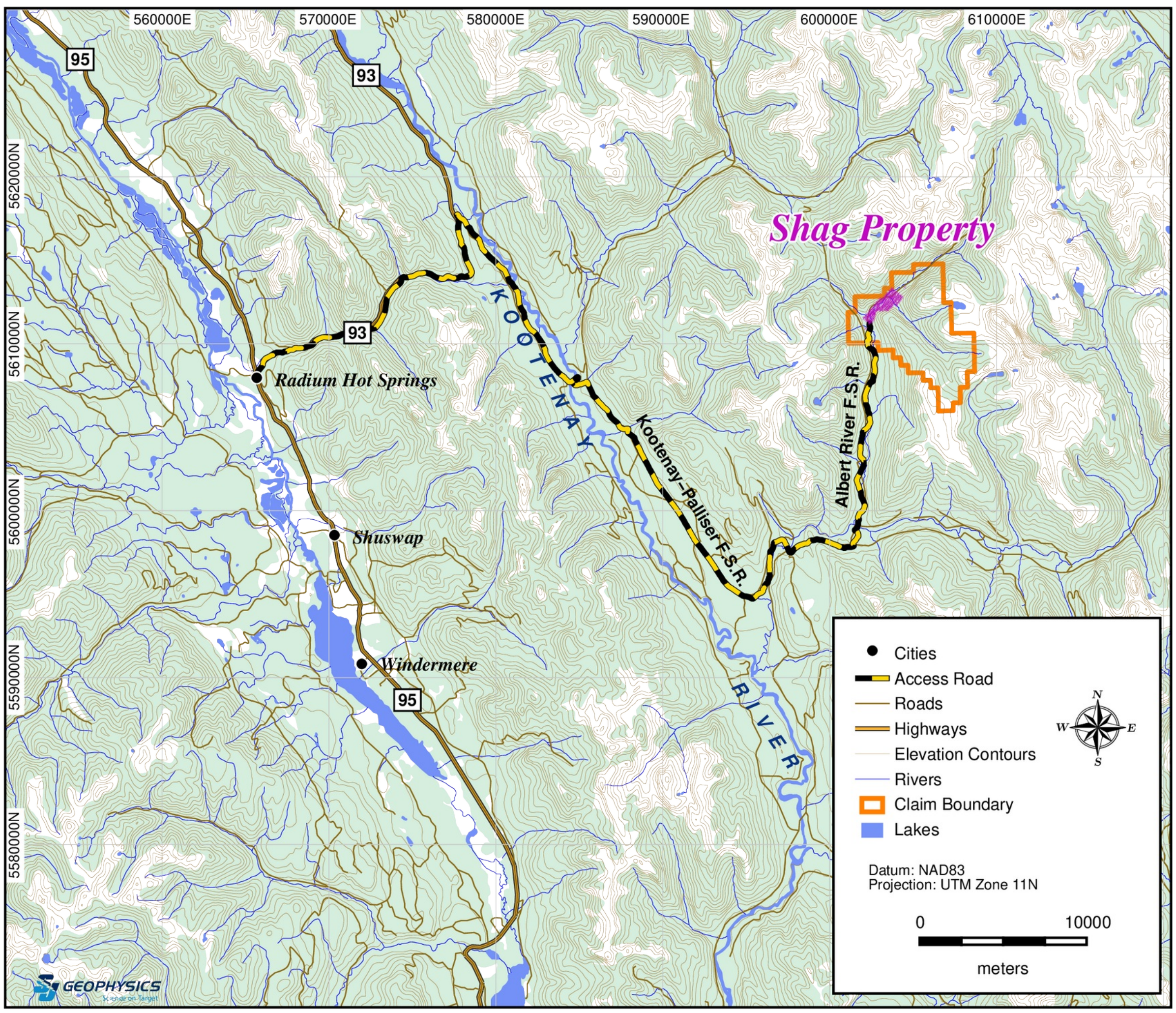

Figure 2: Location map for the Shag Property

3. Survey Grid

The Shag grid consisted of seven survey lines, spaced 150 m apart, and between 700 m and 2500 m in length (Figure 3). No line preparations were completed in advance of the geophysical survey. All survey stations were located in the field in real-time using hand-held GPS units. Stations were not flagged or marked by the crew. The line and station labels for the grid were based on a local coordinate system. Please refer to Appendix A for a detailed breakdown of the survey lines. The survey grid parameters are summarized in Table 2.

