GEOPHYSICAL REPORT
High Resolution Resistivity and Induced Polarization Survey

Field and Data Processing Report

Royal - Rude Project

YT, Canada

Work Performed On: June 20 to 26, 2020

Report# ROY-DCIP20-Fin / Rev. 01

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Table of Contents

List of Figures

1.0 Introduction

This report describes data acquisition and inversion modelling results of the 2020 DC Resistivity-IP magnetic survey. 0890763 BC Ltd. commissioned GroundTruth Exploration Inc. (GroundTruth) headquartered in Dawson City, YT to complete 5 high resolution resistivity and induced polarization (DC Res-IP) surveys on the Rude project during the 2020 field season. Figure 1 shows the location of survey lines.

Between June 20 to 26, 2020, ground VLF (GVLF) and magnetic (GMag) surveys were completed over the Royal claims (ROY), Rude exploration target located in the Yukon Territory. This survey is a part of a comprehensive study completed to target future exploration on the property.

2.0 Purpose and Scope

The primary purpose of completing DC Res-IP geophysical surveys is to identify the geological structure and delineate the extent of mineralized zones that are indicated by soil anomalies. This, in turn, will allow the characterization of geophysical signatures for zones of mineralization and support geological models and structural mapping. This report details the results of the DC Res-IP survey.

3.0 Survey Description

Data were acquired by using AGI Supersting resistivity meter along 5 survey lines. Technical specification of SuperSting R1/IP is presented in Appendix A. Each line consists of 84 electrodes with equivalently spaced along the line at 5m and hammered to a depth of 50cm. The data were processed after QC/QA for the resistivity first and then for chargeability further to applying a high cut-off filter for apparent chargeability.

Total coverage of the survey block amounted to 5 survey lines, each 420m with 5m electrode spacing. The survey lines are in an azimuthal direction of E-W (NE 90°) with a line spacing of 50m. A crew of 5 GroundTruth personnel sets up and operates each survey. Brief operating procedures are as follows:

- The midpoint of a traverse is located and the length of the line is sighted using a compass and GPS.
- Minimal brush is cut along the line to place pickets and set up equipment.
- 84 electrodes are diligently inserted into the ground, equivalently spaced along the line at 5m and hammered to a depth of 50cm (10% of electrode spacing).
- Calcium Chloride (CaCl, 25% solution) is added to the base of all electrodes.

- Cables are laid and connected to the electrodes.
- Contact resistance test is conducted.
- Extra electrodes and CaCl solution is added to each electrode with CR >2,000 Ohms. CR test is repeated.
- Continue to add electrodes and CaCl until satisfactory CR values are achieved.
- Operator initializes survey.
- Operator uses DGPS and data collection software to document survey line parameters incl. electrode locations, topography, and notable geological/cultural features if present. Pickets are placed along the line every 50m.
- Crew cuts and prepares the next survey line.

The outline of survey areas and layout of lines are shown in Figure-1 and Figure 2.

