Arctic Geophysics Inc.

Geophysical Surveys • Prospecting • Consulting

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Geophysical Survey with 2D Resistivity/IP
Indian River, Yukon

FOR
La Tierra Resources Ltd.
Box 304-211 Elliott St
Whitehorse, YT
Y1A2A1

AUTHORS
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Stefan Ostermaier

WORK PERFORMED
September 24th 2010

DATE OF REPORT
January 1st 2011

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1. Introduction

This geophysical investigation was done for La Tierra Resources Ltd..

The survey, using 2D Resistivity /IP, was conducted to prospect the ground for placer - and mineral mining interests.

The ground was tested with one 222m-measuring line, depth 35m.

2. Prospecting Lease

Grant Number	Claim Name	Owner
ID00864	–	La Tierra Resources Ltd.

3. Location

The placer prospecting lease ID00864 is located on a hill above Indian River, close to the confluence with Ophir Creek.

4. Access

The prospecting lease ID00864 was accessed by way of a mining road nearby. However the last part of the way to the prospecting lease had to be hiked due to a wash out in the mining road about 1km below the survey site.

5. Goal

The survey was focussed on measuring and interpreting following **subsurface characteristics**:

Placer Prospecting

1. Depth and topography of bedrock
    - Paleochannels
    - Bedrock benches
2. Sedimentary stratification
3. Permafrost conditions

4. Groundwater table
5. Mining/prospecting history

Mineral Prospecting

1. Alterations in the hardrock
    - Vein systems
    - Ore bodies

6. Methods

The **Resistivity profile** is the foundation for the interpretation of the subsurface conditions for the **placer** prospection. It usually allows for good interpretation of bedrock and overburden for finding secondary deposits.

The **IP model** serves as basis for the interpretation of the mineral and petrologic conditions in **hardrock**. IP is an industry proven standard method for the detection of primary mineral deposits.

Both methods support each other in the interpretation of the profiles.

Resistivity

In this **placer** survey 2D Resistivity was used. Resistivity is a reliable geophysical method for the detection of very shallow and deep layer interfaces in nearly all surface and subsurface conditions in the Yukon. Measuring shallow interfaces for a long distance is more economic than with seismic. The depth penetration is much higher than with ground penetrating radar. Resistivity data taken in discontinuously frozen ground often provide a plausible interpretation since the profile matrix is consistently filled with data representing a material property. There are no “blind zones” in a resistivity profile like they appear in other geophysical methods purely based on signal reflection. A lightweight system is available for flexible use with a small crew.

Induced Polarization (IP)

IP data are simultaneously taken when measuring Resistivity, with the same equipment and staking. So these data are automatically at hand when using Resistivity.

6. Use of Geophysical Methods

6.1. Instrumentation

For this survey a lightweight, custom-built 2D RESISTIVITY and INDUCED POLARIZATION (IP) imaging system with rapid automatic data acquisition was used. The system includes:

- "4 POINT LIGHT" EARTH RESISTIVITY METER[1]
- 100 ELECTRODE CONTROL MODULES[2]
- 100 STAINLESS STEEL ELECTRODES[3]
- 500m MULTICORE CABLE 100x5m[4]

This system weighs approximately 60 kg which is about one third of regular standard equipment. It can be run with a 12V lead battery charged by 60 Watt solar panels. The equipment facilitates high mobility and rapid data acquisition.

6.2. Data Acquisition

The **data acquisition** is carried out by the automatic activation of 4-point-electrodes. Thus several thousand measurements are taken, one every 1-2 seconds. The AC transmitter current of 0.26 to 30 Hz is amplified by the electrode control modules, up to a maximum of 100mA and 400V peak to peak. The voltage measured at the receiver electrodes (M, N) is also amplified.

In this geoelectrical survey the **Schlumberger-array** was used. This array is appropriate to image horizontally running layers as is needed for placer prospecting.

6.3. Processing

The measured Resistivity/IP data were processed with the **RES2DINV** inversion program[5].

