



**Geophysical Survey with 2D Resistivity
12th July Creek, Yukon**

N61 11.308, W137 59.707

FOR

Malcolm Journey

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FROM

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WORK PERFORMED

1st - 4th June 2012

DATE OF REPORT

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Table of Contents

1. Introduction	3
2. Crew	3
3. Claims	3
4. Access.....	3
5. Geophysical Methods	3
6. Use of Geophysical Methods	5
6.1. Instrumentation	5
6.2. Data Acquisition.....	5
6.3. Processing	6
6.4. Interpretation	6
7. Profile image	6
8. Line Arrangement	7
9. Geophysical Implications	7
10. Placer Targets.....	7
11. Survey Map	9
12. Profiles: Interpretation / Recommendations.....	10
13. Qualifications	20
14. Appendix	21
Literature	21
Geophysical Data Table.....	22
Costs.....	23
GPS-Data	24

1. Introduction

This geophysical investigation was done for Malcolm Journey, Peninsula Cutting & Coring Inc., at 12th July Creek.

The survey, using 2D Resistivity /IP, was conducted to prospect the ground for placer mining interests. The geophysical prospecting program was focussed on measuring and interpreting the following placer-related subsurface characteristics:

1. Depth and topography of bedrock
Paleochannels, terraces
2. Sedimentary stratification
3. Groundwater, permafrost
4. Mining/prospecting history

The ground was tested with four measuring lines with a length of up to 480m and a depth of 90m. The fieldwork was done from 1st - 4th June 2012.

2. Crew

Survey Leader: Stefan Ostermaier
Field Assistant: Franz Piechotta
Documentation: Philipp Moll

3. Claims

Grant Number	Tenure	#	Owner
IW00328	Prospecting Lease (1Mile)	-	Malcolm Journey
IW00350	Ditto (3 Miles)	-	Yvonne Journey

4. Access

The mining area was reached via mining road.

5. Geophysical Methods

Resistivity is not a time domain geophysical method such as Ground Penetrating Radar or Seismic. Resistivity measures a material property. In the Resistivity model the different underground zones are

material-dependently differentiated according to their electrical conductivity. Thus, Resistivity promises good chances in respect of measuring the kind and character of the subsurface materials as well as the groundwater distribution, which would be of interest for placer mining. The equipment used (see below) allows for measuring of layer interfaces in depths from 0.5m to 100m by varying the electrode spacing. – Therefore, this prospecting concept is based on the use of 2D Resistivity.



Figure 1: 2D Resistivity/IP measurement, Stefan Ostermaier, Arctic Geophysics Inc., Yukon 2009 (Moll)

Magnetics is based on the characteristic of the earth's magnetic field to induce all matter, magnetic or non-magnetic, with magnetic properties (magnetic susceptibility). Rocks and other objects show a different magnetization depending on their material composition. Magnetics is a reliable method for investigating primary and secondary deposits. The measurability of gold placers depends on the ratio of the depth to the concentration of signal inducing, heavy placer minerals, especially magnetite.

6. Use of Geophysical Methods

6.1. Instrumentation

Resistivity

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

- “4 POINT LIGHT” EARTH RESISTIVITY METER¹
- 96 ELECTRODE CONTROL MODULES²
- 96 STAINLESS STEEL ELECTRODES³
- 480m MULTICORE CABLE: CONNECTOR SPACING: 5m⁴

This system weighs approximately 120 kg which is about one third of regular standard equipment. It can be run with a 12V lead battery. The equipment facilitates high mobility and rapid data acquisition with a small crew.

Magnetics

We use a GEMSYS GSM-19 GW with differential GPS as a walking magnetometer, and a GEMSYS GSM-19 as a base station.

6.2. Data Acquisition

Resistivity

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.

The 2D Resistivity imaging system, used for this survey, allows measurements with a depth of up to 100m. With a depth to bedrock of more than 6m, an electrode spacing of 5m can be used for placer surveys. This allows the measuring of large profile lengths in short time with a horizontal measuring resolution of 2.5m. This quantification has proven itself to be reliable in the determination of the bedrock topography and sedimentary arrangement for placer investigation at the most environmental conditions.

¹ Constructed and produced by LGM (Germany)

² Ditto

³ Constructed and produced by GEOANALYSIS.DE (Germany)

⁴ Ditto

The Schlumberger array, used in this geoelectrical survey, is appropriate to measure subsurface conditions predominantly showing a horizontal zoning of the ground materials.

Magnetics

Magnetic data were taken manually at the electrode locations, every 5 meter.⁵ Thus, the geoelectrical profiles and the magnetogram do spatially coincide 100%.

The walking magnetometer was synchronized with a base station.

6.3. Processing

Resistivity

The measured Resistivity/IP data were processed with the **RES2DINV** inversion program⁶.

Magnetics

The magnetic data were processed with the **GemLink5.0.0** program.

The magnetic data were normalized at 56 000 n Tesla

6.4. Interpretation

The resistivity profile is the basic source for the interpretation of placer-related subsurface aspects of overburden and bedrock. The IP model supports the interpretation of the resistivity profile.

The interpretation of the data should be verified by physical prospecting methods such as drilling, trenching, or test pitting, or shafting since this information about the subsurface cannot be guaranteed.

7. Profile image

In the **Resistivity profile** the interpreted layer interfaces are marked with a black line. 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.⁷

The **graphical markings** showing the interpreted layer interfaces in the profiles (using a black line) are done according to the data structure in the profile itself. This means: the layers there will also show up

⁵ Plastic probes were set instead of the stainless steel electrodes.

⁶ Produced by GEOTOMO SOFTWARE (Malaysia)

⁷ Program settings in RES2DINV for modifying the layer thickness do frequently not work well for our use and could falsify the profile. That's why this mode was not used.

approximately 15% thicker than they are expected in reality. In the interpretation text, the layer thicknesses and depths have been recalculated to the expected real values.

8. Line Arrangement

The **line locations** were discussed and decided upon by Stefan Ostermaier from Arctic Geophysics Inc. and Malcolm Journey.

9. Geophysical Implications

The different components of the overburden (glacial till, glaciofluvial deposits, and colluvium) can hardly be differentiated in the Resistivity profiles, because they show quite similar resistivity data and are sometimes too thin to be measured. The reason for the similar resistivity of the overburden materials is the relatively high amount of fine material such as silt and clay (matrix) of the sediments. The rock components of the gravels, clasts, or boulders show low resistivity itself and support the similarity of the resistivity.

The interface between overburden and bedrock was clearly measured and realistically interpreted in the most parts of the resistivity images.

10. Placer Targets⁸

Clay-layers, too thin to be measured in the resistivity profile, could act as “false bedrock”: The upper part of the clay-layer itself and the material closely on top of it could contain concentrations of placer gold.

Clay layers can also protect the deposits underneath from glacial erosion. So, the material below a clay-rich layer could have preserved older placers.

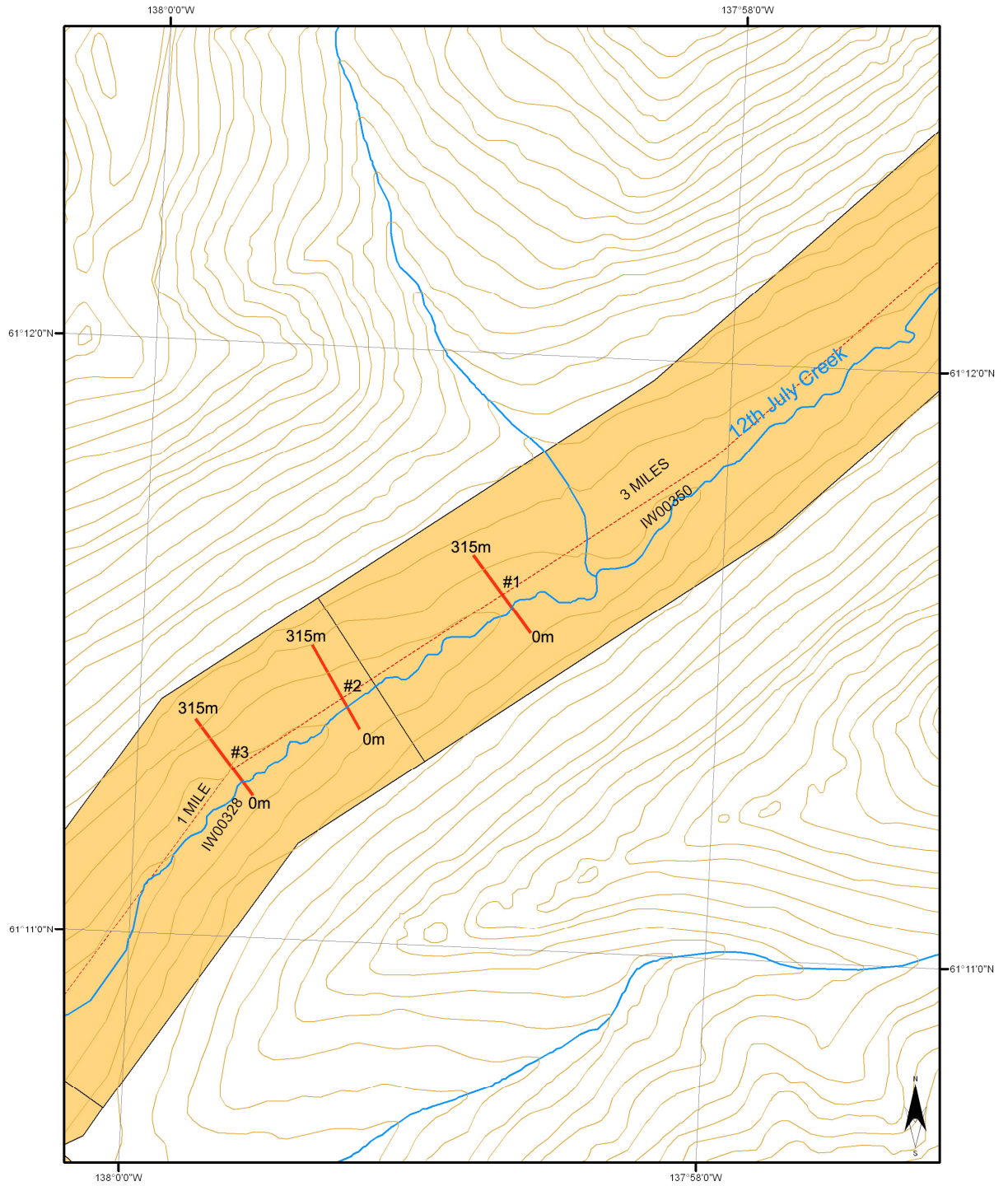
Normally, glaciofluvial gravels have higher potential for placer gold deposits than till, especially if they are reworking pre-existing placers or eroding and re-depositing gold-bearing bedrock.