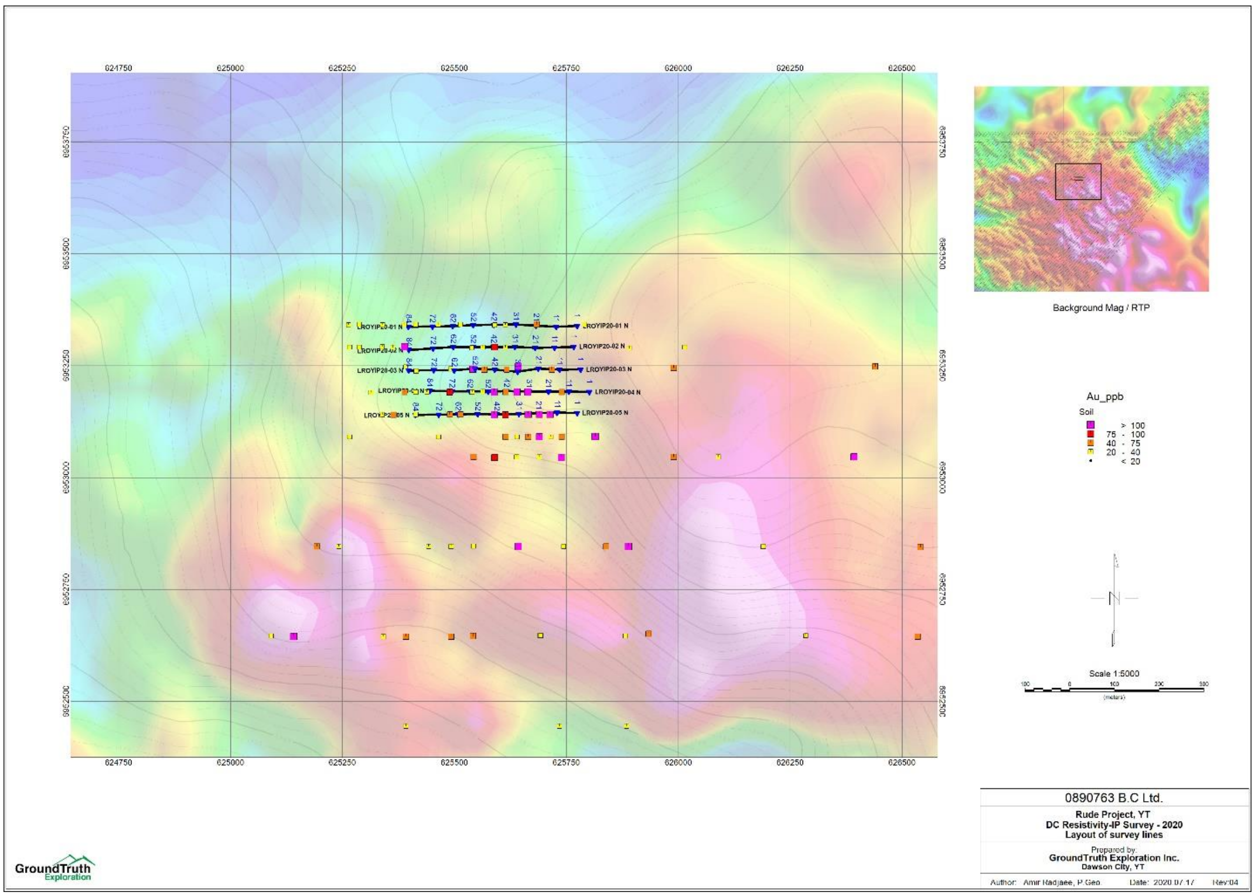


Figure 1: Overview location of the Rude project, 2020 Resistivity-IP survey.

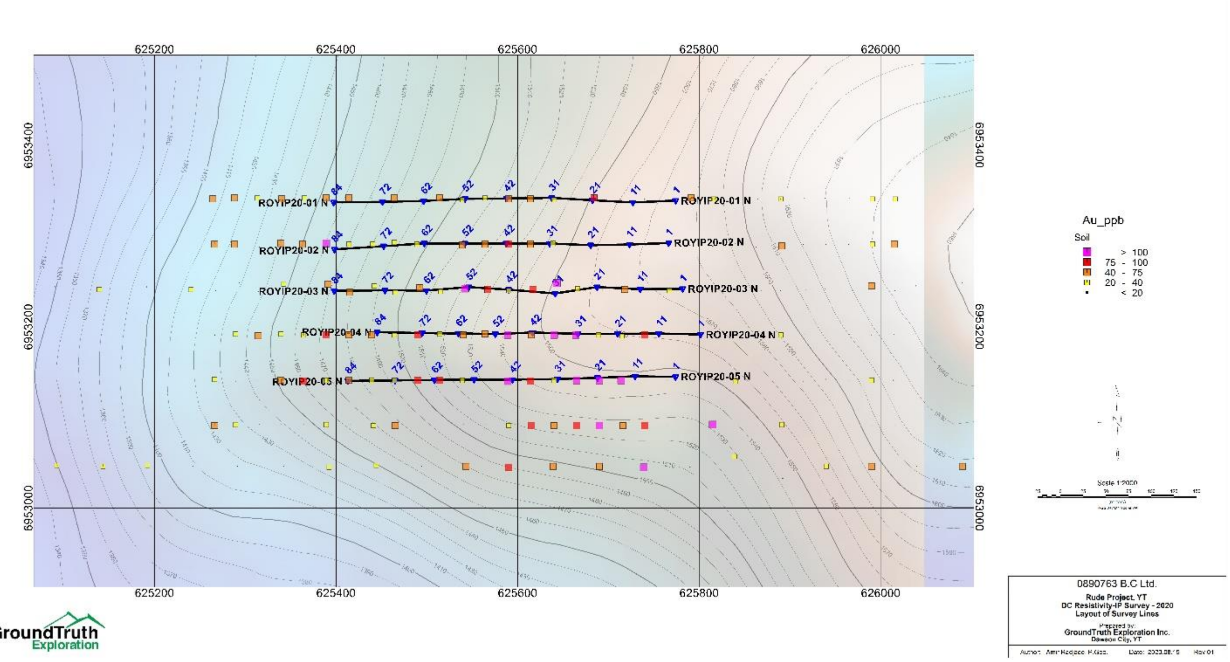


Figure 2*:* Zoom-in view of the Rude project, 2020 Resistivity-IP survey

4.0 Survey Theory

4.1 DC Resistivity-IP Field Survey

Resistivity and Induced Polarization (Res-IP)surveys are an appropriate approach to lode-source gold exploration in Yukon Territories because of the resistivity contrasts inherent to the mineralization and geological structures that are associated with gold deposits. The non-invasive nature of Res-IP combined with its cost efficiency make it a valuable contribution to exploration efforts.