[1] Constructed and produced by LGM (Germany)
[2] Ditto
[3] Constructed and produced by GEOANALYSIS.COM (Germany)
[4] Ditto
[5] Produced by GEOTOMO SOFTWARE (Malaysia)

6.4. Interpretation

The interpretation of the measured data is supported by:

Experience - measuring practice with Resistivity/IP in Yukon/BC since 2005
Discussion - with the customer, and governmental placer geologist William Lebarge et al.[6]
Comparison - between geophysical and technogenic information found in other surveys
Observation - of surficial conditions in the field
Sources - Bedrock Geology Map[7]

6.5. Profile image

In the **Resistivity profile** the interpreted layer interfaces are marked with a black line. Please be aware: The profiles show **ground-layers approximately 15% thicker** than they are in reality. The thickening of the model layers is caused by the inversion software. The correction factor of 0.85 for the determination of the true layer thickness has been established by the Arctic Geophysics Inc. team on the basis of numerous geoelectrical profiles verified by drilling, trenching, and mining done by our customers.

The **graphical markings** showing the interpreted layer interfaces in the profiles (using the black lines) are done accordingly to the data structure in the profile itself. This means: the layers there will also show up approximately 15% thicker than they are in reality. In the interpretation text the layer thicknesses and depths have been recalculated to the expected real values.

8. Resistivity/IP Survey at Indian River

Line Arrangement

The measuring line was located on a hill, about 30m higher than the Indian River, causing a meander. The line runs about 45 degree across the valley direction. This adjustment of the line was done in accordance with the customer's whishes and was supported by a dirt road. Because of time-consuming access, done by one operator, a 90 degree cross-line running through dense vegetation would not have been possible at the same day.

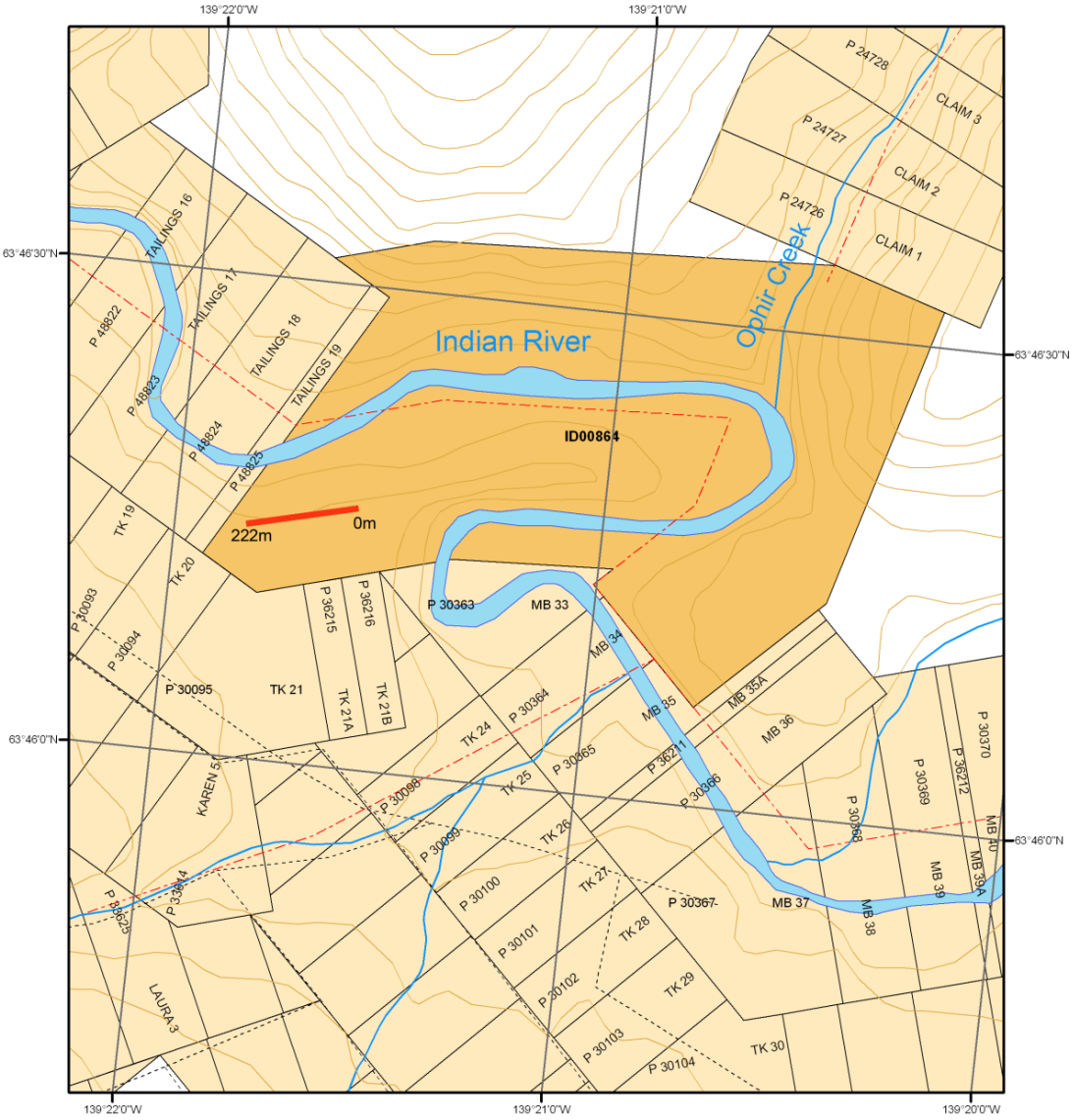
[6] Lebarge, William; Placer Geologist, Yukon Geological Survey