The general case is that glacial till will incorporate placer gold into it and dilute rich paystreaks into a larger volume lower grade deposit which may be uneconomic. So placer gold in till is actually fairly rare in most settings, and usually only occurs when the glacial activity is right on top of a bedrock gold source. But this actually may be the case in 12th Mile Creek (and especially Dublin Gulch).

⁸ Discussion between William LeBarge and Philipp Moll

All of the sandy and gravelly sediments at 12th Mile Creek valley can potentially contain placer gold. Each new sediment discovered when doing physical prospecting would be worth sampling.

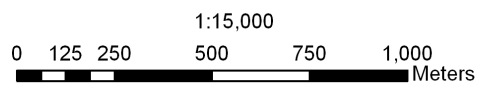
11. Survey Map



Legend

- contour line
- water course
- water body
- placer baseline
- measuring line
- placer claims
- prospecting lease

12th July Creek Survey Map
115H04



12. Profiles: Interpretation / Recommendations

The interpretation of the geophysical profiles is printed in black letters.

The recommendations for physical prospecting are printed in blue letters.

12th July Creek 01

2D Resistivity/IP, Schlumberger array
64 Electrodes: spacing 5m, Horizontal resolution 2.5m
Horizontal and vertical measure in [meter], Iteration error in [%]
Vertical exaggeration in model section display = 1.00
Data acquisition: Stefan Ostermaier, Franz Piechotta 2nd June 2012
Processing: Stefan Ostermaier, 2nd June 2012
Arctic Geophysics Inc., Yukon

The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.

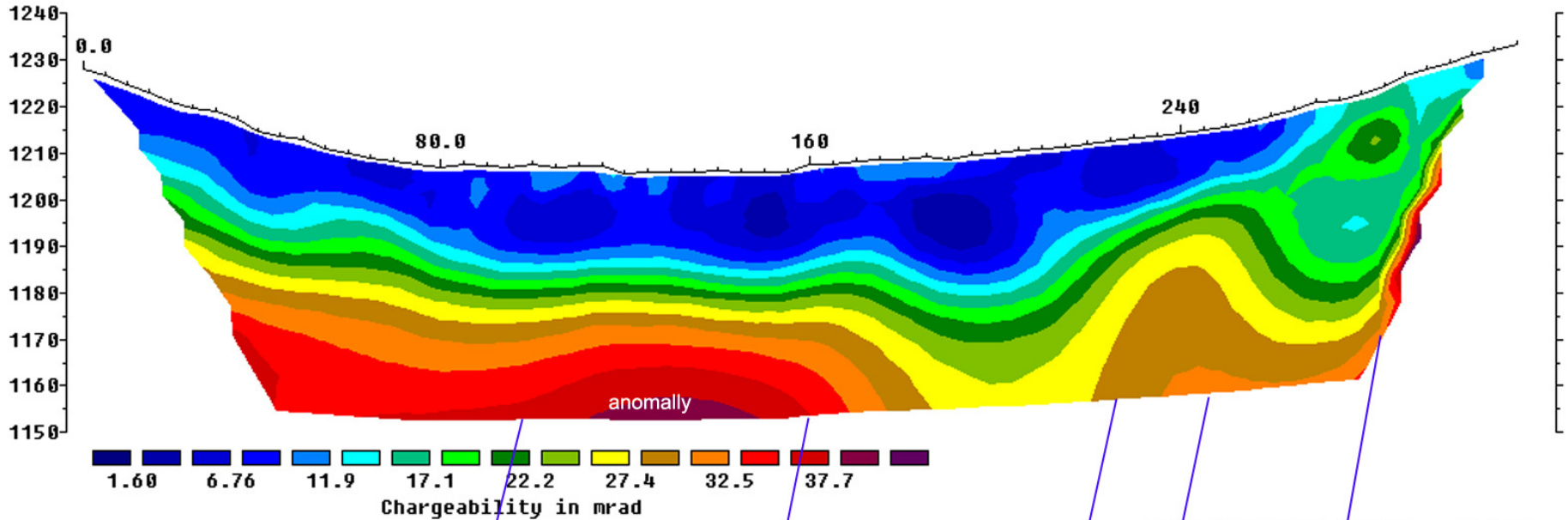
Arctic Geophysics Inc.



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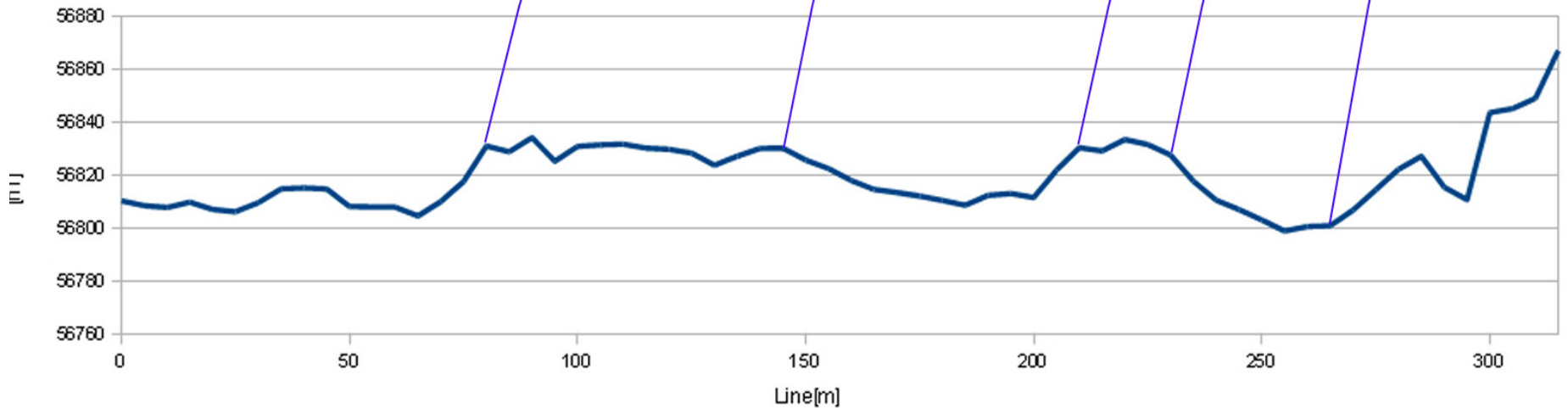
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Phone: 867-993-3671 (Cell), info@arctic-geophysics.com

Model IP with topography
Iteration 5 Abs. error = 1.4



12th July Creek - Line01 - Total Field Magnetics

Datum point every 5m, data acquisition June 2nd 2012;