Res-IP surveys involve current injection from the ground surface to induce an electric field that is a function of the conductivity distribution in the subsurface. A current injection typically uses one sink electrode and one source electrode. A measurement of potential field is then acquired across two electrodes that are different from the current electrodes. Hundreds of potential field measurements are made at intervals along the Res-IP traverse for successive current injections to generate the final raw profile of apparent subsurface resistivity.

There are a wide number of array types used to perform Res-IP surveys, each involving a different configuration of current and potential electrodes. Different arrays have strengths and weaknesses in regards to the time necessary to complete the survey and the measurement sensitivity to vertical or horizontal subsurface features. GroundTruth utilizes an extended dipole-dipole array for the Rude project to adequately image the target zones. Details on the extended dipole-dipole array can be found in Appendix B.

4.2 Data Processing

After each survey is completed immediately, the data measurements are downloaded and reviewed for integrity. Any field errors are thus addressed before moving the equipment. Res-IP datasets are processed daily by the lead operator using EarthImager2D software provided by Advanced Geosciences Inc. Outlier/noisy data are removed, and the cleaned dataset is inverted. Terrain correction to the inversion mesh is applied from topographic measurements collected in the field using a differential GPS. All raw data from the DGPS and SuperSting are archived for future consultation.

The final modelling was performed using the 2D inversion program RES2DINV developed by Geotomo Software. The software is capable of producing L2 (smooth) and L1 (blocky) model results, but the L2 option is selected for modelling, which means that sharp boundaries will appear somewhat smoothed. The inversions were run using 18 layers model increasing in thickness from 2.5m to 12m with a total depth of about 100m. The horizontal mesh size is 5m. The resistivity and chargeability models were then imported to Geosoft Oasis montaj for georeferencing from grid coordinates to the UTM Zone 7N.

5.0 Results and recommendations

The 2D inverted resistivity and chargeability models from DC Res-IP data are displayed in Figure 3 through Figure 7. Interpretation of 2D resistivity and IP surveys first requires identifying anomalous zones caused by real subsurface electrical boundaries versus those that are artifacts formed during the inversion process. The combination of geophysical models and geological and drilling information allows some general correlations to be made. The interpretations of Res-IP results can better identify lithological and structures features, as well as the fracture and alteration zones.

3D inversion modelling of DC resistivity-IP data and integration of other available geoscience data are recommended.

6.0 Deliverables

Report in pdf and doc format

- DC Res-IP survey 2020 Rude target area, YT; August 2020

Database

RAW Data

- IP (data with IP data-misfits removed)
- RES (data with RES data-misfits removed)
- unprocessed data from SuperSting

Processed Data

- 2D inversion models for resistivity in xyz format
- 2D inversion models for chargeability in xyz format

Geosoft grids in .grd format

- Georeferenced section grids for resistivity and chargeability

Maps and sections in .jpg format

ROY_DCIP20_L01_Sec_Rev2.jpg
ROY_DCIP20_L02_Sec_Rev2.jpg
ROY_DCIP20_L03_Sec_Rev2.jpg
ROY_DCIP20_L04_Sec_Rev2.jpg
ROY_DCIP20_L05_Sec_Rev2.jpg
ROY-DCIP20-Location_Rev3.jpg
ROY-DCIP20-Loc_Au_Rev4.jpg
ROY-DCIP20-Loc_Au_SampleID.jpg
ROY-DCIP20-Loc_Au_SampleID_All.jpg
ROY-DCIP20-Loc_Au_Values.jpg
ROY-DCIP20-Loc_Au_Values_All.jpg
ROY-DCIP20-Loc_2k