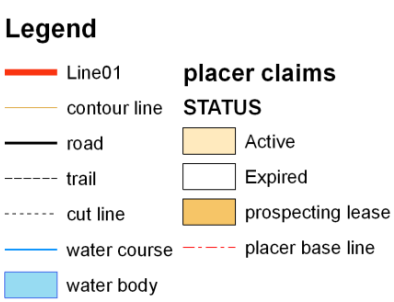
[7] Gordey, S.P. and Makepeace, A.J. (comp.) 1999: Yukon bedrock geology in Yukon digital geology, S.P. Gordey and A.J. Makepeace (comp.); Geological Survey of Canada Open File D3826 and Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1999-1(D)

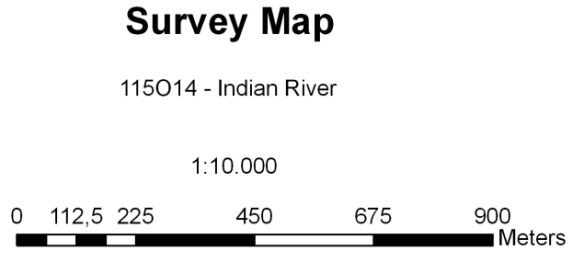
Preliminary Note!

The subsurface information of this study is an interpretation.

Survey Map[8]