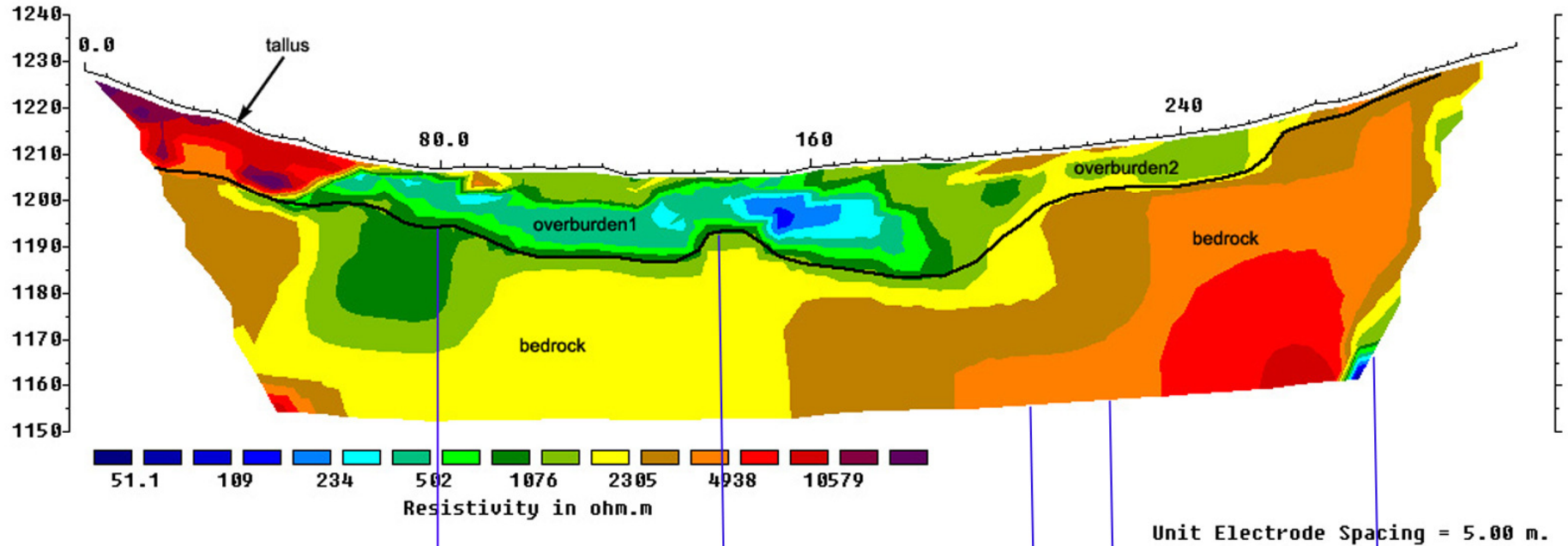


12th July Creek 01

2D Resistivity/IP, Schlumberger array
 64 Electrodes: spacing 5m, Horizontal resolution 2.5m
 Horizontal and vertical measure in [meter], Iteration error in [%]
 Vertical exaggeration in model section display = 1.00
 Data acquisition: Stefan Ostermaier, Franz Plechotta 2nd June 2012
 Processing: Stefan Ostermaier, 2nd June 2012
 Arctic Geophysics Inc., Yukon

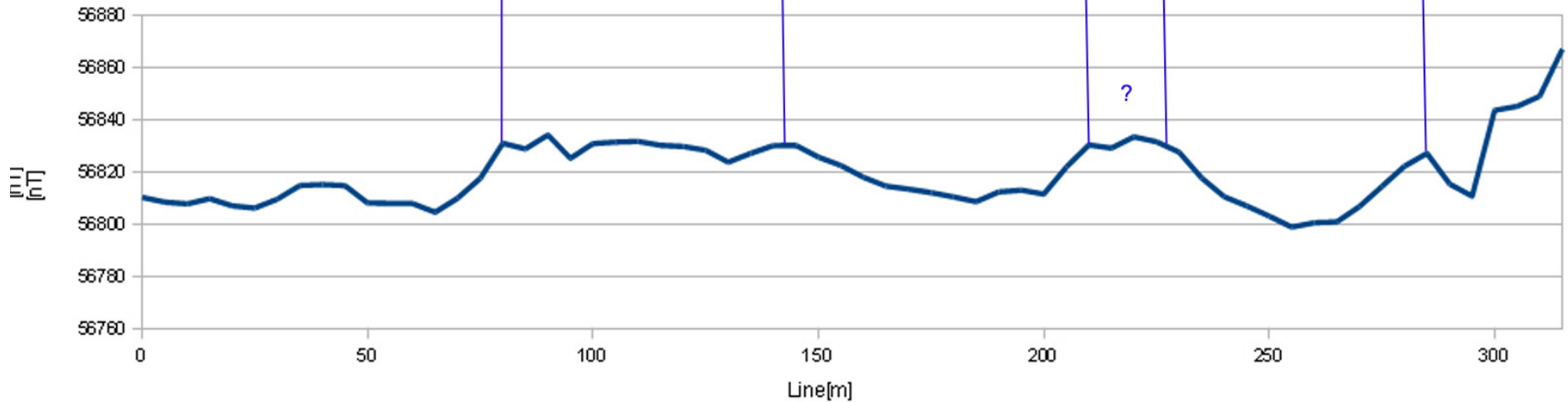
The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.

Model resistivity with topography
 Elevation Iteration 5 Abs. error = 1.3



12th July Creek - Line01 - Total Field Magnetics

Datum point every 5m, data acquisition June 2nd 2012;



Interpretation

Resistivity profile_01 might show 2-22m of overburden on top of bedrock.

At 0-75m in the bedrock seems to be around 10m deep, covered with tallus (colluvium) or frozen gravel.

After 75m the bedrock seems to drop into a paleo-channel showing its bottom between 100 and 135m. At 125m this channel might be 16m deep (deepest point). The overburden on top of the channel is bi-layered: The topmost green layer, 4m thick, should be less saturated with groundwater. The layer below (green-turquoise) seems to contain much ground water. Both layers could consist of glacial till and glaciofluvial deposits. (These two sediment types cannot be differentiated in the resistivity profile.). The magnetic high at the channel would be an indication for magnetite ("black sand)", which is frequently associated with placer gold in Yukon valleys. [At 12th Miles Creek glaciofluvial gravels have high potential to contain commercial placer gold deposits. Glacial till could contain placer gold near bedrock. We recommend drilling this channel at 110m or 125m. When using an auger drill the gold samples could be falsified because of the higher groundwater amount.](#)

At 150 to 210m the main channel seems to be located. At 185m the channel seems to be around 22m deep (deepest point). At the blue zone the water saturation might be highest. The overburden consists of till and glaciofluvial deposits as well. The lower magnetic signal at the main channel could be caused by the larger bedrock depth.

[The interpreted main channel is a promising target for physical prospecting such a drilling or test pitting. Higher amounts of groundwater are expected, especially at 125m, this could falsify drill samples from an auger drill.](#)

At 220 to 255m a bedrock terrace seems to be located. At 240m it would be 9m deep. The magnetic data are low at this terrace, however, placer gold deposits does not have to be associated with significant amounts of magnetite.

[This spot \(240m\) is a promising target for physical testing/sampling. A test pit dug by excavator seems to be manageable easily since the amount of groundwater is lower at this location. Good samples are expected using an auger drill. Another target for sampling would be at 215m. Here the magnetic data are high which could be a sigh for placer gold on bedrock, about 8m deep.](#)

IP profile_01 supports the interpretation of the main channel.

At the IP profile the spatial structure of the data (depth and location of the ground zones) are shown much rougher than in the Resistivity profile. Thus the data pattern of the IP profile was likely moved to the left of about 20m. If this would be the case, the magnetic highs could correlate with the zones of high chargeability. [The correlation of high IP-data and magnetic data could be caused by ore bodies in the bedrock. Native copper was panned by Malcolm Journey in the upper sediments, which could explain the data. At 130m the drill should go at least 60m deep to check the anomaly.](#)

12th July Creek 02
 2D Resistivity/IP, Schlumberger array
 64 Electrodes: spacing 5m, Horizontal resolution 2.5m
 Horizontal and vertical measure in [meter], Iteration error in [%]
 Vertical exaggeration in model section display = 1.00
 Data acquisition: Stefan Ostermaier, Franz Plechotta 3rd June 2012
 Processing: Stefan Ostermaier, 3rd June 2012
 Arctic Geophysics Inc., Yukon

The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.