Survey lines

- Survey lines as shapefile

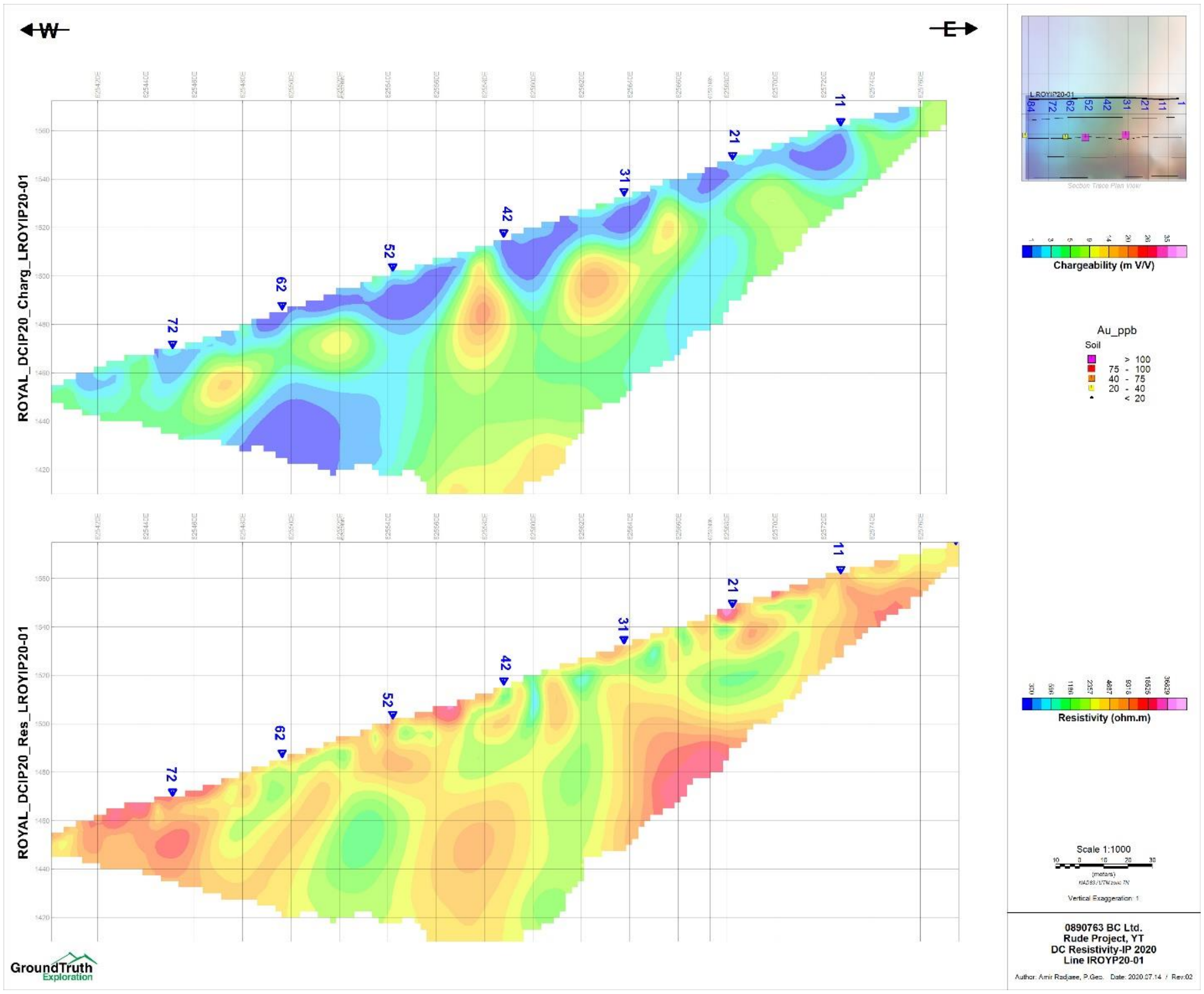


Figure 3: ROYIP20-01 sections, top is inverted chargeability model (mV/V), bottom is inverted resistivity (ohm-m).