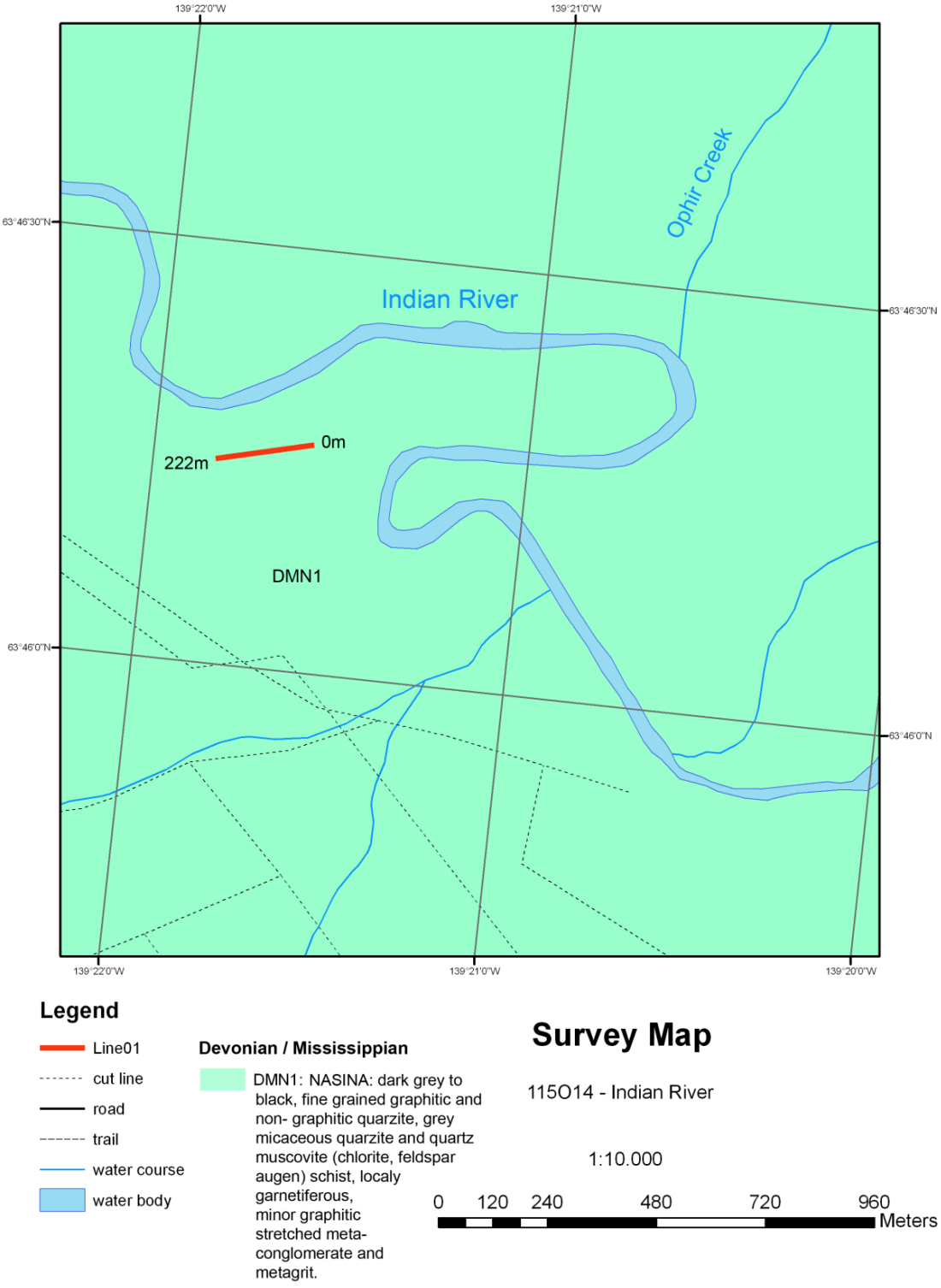






[8] http://www.yukonminingrecorder.ca/PDFs: 115O/14

Bedrock Geology Map[9]