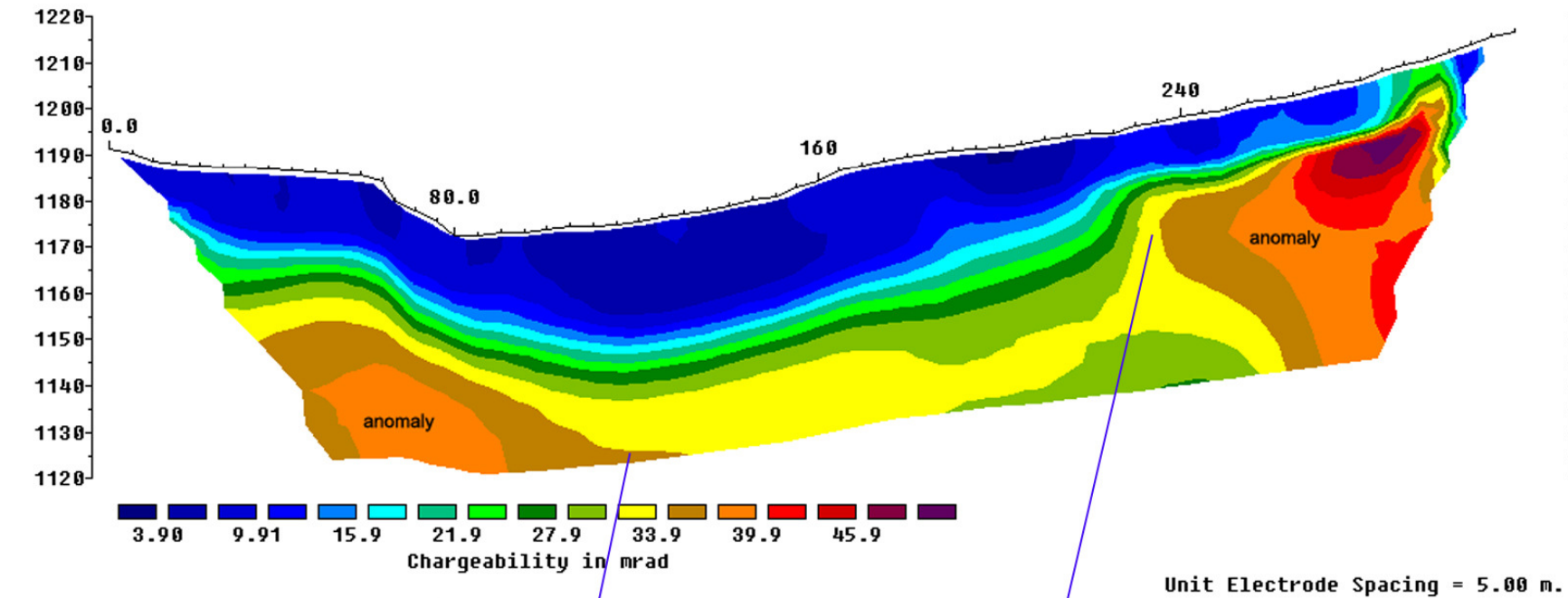
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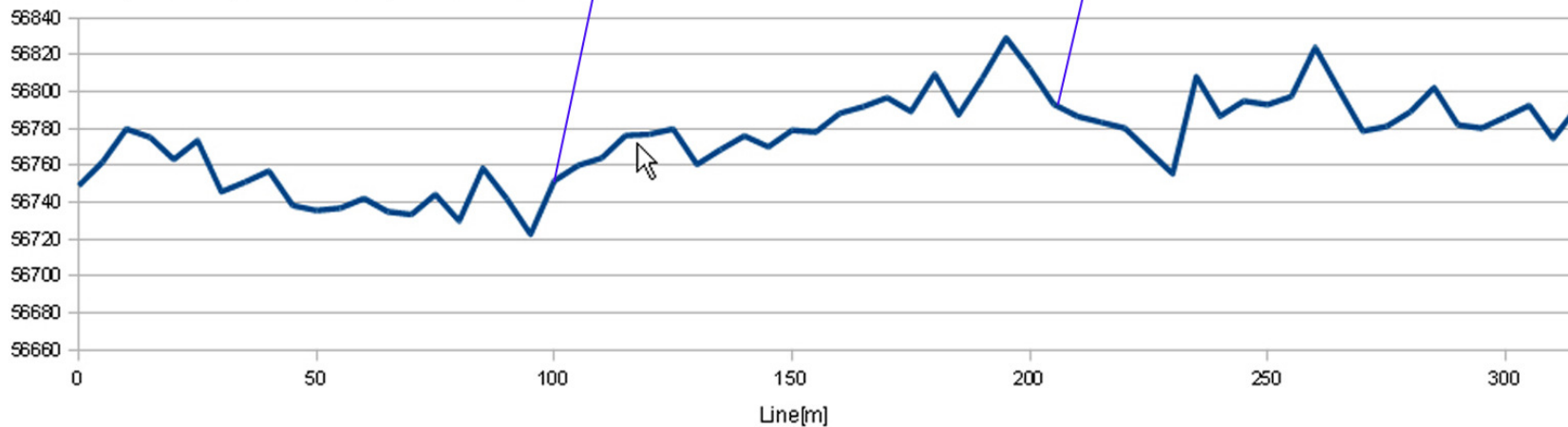
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Model IP with topography
 Iteration 4 Abs. error = 1.6



12th July Creek - Line02 - Total Field Magnetics

Datum point every 5m, data acquisition June 3rd 2012;



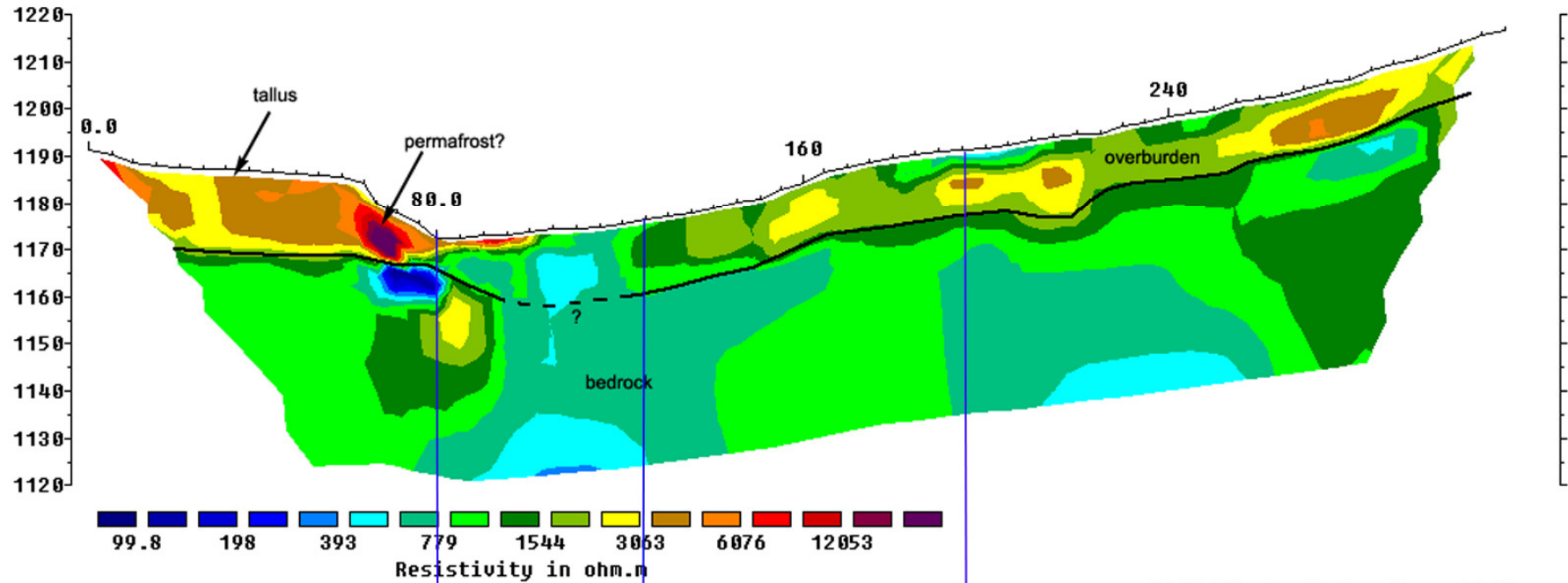
12th July Creek 02
 2D Resistivity/IP, Schlumberger array
 64 Electrodes: spacing 5m, Horizontal resolution 2.5m
 Horizontal and vertical measure in [meter], Iteration error in [%]
 Vertical exaggeration in model section display = 1.00
 Data acquisition: Stefan Ostermaier, Franz Piechotta 3rd June 2012
 Processing: Stefan Ostermaier, 3rd June 2012
 Arctic Geophysics Inc., Yukon

The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.