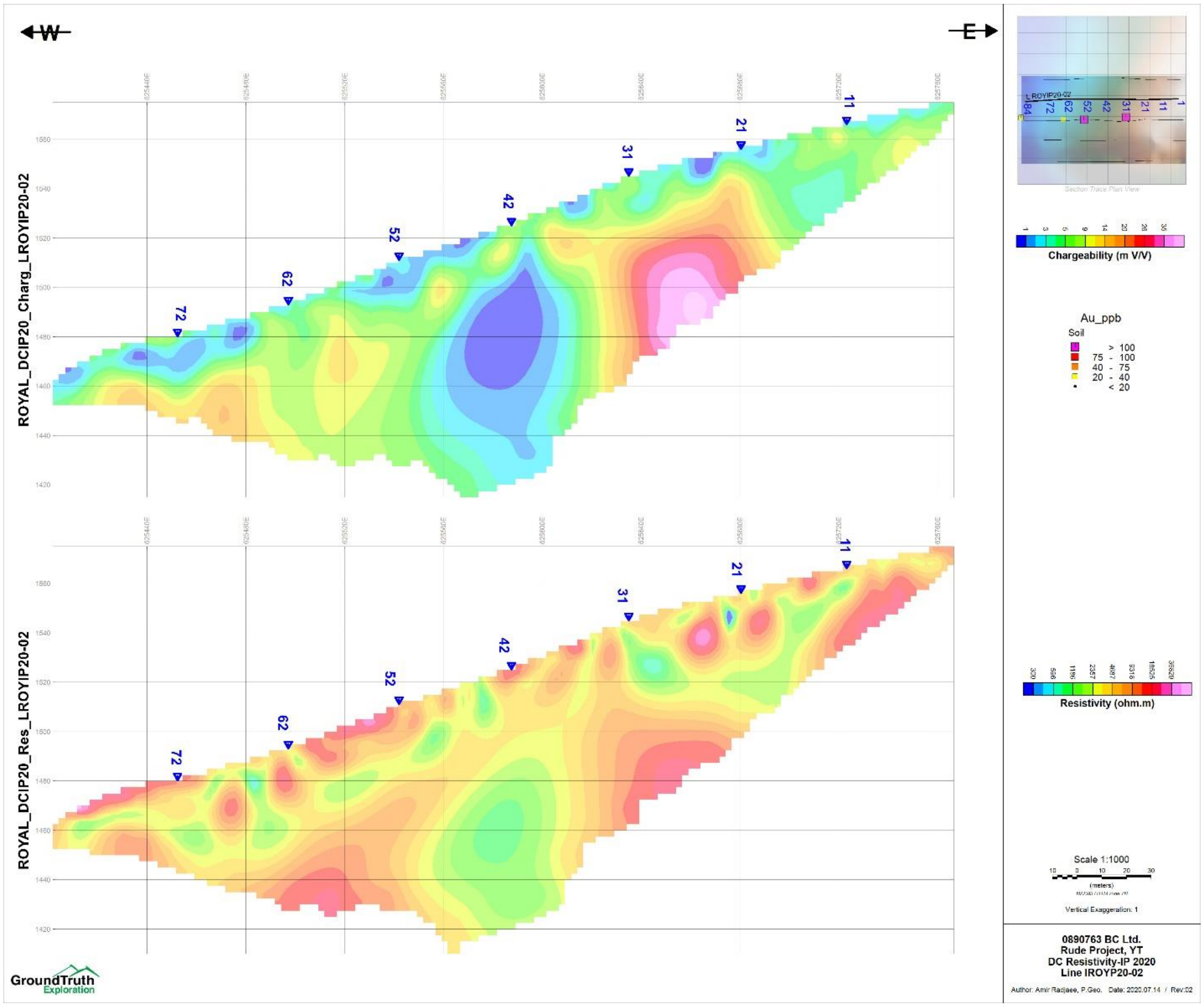


Figure 4: ROYIP20-02 sections, top is inverted chargeability model (mV/V), bottom is inverted resistivity (ohm-m).