Grid	Shag
Number of Surveyed Lines	7
Survey Line Azimuth	41º
Line Spacing	150 m
Station Spacing	50 m

Table 2: Grid parameters

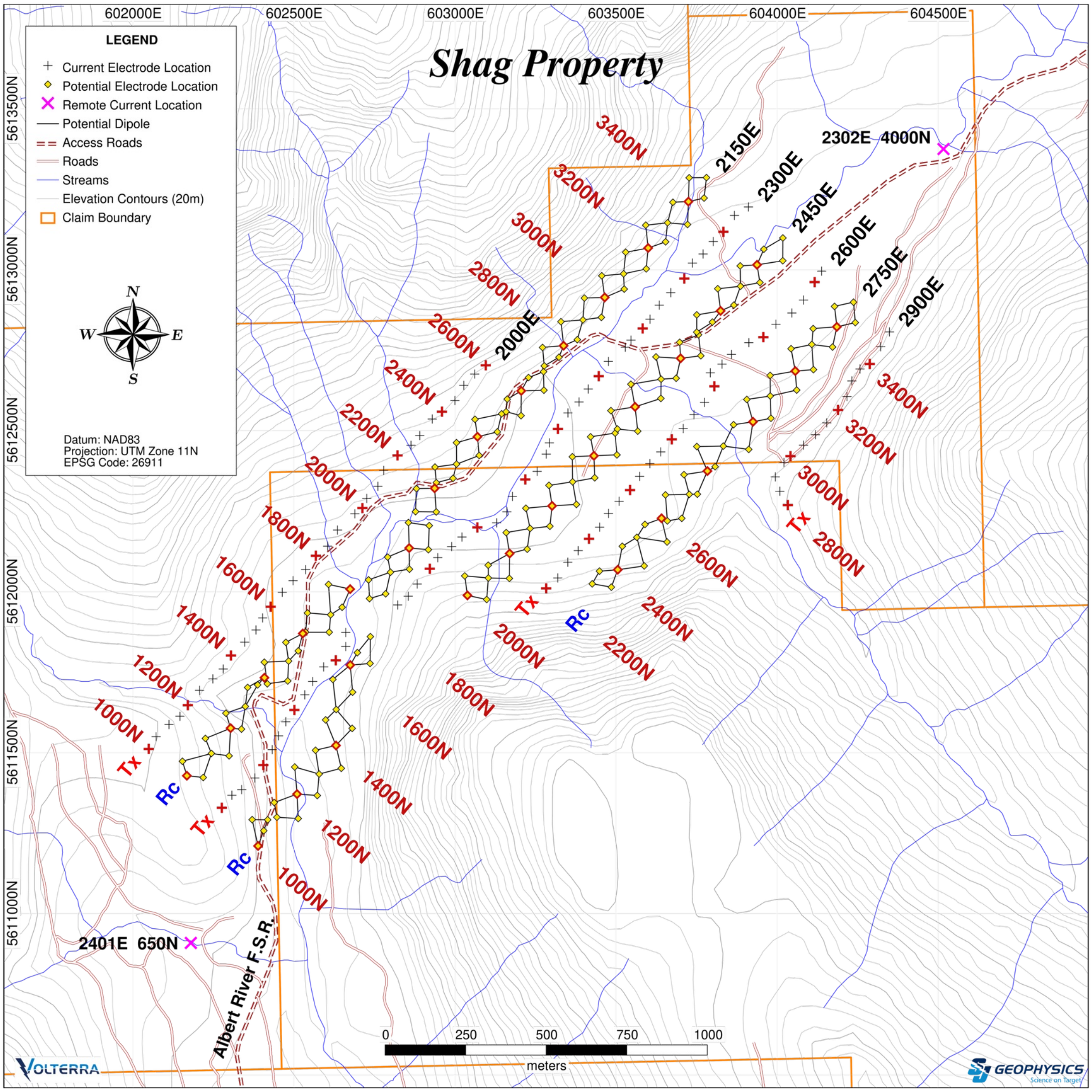

Figure 3: Grid map showing the Shag Property grid

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.