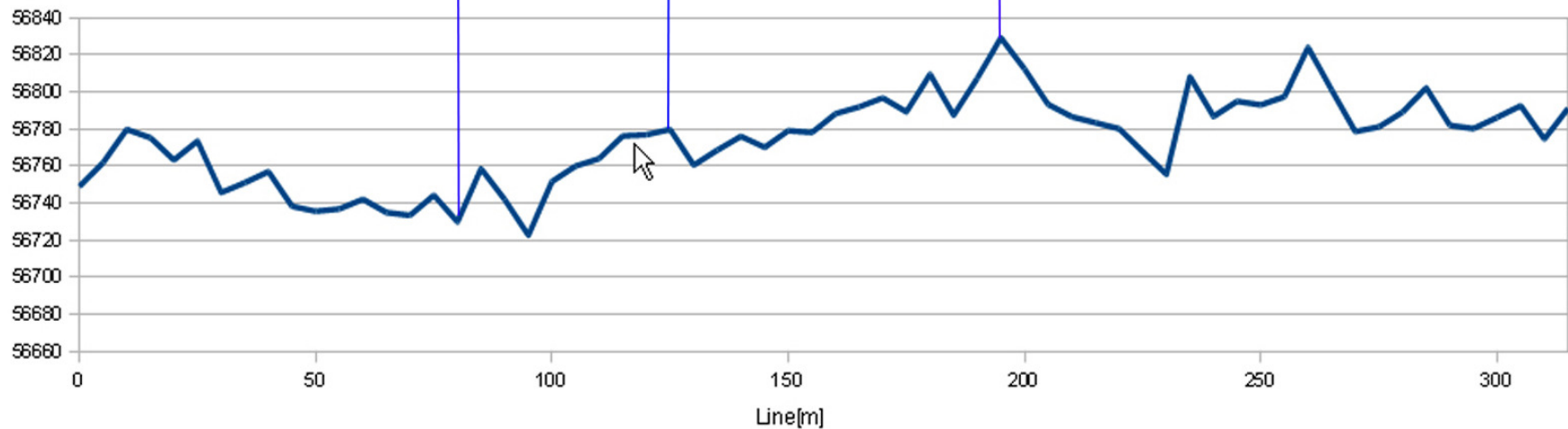
Model resistivity with topography

Elevation Iteration 4 Abs. error = 2.3



Unit Electrode Spacing = 5.00 m.

12th July Creek - Line02 - Total Field Magnetics
 Datum point every 5m, data acquisition June 3rd 2012;



Interpretation

Resistivity profile_02 might show 10-15m of overburden on top of bedrock.

At 0-80m in the bedrock seems to be around 15m, covered with tallus (colluvium) or frozen gravel.

At 80 to 160m the main channel seems to be located. At 105m the channel seems to be around 15m deep (deepest point). In this profile the main channel is shallower because the erosion of the sediments has been higher than in profile_01. This higher erosion can be observed at the surficial topography. In the turquoise zone, the water saturation might be highest. The overburden consist of glacial till and glaciofluvial deposits. (These two sediment types cannot be differentiated in the resistivity profile.). The magnetic data are weakly elevated at the channel, however, the lower magnetic signal at the main channel could be caused by the higher bedrock depth. Also, placer gold deposits do not have to be associated with significant amounts of magnetite.

At 12th Miles Creek glaciofluvial gravels have high potential to contain commercial placer gold deposits. Glacial till could contain placer gold near bedrock. The interpreted main channel is a promising target for physical prospecting such a drilling or test pitting. We recommend the investigation of this channel at 105m (about 16m to bedrock). Higher amounts of groundwater are expected. So when using an auger drill, the gold samples could be falsified because of the higher groundwater amount.

At 215m a small high-channel, 15m deep at 215m, most likely created by glaciofluvial processes, could be located. This channel seems to be covered with colluvium. But on the bottom, near the bedrock, some glaciofluvial material could have been preserved. Possibly the magnetic peak could be a sign for placer gold in this channel.

This spot is a promising target for physical testing. A test pit dug by excavator seems to be possible since the amount of groundwater is lower at this location. When using an auger drill the gold samples could be falsified because of the higher groundwater amount.

At the **IP profile_02** the spatial structure of the data (depth and location of the ground zones) are shown much rougher than in the Resistivity profile. Thus the data pattern of the IP profile could be moved to the left for about 25m. The anomaly on the left side coincides with weakly elevated IP data. In the middle of the profile the relatively high magnetic data could be caused by ore zones deeper in the ground than shown on the profile. The IP-anomaly on the right side of the profile coincides with relatively high chargeability.

The correlation of high IP-data and magnetic data could be caused by ore bodies in the bedrock. Native copper was panned by Malcolm Journey in the upper sediments which could explain the data.

At 130m the drill should go at least 60m deep to check the anomaly.

12th July Creek 03

2D Resistivity/IP, Schlumberger array
 64 Electrodes: spacing 5m, Horizontal resolution 2.5m
 Horizontal and vertical measure in [meter], Iteration error in [%]
 Processing: Stefan Ostermaier, 4th June 2012
 Arctic Geophysics Inc., Yukon

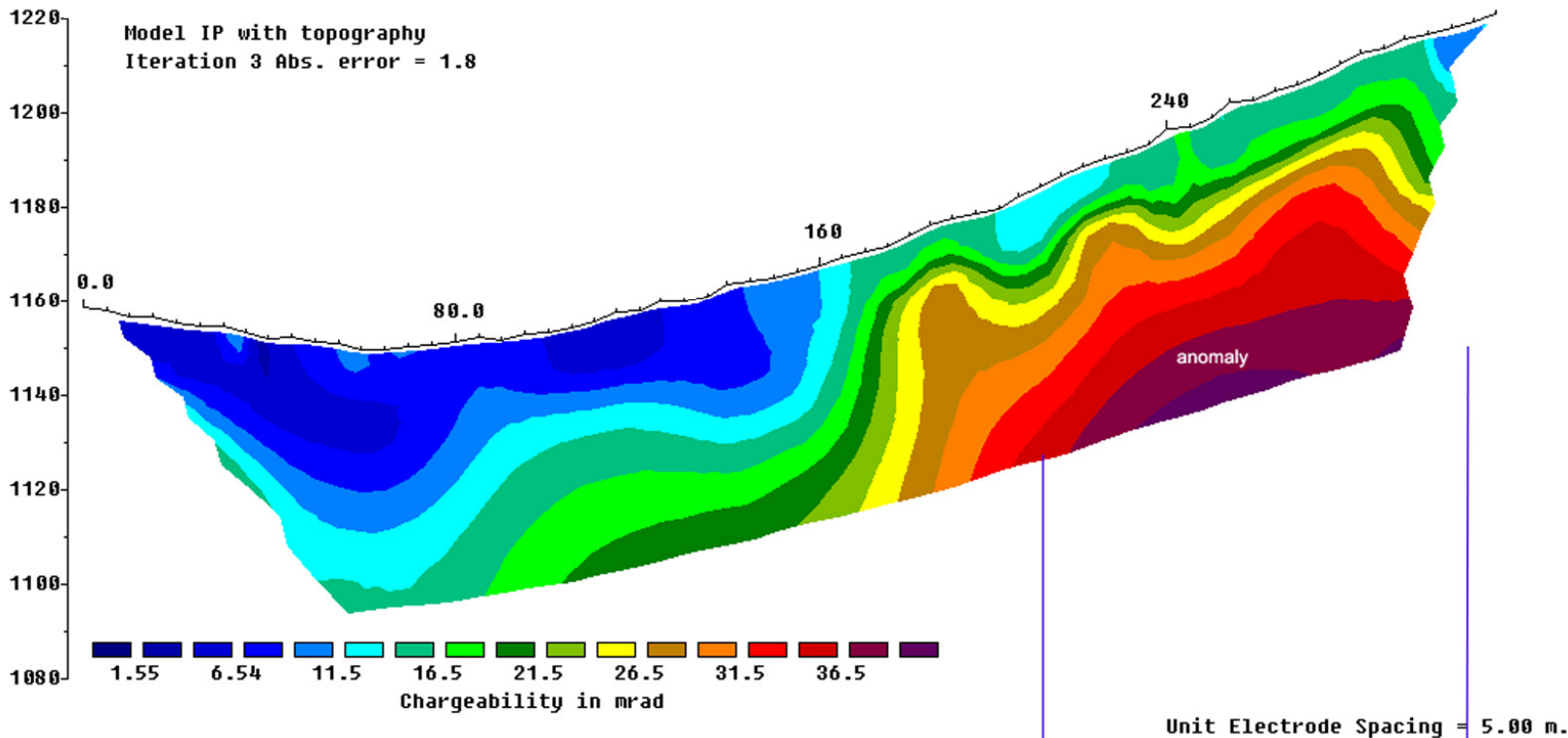
The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.