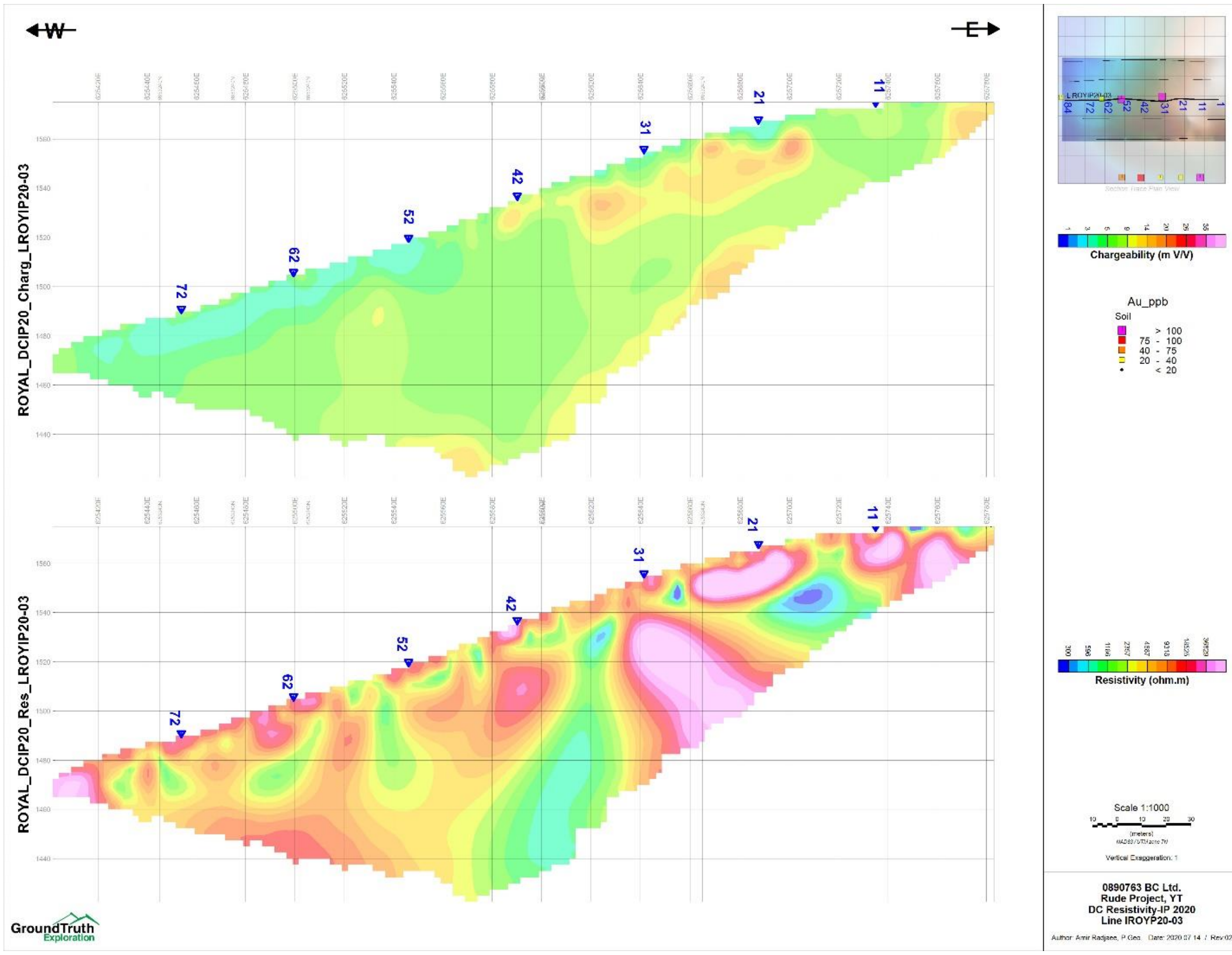


Figure 5: ROYIP20-03 sections, top is inverted chargeability model (mV/V), bottom is inverted resistivity (ohm-m).

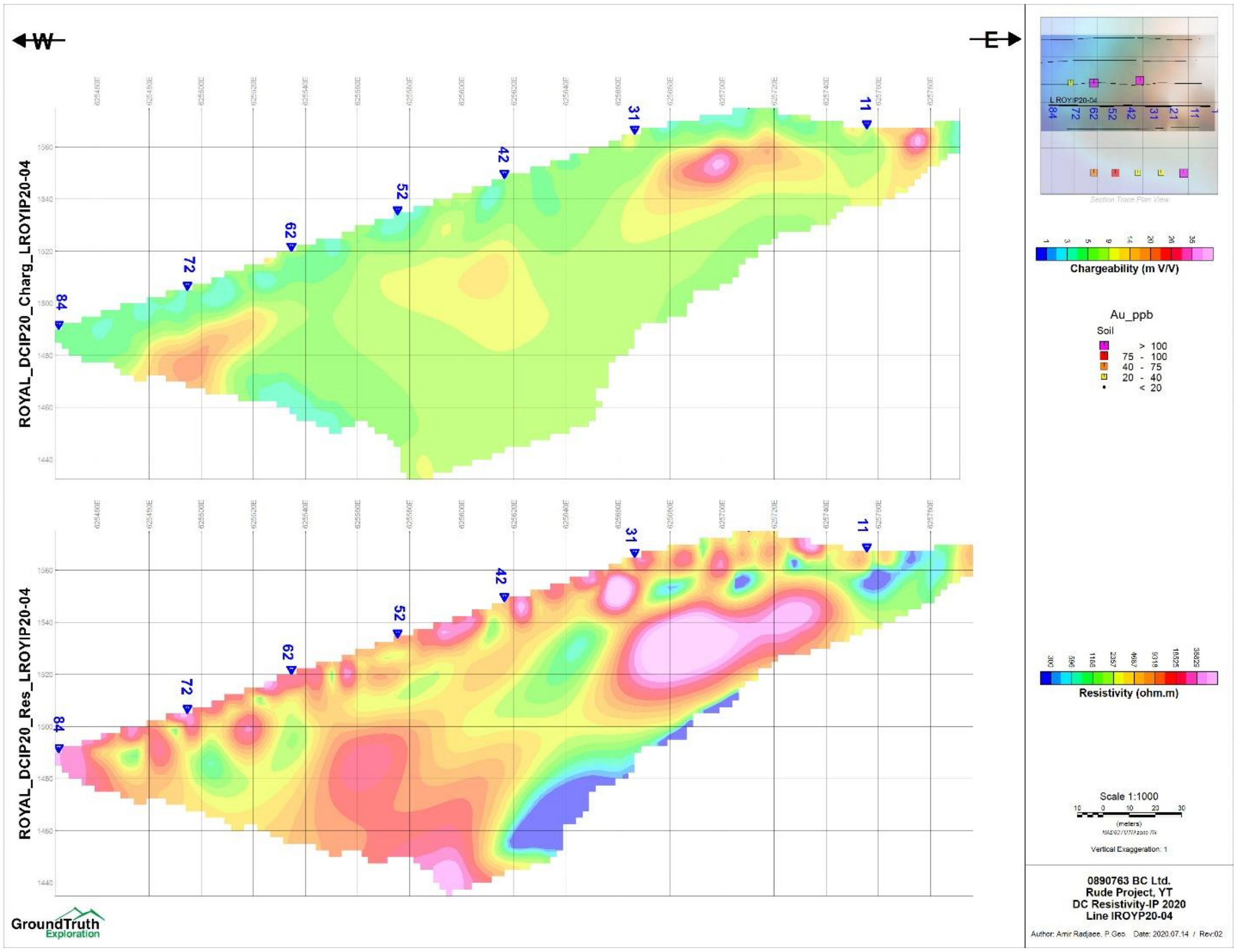


Figure 6: ROYIP20-04 sections, top is inverted chargeability model (mV/V), bottom is inverted resistivity (ohm-m).