Data acquisition units utilized for the survey were 8000 and 8200 series models. The current injections were controlled using a GDD TxII 3600 W transmitter. The full instrument specifications are listed in Appendix B.

4.2. Volterra-3DIP Survey Design

The Volterra-3DIP survey was carried out with a pole-dipole configuration and acquired using 3-line acquisition sets. Three lines were operated on simultaneously with two transmission (current) lines flanking a central receiving line. Upon completion of each acquisition set, the three lines were shifted over by two line-spacing intervals (300 m) to the next acquisition set, repeating one current line each time the set was moved. Current injections occurred every 50 m along each current line. For each current injection, between 48 (L2750E) and 72 (L2150E) receiver dipoles were active and recording.

The Volterra-3DIP survey was acquired with the dipoles arranged in a diamond array. Each diamond had dimensions of 50 m by 50 m in the in-line and cross-line directions respectively, for an effective dipole length of 71 m. Along each receiver line, potential electrodes were set up every 50 m. At the mid-point of two electrodes, two additional electrodes were set up at a perpendicular distance of 50 m. A Volterra data acquisition unit was then set up at the centre of each grouping of four electrodes and wired to form four dipoles in a diamond. A schematic of the diamond array is shown in Figure 4.

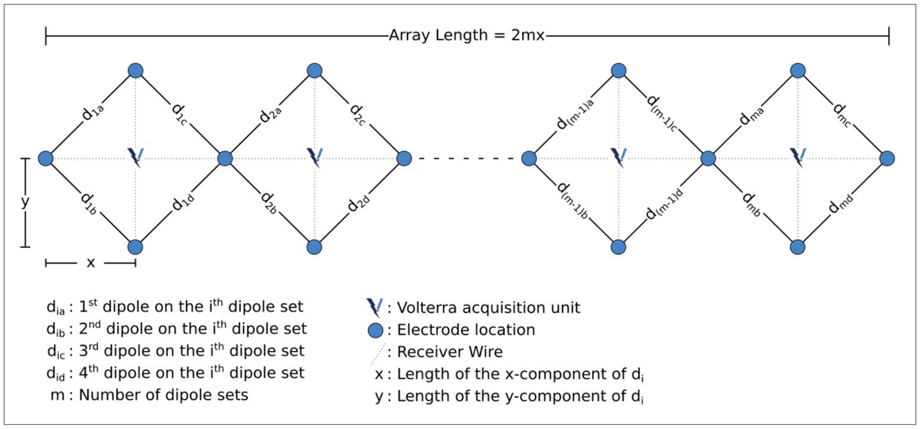

Figure 4: Schematic representation of the diamond array

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.

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 signal quality. Furthermore, this test allowed the operator to inspect the raw signal, ensuring that the Volterra acquisition units were functioning correctly, and to ensure that 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 application was used to record the current injection start time and duration.

4.3. Volterra-3DIP Acquisition Parameters

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

IP Transmitters	GDD TxII (SN #439)
Duty Cycle and Waveform	50%; Square
Cycle and Period	2 sec on / 2 sec off; 8 second
IP Signal Recording	Volterra Acquisition Unit (Dabtube 8000 & 8200 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)	200–1950 ms (windows 6–26)
Properties Calculated	Vp, Mx, Sp, Apparent Resistivity and Chargeability

Table 3: IP transmitter and reading parameters

Two remote electrode stations were utilized over the course of the survey. The locations of the remote current electrodes are listed in Table 4 below.

Name	Label	Easting	Northing
North Remote	2302E 4000N	604516	5613375
South Remote	2401E 650N	602180	5610909
NAD83 UTM Zone 11N			

Table 4: Location of IP remote electrode sites

4.4. GPS

Location data was recorded using Garmin GPSMap 62s/64s handheld GPS units at each survey station. The GPS data was collected in the NAD83 UTM Zone 11N coordinates system.