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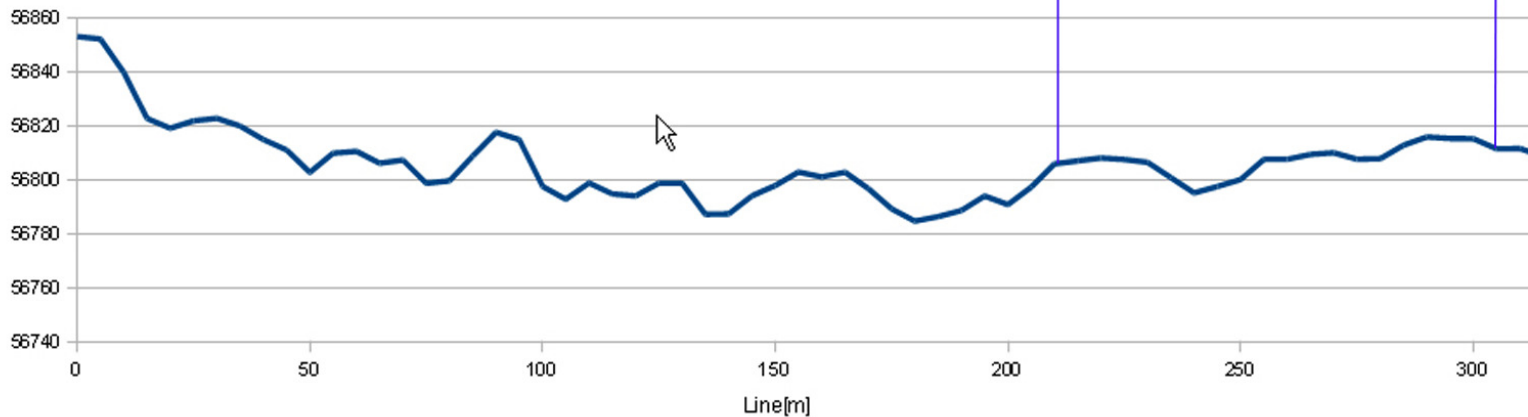
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12th July Creek - Line03 - Total Field Magnetics

Datum point every 5m, data acquisition June 4th 2012;



12th July Creek 03

2D Resistivity/IP, Schlumberger array
 64 Electrodes: spacing 5m, Horizontal resolution 2.5m
 Horizontal and vertical measure in [meter], Iteration error in [%]
 Vertical exaggeration in model section display = 1.00
 Data acquisition: Stefan Ostermaier, Franz Plechotta 4th June 2012
 Processing: Stefan Ostermaier, 4th June 2012
 Arctic Geophysics Inc., Yukon

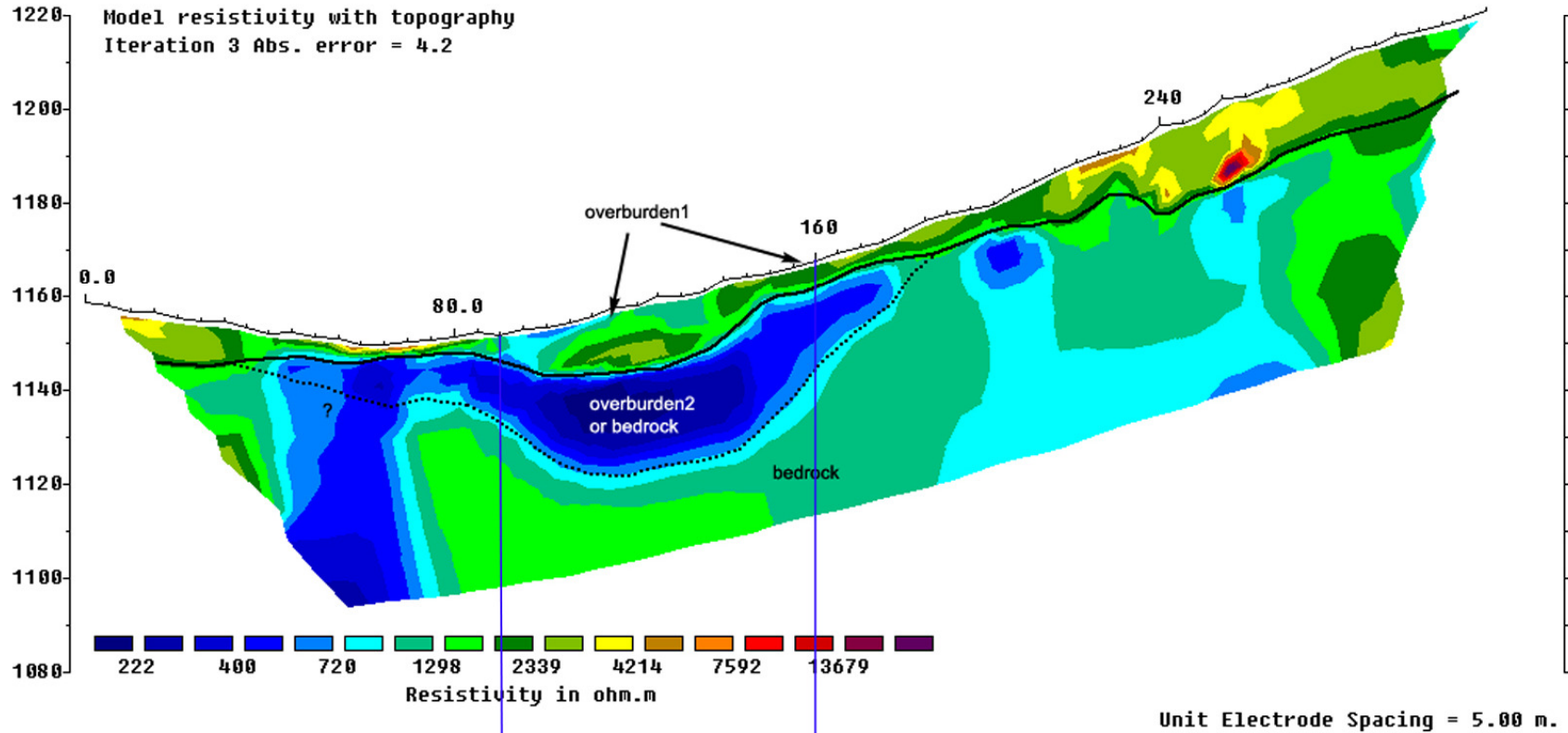
The profile might show the ground-layers up to approximately 15% thicker than expected in reality. This 2D Resistivity measuring result is an interpretation of geophysical data. The verification of the interpretation by drilling, trenching, or shafting is recommended.

Arctic Geophysics Inc.

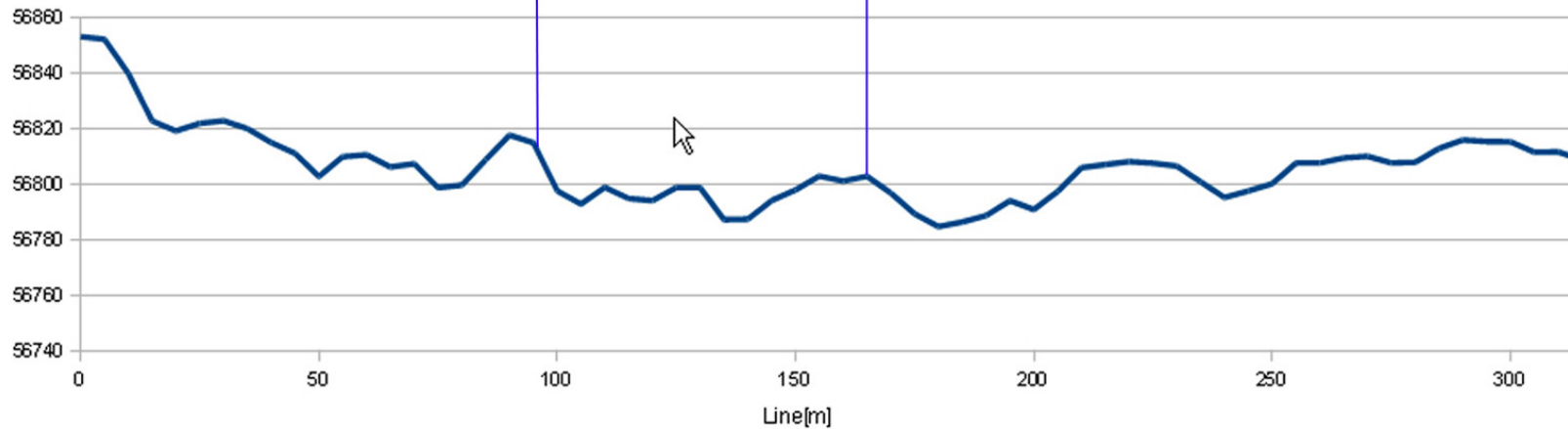


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12th July Creek - Line03 - Total Field Magnetics
 Datum point every 5m, data acquisition June 4th 2012;



Interpretation

Resistivity profile_03 might show 4-11m of overburden on top of bedrock. The overburden seems to be much eroded by the glacier.

At 0 - 85m the overburden seems to thin out towards the valley bottom. At 55m the bedrock seems to be 2.5m deep. Alternatively the bedrock could drop to about 20m depth at 55m; this interpretation would be supported by the IP profile. The overburden consists of glacial till and glaciofluvial deposits. (These two sediment types cannot be differentiated in the resistivity profile.). [At 12th Miles Creek glaciofluvial gravels have high potential to contain commercial placer gold deposits. Glacial till could contain placer gold near bedrock.](#)

[At 90 -140m a channel seems to be located. At 105m the channel might be 11m deep.](#) This channel was most likely created by glaciofluvial processes. It seems to be covered with a domination of glaciofluvial deposits besides inter-layers of till and colluvium. But on the bottom, near the bedrock, a smaller portion of glaciofluvial material could have been preserved. The magnetogram does not show higher data around the channel since the amount of magnetite does not seem to be high enough to be measured. [This spot is a promising target for physical testing. A test pit dug by excavator seems to be manageable easily since the amount of groundwater is lower at this location. When using an auger drill, the samples are expected to be good because of the lower amount of groundwater.](#)

After 140m the bedrock seems to be around 15m, covered with tallus (colluvium) or frozen gravel. The magnetic data is hardly elevated around the channel, however, placer gold deposits do not have to be associated with significant amounts of magnetite.