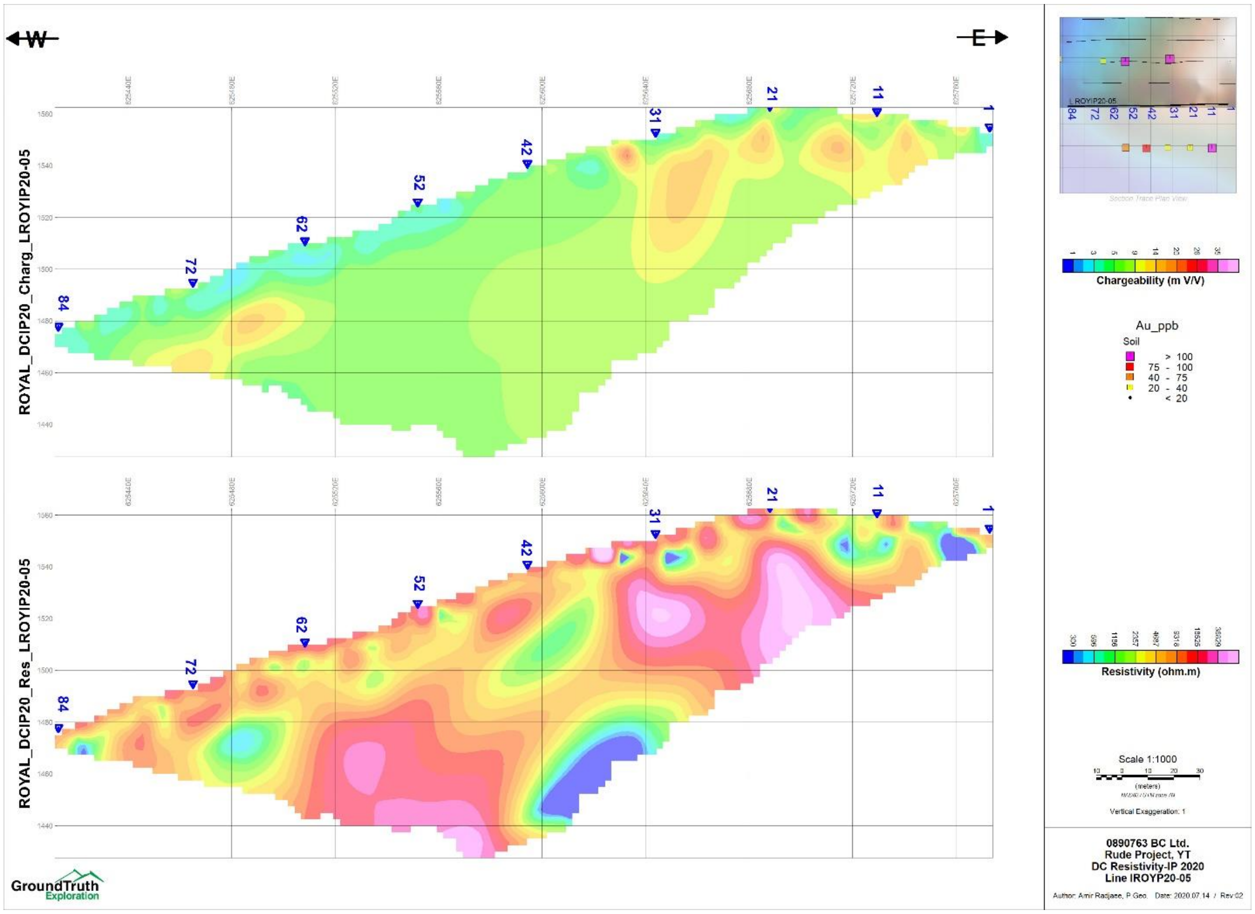


Figure 7: ROYIP20-05 sections, top is inverted chargeability model (mV/V), bottom is inverted resistivity (ohm-m).