4.5. Magnetometer

The magnetic data was acquired using two GEM Systems GSM-19W Overhauser magnetometers. One unit was used as a base station to measure the diurnal variations in the magnetic field and the second unit was used as a rover to measure the magnetic response along the survey line. Both units were set to record the magnetic field at a sampling rate of 1 second. The instrument parameters are summarized in Table 5 with the instrument specifications are listed in Appendix B. The locations of the magnetic base station are listed in Table 6.

Magnetometer	GEM GSM-19W Overhauser Magnetometer
Base Recording Interval	1 second
Rover Recording Interval	1 second
Measured Property	Total Magnetic Intensity

Table 5: Magnetometer instrument parameters

Name	Easting	Northing
Magnetic Base – Sept 26	602344	5611642
Magnetic Base – Sept 28	603597	5612677
NAD83 UTM 11N		

Table 6: Locations of magnetic base stations

The magnetic data was recorded along Albert River FSR. A number of very high amplitude anomalies were recorded which corresponded to metal bridges and culverts along the road as noted by the operators in the field notes. The surveyed line and acquired magnetic data is shown in Figure 5. The magnetic response shows a smooth gradient along the line with higher values in the northeast and lower values in the southwest. The difference in amplitude across the survey line corresponds to approximately 15 nT.

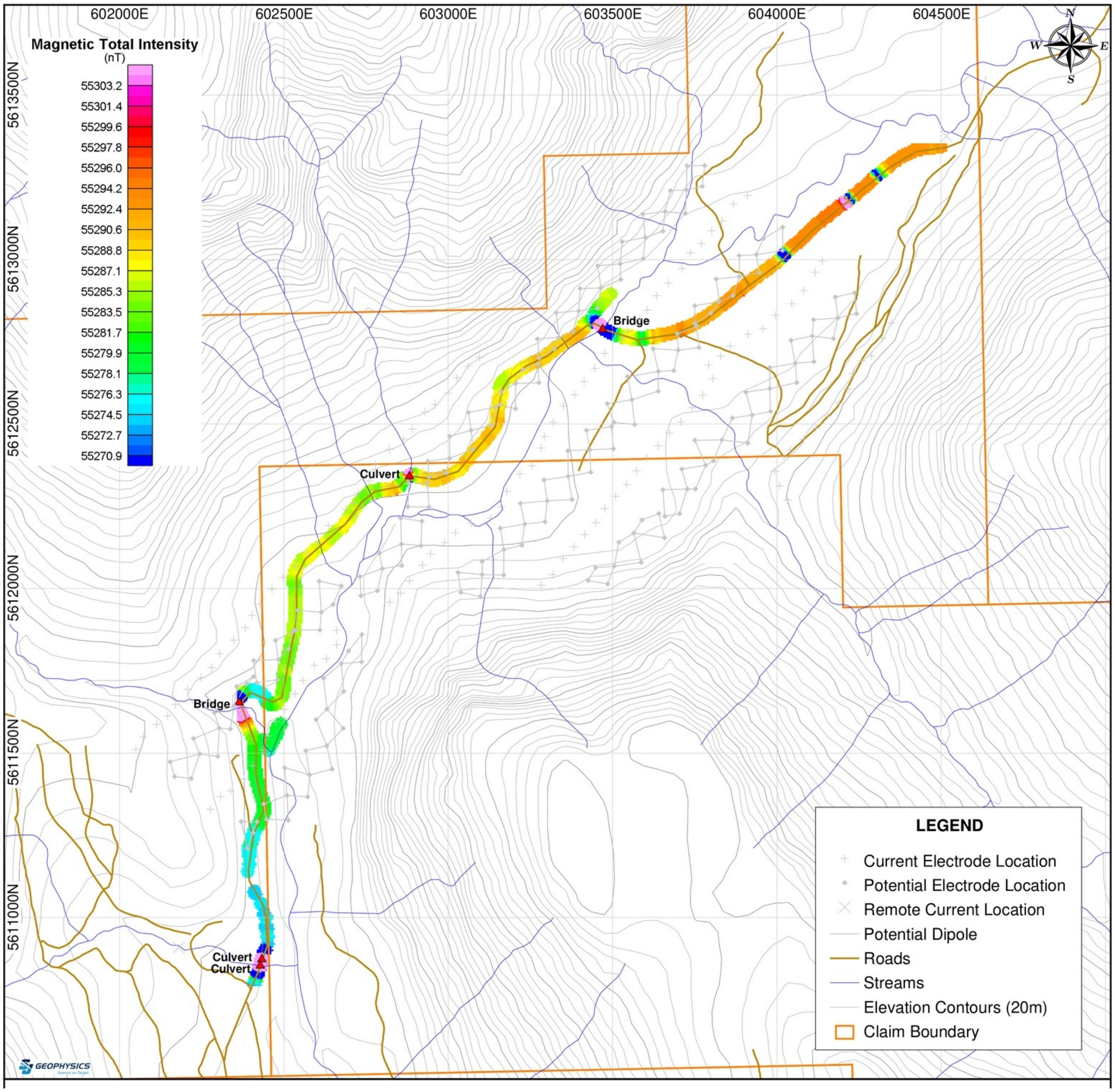

Figure 5: Map showing the magnetic grid and measured TMI data

5. *Field Logistics*

The SJ Geophysics field crew consisted of one geophysicist, five field technicians, and one field assistant 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 7 lists the SJ Geophysics crew members on this project. The client provided two field assistants to help the geophysical crew with the operation of the survey (Table 8).

Crew Member Name	Role	Dates on Site
Brian Chen	Geophysicist	September 19 – September 30, 2021
Jeff Moorcroft	Field Technician	September 19 – September 28, 2021
Jasmin Smallwood	Field Technician	September 20 – September 30, 2021
Braeden Gray	Field Technician	September 19 – September 30, 2021
Gina Visser	Field Technician	September 19 – September 30, 2021
Alex Visser	Field Technician	September 20 – September 28, 2021
Randy Chapman	Field Assistant	September 19 – September 30, 2021

Table 7: Details of the SJ Geophysics crew on site

Crew Member Name	Role	Dates on Site
Christopher Graf	Field Assistant	September 19 – September 30, 2021