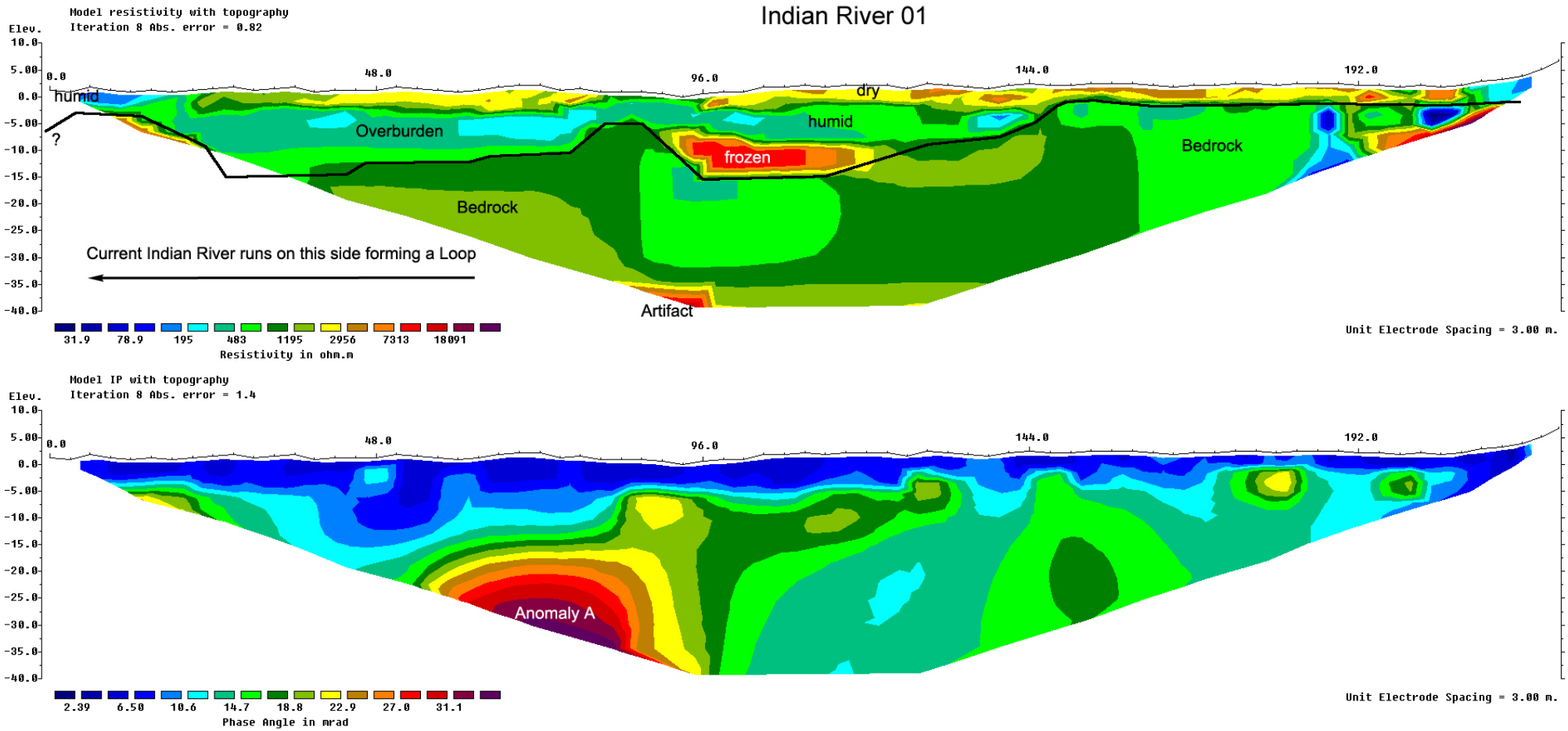


[9] Gordey, S.P. and Makepeace, A.J. (comp.) 1999: Yukon bedrock geology in Yukon digital geology, S.P. Gordey and A.J. Makepeace (comp.); Geological Survey of Canada Open File D3826 and Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1999-1(D)

Measurement

Indian River 01

Line: Cross valley, 45 degrees	**Horizontal measure:** in [meter]	**Data acquisition:** Stefan Ostermaier
View: Upstream	**Vertical measure:** in [meter]	**Processing:** Stefan Ostermaier
Electrodes: 75, spacing 3m	**Iteration error:** in [%]	**Interpretation:** Philipp Moll
Array: Schlumberger	**Vertical exaggeration in model section display:** 0.78	Stefan Ostermaier



The **surface** of the ground is stripped.

The **overburden** might be **gravel**, 3-14m thick, on top of bedrock. The upper 2-3m of the gravel (yellow-brown) might be dry which causes high resistivity. The gravel underneath is humid. The interpreted thickness of the gravel is confirmed by the IP model (blue layer).

The **bedrock** we interpret as **schist.**[10] At 0-185m in the profile moderate variability of resistivity in the schist is caused by discontinuous permafrost and/or metamorphic alteration.

At 0-185m the **bedrock** could alternatively be interpreted as **quartzite rich in graphite**[11], and/or other minerals which increase the conductivity. The IP model would support the interpretation of mineral-rich quartzite as the bedrock shows increased chargeability. However, it is less likely that the moderate amount of alluvial overburden did cut that deep into quartzite bedrock which is hard. This aspect leads back to schist.

At the right edge (beyond 185m) the hypothetic schist bedrock shows a dense pattern of **highly various Resistivity**. This might be caused by changing amounts of weathering and frost.[12] After 185m the disturbance in the subsurface could less likely indicate some technogenic material sitting into a former test pit.

The **bedrock interface** is suggested by both profiles (RES/IP). It presents **two paleochannels** with similar shape. Both channels, separated by a hump, do show their deepest part on the left hand side! Also on the left side the current Indian River is passing the measuring line forming a loop. It looks like as the paleochannels seen in the profile are some old meanders mapping the historical path of the Indian River towards its current loop. To the left of the profile all the way to the river the existence of some more channels would be plausible.