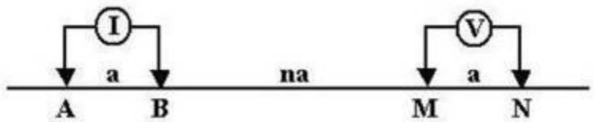
Appendix A: SuperSting R1/IP technical specification

Measurement modes	Apparent resistivity, resistance, self potential (SP), induced polarization (IP), battery voltage
Measurement range	+/- 10V
Measuring resolution	Max 30 nV, depends on voltage level
Screen resolution	4 digits in engineering notation
Output current	1mA – 2 A continuous, measured to high accuracy
Output voltage	800 Vp-p, actual electrode voltage depends on transmitted current and ground resistivity
Output power	200 W
Input gain ranging	Automatic, always uses full dynamic range of receiver
Input impedance	>20 MΩ
SP compensation	Automatic cancellation of SP voltages during resistivity measurement. Constant and linearly varying SP cancels completely.
Type of IP measurement	Time domain chargability (M), six time slots measured and stored in memory
IP current transmission	ON+, OFF, ON-, OFF
IP time cycles	0.5, 1 , 2 , 4 and 8 seconds (combined resistivity/IP mode)
Measure cycles	Running average of measurement displayed after each cycle. Automatic cycle stop when reading errors fall below user set limit or user set max cycles are done.
Resistivity time cycles	Basic measure time is 0.4, 0.8, 1.2, 3.6, 7.2 or 14.4 seconds as selected by user via keyboard, autoranging and commutation adds about 1.4 s.
Signal processing	Continuous averaging after each complete cycle. Noise errors calculated and displayed as percentage of reading. Reading displayed as resistance (ΔV/I) and apparent resistivity (Ωm). Resistivity is calculated using user entered electrode array coordinates.
Noise suppression	Better than 100 dB at f>20 Hz Better than 120 dB at power line frequencies (16 2/3, 20, 50 and 60 Hz) for measure cycles of 1.2 s and above
Total accuracy	Better than 1% of reading in most cases (lab measurements). Field measurement accuracy depends on ground noise and resistivity. Instrument will calculate and display running estimate of measuring accuracy.
System calibration	Calibration is done digitally by the microprocessor based on correction values stored in memory.
Supported manual	Resistance, Schlumberger, Wenner, dipole-dipole, pole-dipole, pole-pole, SP-absolute, SP-gradient
Operating system	Stored in re-programmable flash memory. New version can be downloaded from our web site and stored in the flash memory.
Data storage	Full resolution reading average and error are stored along with user entered coordinates and time of day for each measurement. Storage is effected automatically in a job oriented file system
Data display	Apparent resistivity (Ohmmeter), injected current (mAmp) and measured voltage (mVolt) are displayed and stored in memory for each measurement
Memory capacity	The memory can store 24,468 measurements in Resistivity Mode and 14,966 measurements in combined Resistivity/IP Mode

Data transmission	RS-232C channel available to dump data from the instrument to a Windows type computer on user command.
Automatic multi-electrodes	The SuperSting is designed to run dipole-dipole, pole-dipole, pole-pole, Wenner and Schlumberger surveys including roll-along surveys completely automatic with the Swift Dual Mode Automatic Multi-electrode system (patent 6,404,203) or with switch box and passive cables. The SuperSting can run any other array by using user programmed command files. These files are ASCII files and can be created using a regular text editor. The command files are downloaded to the SuperSting RAM memory and can at any time be recalled and run. Therefore there is no need for a fragile computer in the field.
Manual measurements	The instrument has four banana pole screws for connecting current and potential electrodes during manual measurments
User controls	20 key tactile, weather proof keyboard with alpha numeric entry keys and function keys. On/off switch. Measure button. LCD night light switch (push to light).
Display	Graphics LCD display (16 lines x 30 characters) with night light.
Power supply, field	12V or 2x12 V DC external power (one or two 12 V batteries), connector on front panel.
Power supply, office	DC power supply
Operating time	Depends on survey conditions and size of battery used. Internal circuitry in auto mode adjusts current to save energy
Operating temperature	-5 to +50ºC
Weight	10.9 kg (24 lb.)
Dimensions	Width 184 mm (7.25"), length 406 mm (16") and height 273 mm (10.75”)

Appendix B: Extended Dipole-Dipole Array

The extended dipole-dipole array provides extended data coverage of the standard dipole-dipole array. The electrode configuration for dipole-dipole is shown below, where the current electrodes (A and B) and potential electrodes (M and N) are equivalently spaced by “a”, and separated by a factor “n” times the spacing “a”. A measurement of apparent resistivity can be calculated using the equation below the figure, where V = potential difference (V), I = current (Amp), and ρ_A = apparent resistivity (Ohm-m).



$$\rho_A = \frac{V}{I}\pi\, a\, n(n+1)(n+2).$$

Penetration depth of the extended dipole-dipole array (measurement locations shown below) is approximately 14 times the electrode spacing, which is equivalent to 70m using 5m electrode spacing, but is also dependent on: (1) the actual distribution of subsurface resistivity, and (2) the best achievable contact resistance values between the electrodes and the ground. The figure below shows the measurement locations (in pseudo depth) for an extended dipole-dipole array using 84 surface electrodes.