Donavan Graf	Field Assistant	September 19 – September 30, 2021

Table 8: Details of the client supplied crew on site

The SJ Geophysics crew mobilized to the Shag Property from Vancouver, BC on September 18, with the majority of the crew arriving in Radium Hot Springs that evening. Two of the crew members arrived on September 19. The crew remained on site through September 30.

The SJ Geophysics crew and client supplied helpers were accommodated in two AirBnB rental units located in an apartment complex on Prospector Avenue in Radium Hot Springs. Each apartment had a kitchen, showers, and individual rooms for the crew members. Internet was available in each house. Communication with the SJ Geophysics office primarily occurred via email and telephone. Cellular service was available in Radium Hot Springs, but was not available on the survey grid. Service was lost once on Settler's Rd.

SJ Geophysics provided two pickup trucks for transportation to and from the survey grid. Roads to the survey grid were graded regularly and only required 2WD. Once on Albert River FSR, 4WD was required. The crew experienced multiple flat tires while driving on the Albert River FSR due to the rough conditions.

At the start of the survey, the crew completed a project start up safety meeting with the client helpers to discuss COVID-19 safety precautions. 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 work on the northwest side of the survey grid on September 19. Acquisition consisted of setup days followed by survey days. Once one acquisition set was acquired the crew moved to the next acquisition set. The first acquisition set, consisting of lines 2000E, 2150E, and 2300E, was surveyed on September 21, 22, and 23. Two setup days were required to pickup and setup wire for the next set of lines. The second acquisition set (lines 2300E, 2450E, and 2600E) was surveyed on September 26 and 27. The third acquisition set (lines 2600E, 2750E, and 2900E) was surveyed September 29. All wire was picked up from the survey grid on September 30 with the crew demobilizing from the project on October 1.

6. Data Quality

6.1. Locations

The location data acquired was overall of good quality. In areas of thick forest cover and in a spots located adjacent to steep mountains, the location data was of lower quality as a result of the reduced number of satellites in view. The GPS points had a typical accuracy of 5-10 m.

For the 3D inversion modeling, the recorded GPS elevations were replaced with elevations obtained from the BC TRIM 20k DEM for the survey area.