Thus the **left channel** might be younger. It is 60m wide, and shows the **deepest bedrock** at 14m. The **right channel** is 55m wide presenting bedrock at 14m as well. Its lower gravel must be frozen (red zone).

The **IP** model indicates a higher concentration of IP-active minerals in the bedrock all along the profile. A common reason for that would be pyrite in the schist. Alternatively the Bedrock Geology Map refers to graphite in the quartzite, which also would produce strong IP signals.[13]

Anomaly A shows a chargeability of 35 milliradian. This data is significant. So this anomaly could indicate the beginning of a commercially profitable primary ore deposit. Possible ore minerals are: Argentite, Copper, Chalcocite, Gelena, Sphalerite, Molybdenite etc..

[10] This bedrock type fits with the Bedrock Geology Map.

[11] This bedrock type fits with the Bedrock Geology Map as well.The graphite reduces the resistivity of quartzite which usually shows higher data.

[12] Description: Schist bedrock easily fractures by frost wedging and faults. The fractures produce some cavities which are filled with water. This increases the conductivity and decreased the Resistivity. The fractured rock starts chemical weathering which increases the pore volume of the rock that is filled with water collecting a high amount of solved minerals. The resistivity is reduced even more. Larger fractures in the rock could have been penetrated by water saturated sediments. – All these factors could have significantly decreased the resistivity of the local bedrock. (Blue zones) In permafrost conditions all these factors produce an inverse effect: Porous rocks show higher resistivity than solid rocks, because the rock particles are insulated by ice. (Red zone) – All these influences might have controlled the highly varying resistivity in the local bedrock measured at the right edge of the profile.

[13] IP signals in solid rock are mostly produced by sulfide accessory minerals, graphite, and copper all indicating a large range of possible ore types. For an in depth interpretation of IP-data more geological background information would be needed.

8. Recommendations

Placer Prospecting

In the profile two plaleochannles were interpreted.

This table shows some suitable locations in the profiles to verify these channels by **drilling**.

Location in profile	**Interpreted Depth to Bedrock**	**Interpreted Overburden**
33m	14m	Gravel
69m	11m	Gravel
102m	14m	Gravel
165m	3m	Gravel

The gravel on top of bedrock should contain little ground water which allows for good drill samples with an auger. At 102m the lower gravel might be frozen; a very good drill sample would be expected.

To the west of the profile the existence of some more paleochannels is likely. These hypothetic channels could be prospected with 2D Resistivity/IP or Ground Penetrating Radar (GPR)[14].

Mineral Prospecting

In the IP profile a prominent anomaly is shown (A).

This anomaly could be sampled by **drilling** the profile at 75m. The drilling should be done at least 30m deep to surely hit the material which produces 35 milliradian of chargeability.

[14] When using GPR disturbed bedrock, such as seen in the profile after 185m, could produce an indistinct response. Radar would not be recommended if clay were present in the overburden.

10. References

Literature

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Maps

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11. Qualification

Philipp Moll

- Study of geology, University of Freiburg, Germany
- Visit of geophysical field courses, University of Karlsruhe and University of Stuttgart, Germany
- Geological Prospecting for precious metals and minerals in the Yukon, NWTs, and Alaska since 1989
- Geophysical surveying for Mining Exploration in the Yukon since 2005
- Study of biology and German language and literature, University of Freiburg, Germany
- Apprenticeship of precision mechanic, Tools Factory Hermann Bilz, Zell, Germany