At 240m there could be a high-channel, 15m deep, filled with the local specific overburden.

In the **IP profile_03** the spatial structure of the data (depth and location of the ground zones) are shown much rougher than in the Resistivity profile. The IP-anomaly on the right side of the profile weakly coincides with higher magnetic data.

[The correlation of high IP-data and magnetic data could be caused by ore bodies in the bedrock. Native copper was panned by Malcolm Journey in the upper sediments which could explain the data.](#)

[At 240m the drill should go at least 60m deep to check the anomaly.](#)

13. Qualifications



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- Study of geology, University of Freiburg, Germany
- Visit of geophysical field courses, University of Karlsruhe and University of Stuttgart, Germany
- Working for Arctic Geophysics Inc. since June 2007 (foundation)
Geophysical field surveys using 2D Resistivity, Induced Polarization, Magnetics: Data acquisition, processing, interpretation, documentation
- Geophysical surveying for Mining Exploration in the Yukon since 2005
- Geological Prospecting for precious metals and minerals in the Yukon, NWTs, and Alaska since 1989
- Publications:
 - A) Numerous Assessment Reports about geophysical surveys done for Yukon mining companies, filed at Yukon Mining Recorder
 - B) Geophysical survey (45 field days) for Yukon Government: Yukon Geological Survey, Publication:
<http://www.geology.gov.yk.ca/recent.html> Open Files: Moll, P., & Ostermaier, S., 2010. 2D Resistivity/IP Data Release for Placer Mining and shallow Quartz Mining - Yukon 2010. Yukon Geological Survey Miscellaneous Report MR-4. [PDF Report](#) [10.3 MB Data Profiles [45.4 MB 



Philipp Moll

14. Appendix

Literature

Chesterman W. Ch. and Lowe K.E. Field Guide to Rocks and Minerals - North America, Chanticleer Press Inc. New York 2007

Evans A.M. Erzlagerstättenkunde, Ferdinand Enke Verlag Stuttgart (1992)

Griffiths, D.H.,Turnbull, J. and Olayinka,A.I. Two dimensional resistivity mapping with a computer-controlled array, First Break 8: 121-129 (1990)

Griffiths, D.H. and Barker, R.D. Two-dimensional resistivity imaging and modeling in areas of complex geology. Journal of Applied Geophysics 29 : 211 - 226. (1993)

Keller, G.V.and Frischknecht, F.C. Electrical methods in geophysical prospecting. Oxford: Pergamon Press Inc. (1966)

Loke M.H. and Barker R.D. Rapid least-squares inversion of apparent resistivity pseudosections by a quasi-Newton method. Geophysical Prospecting 44: 131-152 (1996)

Ostensoe Eric A. "Report on the Gladstone Creek, Placer Gold Property, Kluane Area" (Feb 1984), for: CATEAR RESOURCES LTD.

Press F., Siever R., Grotzinger J., Thomas H.J. Understanding Earth, W.H. Freeman and Company, New York (2004)

Robb L. Introducing to Ore-Forming Processes, Backwell Science Ltd., 2005

Maps

Energy, Mines and Resources: CSW_MINING.PLACER_LANDUSE_PERMIT_POLY_50K

Government of Canada, Natural Resources Canada, Centre for Topographic Information: 115H 04

Geophysical Data Table

Rock type	Resistivity range (Ωm)
Granite porphyry	4.5×10^3 (wet) – 1.3×10^6 (dry)
Feldspar porphyry	4×10^3 (wet)
Syenite	10^2 – 10^6
Diorite porphyry	1.9×10^3 (wet) – 2.8×10^4 (dry)
Porphyrite	10 – 5×10^4 (wet) – 3.3×10^3 (dry)
Carbonatized porphyry	2.5×10^3 (wet) – 6×10^4 (dry)
Quartz diorite	2×10^4 – 2×10^6 (wet) – 1.8×10^5 (dry)
Porphyry (various)	60 – 10^4
Dacite	2×10^4 (wet)
Andesite	4.5×10^4 (wet) – 1.7×10^2 (dry)
Diabase (various)	20 – 5×10^7
Lavas	10^2 – 5×10^4
Gabbro	10^3 – 10^6
Basalt	10 – 1.3×10^7 (dry)
Olivine norite	10^3 – 6×10^4 (wet)
Peridotite	3×10^3 (wet) – 6.5×10^3 (dry)
Hornfels	8×10^3 (wet) – 6×10^7 (dry)
Schists (calcareous and mica)	20 – 10^4
Tuffs	2×10^3 (wet) – 10^5 (dry)
Graphite schist	10 – 10^2
Slates (various)	6×10^2 – 4×10^7
Gneiss (various)	6.8×10^4 (wet) – 3×10^6 (dry)
Marble	10^2 – 2.5×10^8 (dry)
Skarn	2.5×10^2 (wet) – 2.5×10^8 (dry)
Quartzites (various)	10 – 2×10^8
Consolidated shales	20 – 2×10^3
Argillites	10 – 8×10^2
Conglomerates	2×10^3 – 10^4
Sandstones	1 – 6.4×10^8
Limestones	50 – 10^7
Dolomite	3.5×10^2 – 5×10^3
Unconsolidated wet clay	20
Marls	3 – 70
Clays	1 – 100
Oil sands	4 – 800

Costs

Arctic Geophysics Inc.



Geophysical Surveys • Prospe

Malcolm Journeay
Ruby Range Mining Inc.

Arctic Geophysics Inc.
Box 747
Dawson City, Yukon
Y0B-1G0, Canada
Phone: 867-993-3671 (Cell)
info@arctic-geophysics.com
www.arctic-geophysics.com

Resistivity/Magnetics Survey, 12th Miles Creek
Invoice Number: 20120626

Date: 26th June 2012

Quantity	Description	Amount \$CAN
Mob/Demob		
5 days	Vehicle \$ 70.-- / day - [minus 1 day = 50% share]	175.--
1760 Km	\$ 0.55 / km [50%] share	484.--
2 days	Driving \$ 450.-- / day, operator + assistant- [50% share] Dawson – 12 th of Miles Creek – Dawson - [50%]Share	450.--
Geophysical Survey		
3 days	Geoelectrical 2D-Resistivity Imaging System + two magnetometer + survey leader \$ 880.-- / day	2 640.--
4 days	Field Assistant 250.--	1000.--
1 day	Fieldwork survey leader 400.--	400.--
1 day	First Documentation \$ 350.-- / day	350.--
2 days	Writing report \$ 350.-- / day Printing / Binding /Shipping	700.-- 60.--
		NET Amount \$ 6 259.--
GST Number 846363216RT0001		G.S.T. (5%) \$ 312.95
Total Due		\$ 6 571.95

GPS-Data

12th July Creek_Line01

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
1	0.0	N61 11.532 W137 58.655	3	*
2	5.0	N61 11.536 W137 58.652	3	
3	10.0	N61 11.539 W137 58.657	3	
4	15.0	N61 11.541 W137 58.661	3	
5	20.0	N61 11.541 W137 58.664	3	
6	25.0	N61 11.543 W137 58.668	3	
7	30.0	N61 11.545 W137 58.672	3	
8	35.0	N61 11.547 W137 58.676	3	
9	40.0	N61 11.549 W137 58.677	3	
10	45.0	N61 11.551 W137 58.680	3	
11	50.0	N61 11.552 W137 58.685	3	
12	55.0	N61 11.554 W137 58.687	3	
13	60.0	N61 11.556 W137 58.692	3	
14	65.0	N61 11.558 W137 58.696	3	
15	70.0	N61 11.561 W137 58.702	3	
16	75.0	N61 11.563 W137 58.704	3	
17	80.0	N61 11.564 W137 58.705	3	
18	85.0	N61 11.565 W137 58.711	3	
19	90.0	N61 11.568 W137 58.715	3	
20	95.0	N61 11.570 W137 58.718	3	
21	100.0	N61 11.572 W137 58.721	3	
22	105.0	N61 11.573 W137 58.723	3	
23	110.0	N61 11.576 W137 58.728	3	
24	115.0	N61 11.577 W137 58.731	3	
25	120.0	N61 11.579 W137 58.734	3	
26	125.0	N61 11.581 W137 58.738	3	
27	130.0	N61 11.583 W137 58.740	3	
28	135.0	N61 11.586 W137 58.744	3	
29	140.0	N61 11.587 W137 58.746	3	
30	145.0	N61 11.589 W137 58.749	3	
31	150.0	N61 11.591 W137 58.755	3	
32	155.0	N61 11.593 W137 58.758	3	
33	160.0	N61 11.596 W137 58.762	3	*
34	165.0	N61 11.598 W137 58.765	3	
35	170.0	N61 11.600 W137 58.769	3	
36	175.0	N61 11.602 W137 58.774	3	
37	180.0	N61 11.605 W137 58.778	3	