6.2. Volterra-3DIP Data

The resistivity and induced polarization data collected was of good quality. The current injection amplitudes varied from 250 mA to 1500 mA, and was most frequently around 850 mA. The measured voltage potentials (Vp) varied across the survey grid depending on the local geologic conditions encountered. In areas of more resistive ground, values were in the 10’s to 1000’s of mV. In areas of less resistive ground, or at far offsets, values were in the 1’s to 100’s of mV. Repeat readings acquired on the same survey day and between survey days were observed to be repeatable and of good quality.

The quality of the chargeability decay curves was good due to the strong chargeability response observed on the survey grid. For measured Vp’s less than 5 mV the decay curves showed increased noise. This primarily occurred at far-offsets where the signal strength was lowest. Figure 6 shows an example of the typical decay curve quality observed on the project.

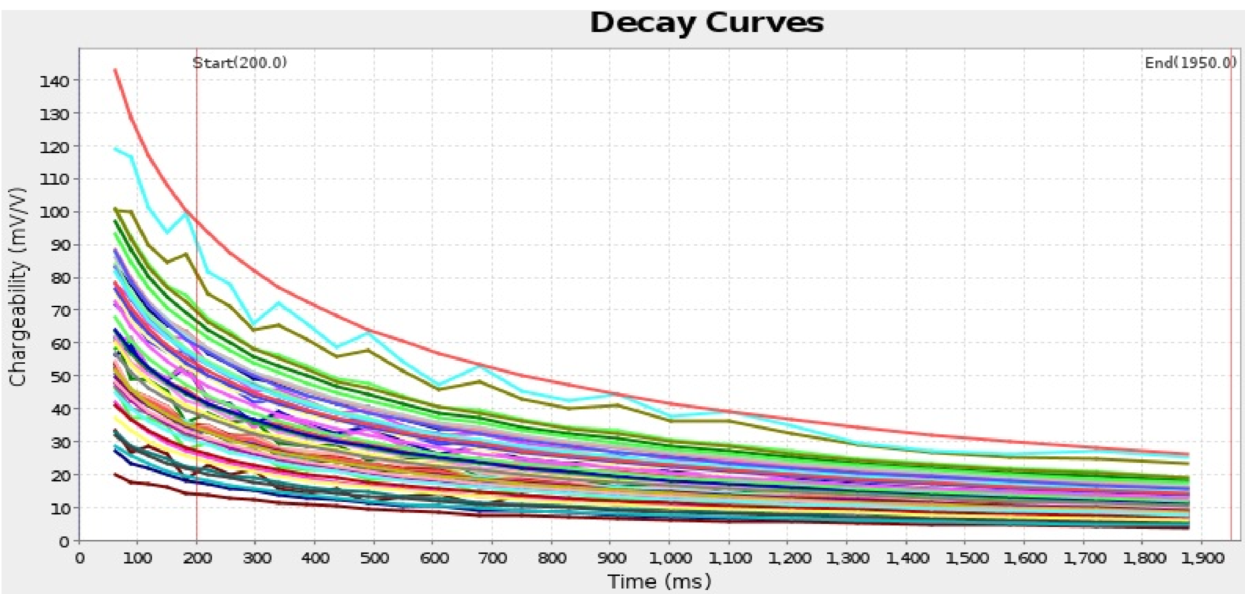

Figure 6: Example of typical decay curves

Receiver line 2150E, current line 2300E station 1200N.

7. Deliverables

This logistics report and maps are provided digitally in PDF format. The geophysical survey data is provided digitally via a secure FTP site. A brief description of the provided data is below.