Philipp Moll

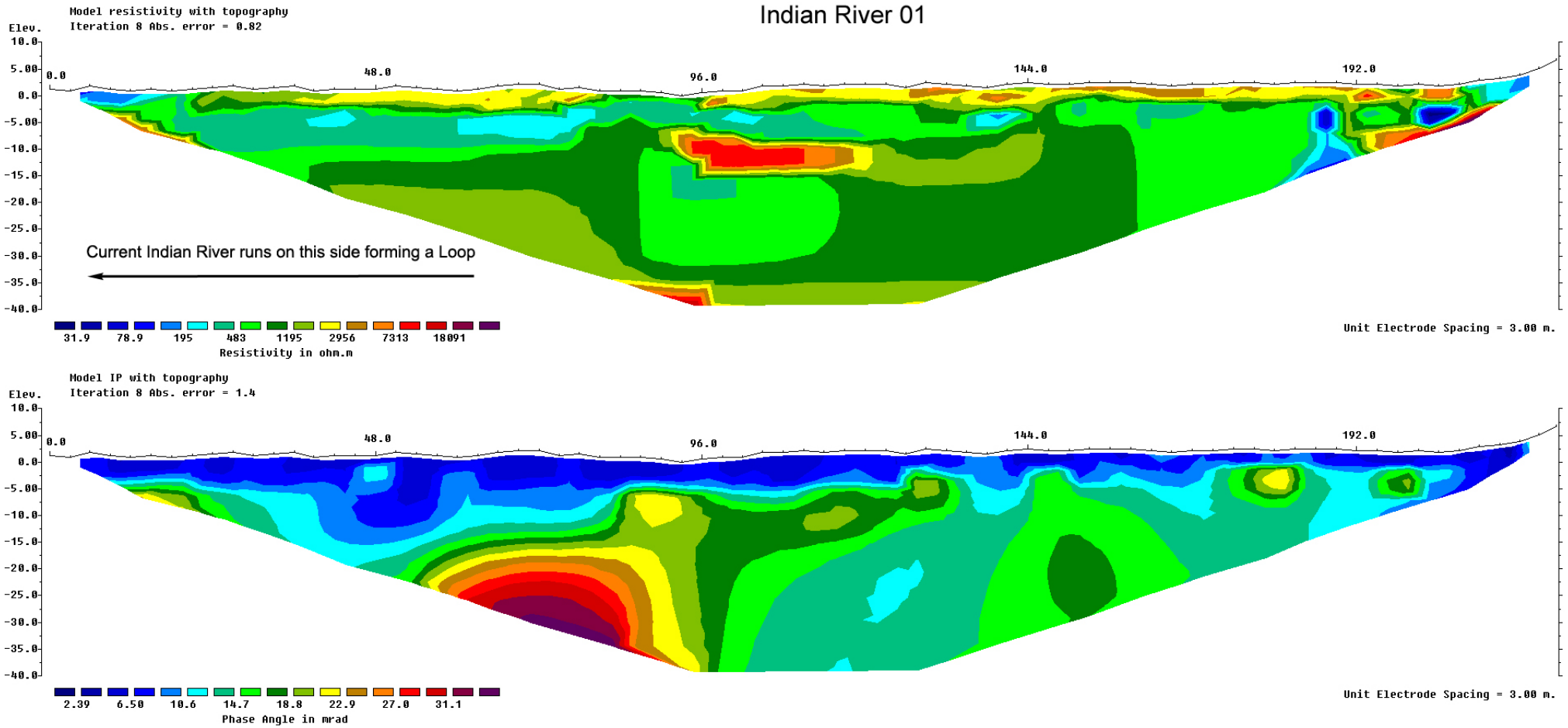
Stefan Ostermaier

- Study of geology, University of Tübingen, Germany
- Visit of geophysical field courses, University of Karlsruhe and U
  Stuttgart, Germany
- Geological prospecting for precious metals and minerals in the
  since 2001
- Geophysical Surveying for Mining Exploration in the Yukon sin
- Study of computer science, University of Stuttgart, Germany

Stefan Ostermaier

12. Addendum

Profile raw



GPS-Data

Indian River Line01

Accuracy 3m

Profile [m]	Latitude / Longitude
0	N63 46 16.2
	W139 21 34.4
3	N63 46 16.2
	W139 21 34.6
6	N63 46 16.2
	W139 21 34.8
9	N63 46 16.2
	W139 21 35.0
12	N63 46 16.1
	W139 21 35.3
15	N63 46 16.1
	W139 21 35.4
18	N63 46 16.1
	W139 21 35.6
21	N63 46 16.1
	W139 21 35.9
24	N63 46 16.1
	W139 21 36.1
27	N63 46 16.0
	W139 21 36.3
30	N63 46 16.0
	W139 21 36.5
33	N63 46 16.0
	W139 21 36.7
36	N63 46 16.0
	W139 21 36.9
39	N63 46 16.0
	W139 21 37.1
42	N63 46 15.9
	W139 21 37.3
45	N63 46 15.9