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
38	185.0	N61 11.606 W137 58.781	3	
39	190.0	N61 11.608 W137 58.784	3	
40	195.0	N61 11.610 W137 58.789	3	
41	200.0	N61 11.612 W137 58.791	3	
42	205.0	N61 11.613 W137 58.794	3	
43	210.0	N61 11.616 W137 58.799	3	
44	215.0	N61 11.618 W137 58.801	3	
45	220.0	N61 11.620 W137 58.805	3	
46	225.0	N61 11.622 W137 58.807	3	
47	230.0	N61 11.624 W137 58.810	3	
48	235.0	N61 11.625 W137 58.812	3	
49	240.0	N61 11.628 W137 58.819	3	
50	245.0	N61 11.630 W137 58.823	3	
51	250.0	N61 11.632 W137 58.826	3	
52	255.0	N61 11.635 W137 58.829	3	
53	260.0	N61 11.636 W137 58.834	3	
54	265.0	N61 11.638 W137 58.836	3	
55	270.0	N61 11.640 W137 58.838	3	
56	275.0	N61 11.642 W137 58.840	3	
57	280.0	N61 11.644 W137 58.845	3	
58	285.0	N61 11.648 W137 58.850	3	
59	290.0	N61 11.649 W137 58.854	3	
60	295.0	N61 11.651 W137 58.855	3	
61	300.0	N61 11.652 W137 58.858	3	
62	305.0	N61 11.655 W137 58.862	3	
63	310.0	N61 11.658 W137 58.864	3	
64	315.0	N61 11.659 W137 58.868	3	*

12th July Creek_Line02

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
1	0.0	N61 11.358 W137 59.233	3	*
2	5.0	N61 11.361 W137 59.235	3	
3	10.0	N61 11.363 W137 59.238	3	
4	15.0	N61 11.365 W137 59.241	3	
5	20.0	N61 11.367 W137 59.244	3	
6	25.0	N61 11.370 W137 59.246	3	
7	30.0	N61 11.372 W137 59.248	3	
8	35.0	N61 11.375 W137 59.250	3	
9	40.0	N61 11.377 W137 59.253	3	
10	45.0	N61 11.379 W137 59.256	3	
11	50.0	N61 11.381 W137 59.259	3	
12	55.0	N61 11.384 W137 59.264	3	
13	60.0	N61 11.386 W137 59.267	3	
14	65.0	N61 11.387 W137 59.270	3	
15	70.0	N61 11.390 W137 59.272	3	
16	75.0	N61 11.393 W137 59.274	3	
17	80.0	N61 11.394 W137 59.276	3	
18	85.0	N61 11.397 W137 59.279	3	
19	90.0	N61 11.399 W137 59.279	3	
20	95.0	N61 11.401 W137 59.283	3	
21	100.0	N61 11.403 W137 59.287	3	
22	105.0	N61 11.406 W137 59.289	3	
23	110.0	N61 11.407 W137 59.291	3	
24	115.0	N61 11.409 W137 59.294	3	
25	120.0	N61 11.411 W137 59.297	3	
26	125.0	N61 11.414 W137 59.302	3	
27	130.0	N61 11.416 W137 59.303	3	
28	135.0	N61 11.419 W137 59.307	3	
29	140.0	N61 11.421 W137 59.309	3	
30	145.0	N61 11.423 W137 59.312	3	
31	150.0	N61 11.426 W137 59.314	3	*
32	155.0	N61 11.428 W137 59.317	3	
33	160.0	N61 11.430 W137 59.319	3	
34	165.0	N61 11.432 W137 59.321	3	
35	170.0	N61 11.435 W137 59.324	3	
36	175.0	N61 11.437 W137 59.328	3	
37	180.0	N61 11.439 W137 59.331	3	

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
38	185.0	N61 11.441 W137 59.332	3	
39	190.0	N61 11.443 W137 59.335	3	
40	195.0	N61 11.446 W137 59.339	3	
41	200.0	N61 11.448 W137 59.343	3	
42	205.0	N61 11.450 W137 59.347	3	
43	210.0	N61 11.452 W137 59.350	3	
44	215.0	N61 11.454 W137 59.351	3	
45	220.0	N61 11.456 W137 59.355	3	
46	225.0	N61 11.458 W137 59.358	3	
47	230.0	N61 11.460 W137 59.361	3	
48	235.0	N61 11.463 W137 59.364	3	
49	240.0	N61 11.466 W137 59.368	3	
50	245.0	N61 11.468 W137 59.369	3	
51	250.0	N61 11.470 W137 59.372	3	
52	255.0	N61 11.471 W137 59.374	3	
53	260.0	N61 11.473 W137 59.379	3	
54	265.0	N61 11.476 W137 59.383	3	
55	270.0	N61 11.479 W137 59.384	3	
56	275.0	N61 11.480 W137 59.389	3	
57	280.0	N61 11.483 W137 59.392	3	
58	285.0	N61 11.485 W137 59.394	3	
59	290.0	N61 11.487 W137 59.396	3	
60	295.0	N61 11.489 W137 59.400	3	
61	300.0	N61 11.490 W137 59.404	3	
62	305.0	N61 11.492 W137 59.405	3	
63	310.0	N61 11.495 W137 59.409	3	
64	315.0	N61 11.497 W137 59.412	3	*

12th July Creek Line03

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
1	0.0	N61 11.238 W137 59.593	3	*
2	5.0	N61 11.241 W137 59.596	3	
3	10.0	N61 11.242 W137 59.598	3	
4	15.0	N61 11.245 W137 59.601	3	
5	20.0	N61 11.247 W137 59.606	3	
6	25.0	N61 11.249 W137 59.609	3	
7	30.0	N61 11.251 W137 59.613	3	
8	35.0	N61 11.254 W137 59.616	3	
9	40.0	N61 11.254 W137 59.619	3	
10	45.0	N61 11.256 W137 59.623	3	
11	50.0	N61 11.259 W137 59.626	3	
12	55.0	N61 11.261 W137 59.630	3	
13	60.0	N61 11.263 W137 59.634	3	
14	65.0	N61 11.266 W137 59.638	3	
15	70.0	N61 11.267 W137 59.641	3	
16	75.0	N61 11.269 W137 59.642	3	
17	80.0	N61 11.270 W137 59.644	3	
18	85.0	N61 11.273 W137 59.649	3	
19	90.0	N61 11.276 W137 59.653	3	
20	95.0	N61 11.278 W137 59.658	3	
21	100.0	N61 11.280 W137 59.662	3	
22	105.0	N61 11.282 W137 59.665	3	
23	110.0	N61 11.284 W137 59.668	3	
24	115.0	N61 11.285 W137 59.671	3	
25	120.0	N61 11.288 W137 59.675	3	
26	125.0	N61 11.290 W137 59.677	3	
27	130.0	N61 11.292 W137 59.682	3	
28	135.0	N61 11.294 W137 59.685	3	
29	140.0	N61 11.296 W137 59.689	3	
30	145.0	N61 11.298 W137 59.691	3	
31	150.0	N61 11.300 W137 59.693	3	*
32	155.0	N61 11.302 W137 59.697	3	
33	160.0	N61 11.304 W137 59.701	3	
34	165.0	N61 11.306 W137 59.704	3	
35	170.0	N61 11.308 W137 59.707	3	
36	175.0	N61 11.310 W137 59.712	3	
37	180.0	N61 11.312 W137 59.713	3	

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude hddd° mm.mmm'	GPS-Accuracy [m]	Post [*]
38	185.0	N61 11.314 W137 59.717	3	
39	190.0	N61 11.316 W137 59.721	3	
40	195.0	N61 11.318 W137 59.723	3	
41	200.0	N61 11.319 W137 59.727	3	
42	205.0	N61 11.321 W137 59.729	3	
43	210.0	N61 11.322 W137 59.731	3	
44	215.0	N61 11.324 W137 59.735	3	
45	220.0	N61 11.326 W137 59.738	3	
46	225.0	N61 11.328 W137 59.742	3	
47	230.0	N61 11.330 W137 59.747	3	
48	235.0	N61 11.332 W137 59.751	3	
49	240.0	N61 11.334 W137 59.753	3	
50	245.0	N61 11.336 W137 59.757	3	
51	250.0	N61 11.338 W137 59.761	3	
52	255.0	N61 11.340 W137 59.763	3	
53	260.0	N61 11.342 W137 59.766	3	
54	265.0	N61 11.344 W137 59.771	3	
55	270.0	N61 11.345 W137 59.774	3	
56	275.0	N61 11.348 W137 59.778	3	
57	280.0	N61 11.350 W137 59.781	3	
58	285.0	N61 11.351 W137 59.785	3	
59	290.0	N61 11.354 W137 59.788	3	
60	295.0	N61 11.356 W137 59.791	3	
61	300.0	N61 11.358 W137 59.793	3	
62	305.0	N61 11.360 W137 59.797	3	
63	310.0	N61 11.362 W137 59.801	3	
64	315.0	N61 11.363 W137 59.804	3	*