- Logistics report
- 3DIP Data – Raw DCIP data export as a .txt file
- Locations – Locations of survey stations with DEM elevations
- Maps (Location and grid maps)
- 3D Inversions Models
  - UBC – Inverted models in UBC-GIF standard format (UTM 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
  - All models are provided (.msh, .con, .res, .chg, sensitivity)
- 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

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Geophysicist	Geophysicist
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Appendix A: Survey Details

Shag Grid

Line	Series	Type	Start Station	End Station	Survey Length (m)
2000	E	Tx	1000	2600	1600
2150	E	Rc	1000	3500	2500
2300	E	Tx	1000	3500	2500
2450	E	Rc	1000	1700	700
2450	E	Rc	2000	3500	1500
2600	E	Tx	2200	3450	1250
2750	E	Rc	2300	3500	1200
2900	E	Tx	2800	3500	700

Total Linear Metres = 11,950

Rc = Receiver Line, Tx = Transmitter Line

Appendix B: Instrument Specifications

Volterra Acquisition Unit (Dabtube 8000 Series)

Technical:

Input impedance:	100 MΩ
Input overvoltage protection:	5.6 V
ADC bit resolution:	24-bit
Internal memory:	Storage Capacity 32 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)
Features	Programmable Gain

General:

Dimensions:	Diameter: 43 mm, Length: 405 mm
Weight:	0.5 kg
Battery:	5.0 VDC nominal
Operating temperature range:	-40 ºC to 40 ºC

Volterra Acquisition Unit (Dabtube 8200 Series)

Technical:

Input impedance:	20 MΩ
Input overvoltage protection:	5.6 V
ADC bit resolution:	24-bit
Internal memory:	Storage Capacity 64 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)
Features	Programmable Gain, AC/DC coupling

General:

Dimensions:	Diameter: 43 mm, Length: 405 mm
Weight:	0.5 kg
Battery:	5.0 VDC nominal
Operating temperature range:	-40 ºC to 40 ºC

GDD TxII IP Transmitter

Input Voltage:	220-240 V / 50-60 Hz
Output Power:	3600 W
Output Voltage:	150 to 2400 V
Output Current:	0.03 A to 10 A
Time Base:	2 s ON+, 2s OFF, 2 s ON- 1, 2, 4, 8 seconds on/off cycle
Operating Temperature:	-40ºC to +65ºC
Display:	Digital LCD, read to 0.001 A resolution
Dimensions:	20 x 40 x 47 cm
Weight:	32 kg

GEM GSM-19W Magnetometer

Resolution:	0.01 nT, magnetic field and gradient
Accuracy:	0.1 nT over operating range
Range:	15,000 to 120,000 nT
Gradient Tolerance:	Over 10,000 nT/m
Operating Interval:	3 seconds minimum, faster optional
Reading:	Initiated by keyboard depression, external trigger or carriage return via RS-232C
Input/Output:	6 pin weatherproof connector, RS-232C, and optional analog output
Power Requirements:	12 V, 200 mA peak (during polarization), 30 mA standby, 300 mA peak in gradiometer mode
Power Source:	Internal 12 V, 2.6 Ah sealed lead-acid battery standard, others optional External 12 V power source can also be used
Battery Charger:	Input: 110/220 VAC, 50/60 Hz and/or 12VDC Output: 12 V dual level charging
Operating Range:	Temperature: -40°C to +60°C Battery Voltage: 10 V minimum to 15 V maximum
Dimensions:	
Console:	223 x 69 x 240 mm
Sensor Staff:	4 x 450 mm sections
Sensor:	170 x 71 mm diameter
Weights:	
Console:	2.1 kg
Staff:	0.9 kg
Sensor:	1.1 kg each

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.

Magnetic Method

Magnetic intensity measurements are conducted along survey lines (normally on a regular grid) and are used to identify metallic mineralization related to magnetic materials in the ground (e.g., magnetite and/or pyrrhotite). Magnetic data can be used as a mapping tool to distinguish rock types and to identify faults, bedding, structure and alteration zones. Line and station spacing are usually determined by the size and depth of the exploration targets of interest.

The most common technique used in mineral exploration is to measure the amplitude of the magnetic field using a magnetometer. The instrument digitally records the survey line, station, total magnetic field and time of day at each station. After each day of surveying, data are downloaded to a computer for archiving and further processing.

The earth's magnetic field is continually changing (diurnal variations) so field measurements are calibrated to these variations. The most accurate technique is to establish a stationary base station magnetometer to continually monitor and record the magnetic field over the course of a day. The base station and field magnetometers are synchronized on the basis of time and computer software is used to correct the field data for the diurnal variations.

Appendix D: Field Data Processing & Quality Assurance Procedures

Volterra-IP 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.