Profile [m]	Latitude / Longitude
	W139 21 37.6
48	N63 46 15.9
	W139 21 37.7
51	N63 46 15.9
	W139 21 38.0
54	N63 46 15.9
	W139 21 38.2
57	N63 46 15.8
	W139 21 38.4
60	N63 46 15.8
	W139 21 38.6
63	N63 46 15.8
	W139 21 38.8
66	N63 46 15.8
	W139 21 39.0
69	N63 46 15.8
	W139 21 39.2
72	N63 46 15.7
	W139 21 39.4
75	N63 46 15.7
	W139 21 39.6
78	N63 46 15.7
	W139 21 39.8
81	N63 46 15.7
	W139 21 40.1
84	N63 46 15.7
	W139 21 40.3
87	N63 46 15.6
	W139 21 40.5
90	N63 46 15.6
	W139 21 40.7

Profile [m]	Latitude / Longitude
93	N63 46 15.6
	W139 21 40.8
96	N63 46 15.6
	W139 21 41.1
99	N63 46 15.5
	W139 21 41.2
102	N63 46 15.5
	W139 21 41.4
105	N63 46 15.5
	W139 21 41.7
108	N63 46 15.5
	W139 21 41.8
111	N63 46 15.4
	W139 21 42.1
114	N63 46 15.4
	W139 21 42.2
117	N63 46 15.4
	W139 21 42.5
120	N63 46 15.4
	W139 21 42.7
123	N63 46 15.3
	W139 21 42.9
126	N63 46 15.3
	W139 21 43.1
129	N63 46 15.3
	W139 21 43.4
132	N63 46 15.2
	W139 21 43.6
135	N63 46 15.2
	W139 21 43.7
138	N63 46 15.2

Profile [m]	Latitude / Longitude
	W139 21 43.9
141	N63 46 15.2
	W139 21 44.1
144	N63 46 15.2
	W139 21 44.3
147	N63 46 15.2
	W139 21 44.5
150	N63 46 15.1
	W139 21 44.7
153	N63 46 15.1
	W139 21 45.0
156	N63 46 15.1
	W139 21 45.2
159	N63 46 15.1
	W139 21 45.4
162	N63 46 15.0
	W139 21 45.6
165	N63 46 15.0
	W139 21 45.8
168	N63 46 15.0
	W139 21 46.0
171	N63 46 15.0
	W139 21 46.2
174	N63 46 14.9
	W139 21 46.5
177	N63 46 14.9
	W139 21 46.7
180	N63 46 14.9
	W139 21 46.9
183	N63 46 14.9
	W139 21 47.1

Profile [m]	Latitude / Longitude
186	N63 46 14.9
	W139 21 47.4
189	N63 46 14.9
	W139 21 47.5
192	N63 46 14.8
	W139 21 47.8
195	N63 46 14.8
	W139 21 48.0
198	N63 46 14.8
	W139 21 48.3
201	N63 46 14.7
	W139 21 48.5
204	N63 46 14.7
	W139 21 48.7
207	N63 46 14.7
	W139 21 48.9
210	N63 46 14.7
	W139 21 49.2
213	N63 46 14.6
	W139 21 49.3
216	N63 46 14.6
	W139 21 49.5
219	N63 46 14.5
	W139 21 49.8
222	N63 46 14.5
	W139 21 50.0

Cost

Arctic Geophysics Inc.

Geophysical Surveys • Prospecting • Consulting

Invoice # 201009261

Date: September 26th , 2010

Services provided:

Quantity	Description	Amount $CAN
Geophysical Survey		
1 1/4 days	Geoelectrical 2D-Resistivity Survey @ $ CAN 600.00 / day	750.00
1 day	Report @ $CAN 200.00 / day	200.00
1	Printing, Postage	50.00
	NET Amount	**$1,000.00**
GST Number 846363216RT0001	**G.S.T.**	**$ 50.00**
	Total Due	**$1,050.00**