Arctic Geophysics Inc.

Geophysical Surveys • Prospecting • Consulting

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Geophysical Survey with 2D Resistivity
Duncan Creek, Yukon

FOR
Melvin Lee Zeiler
Mayo, Yukon YT
Y0B 1G0

AUTHORS
Philipp Moll
Stefan Ostermaier

WORK PERFORMED
July 16th - 17th 2010

DATE OF REPORT
February 12th 2011

Index

1. Introduction

This geophysical investigation was done for Melvin Lee Zeiler.

The survey, using 2D Resistivity, was conducted to prospect the ground for placer mining interests.

The ground was tested with two 495m-measuring line, depth 80m.

2. List of Claims / Prospecting Leases

Grant Number	**Claim Name**	**Owner**
P 02284	Star 9	Melvin Lee Zeiler
P 02285	Star 10	„
P 02286	Star 11	„
P 02287	Star 12	„

3. Location

The placer claims Star 9-12 (P 02284 – P 02287) are located in the valley of *Duncan Creek,* just at the confluence with *Williams Creek.*

4. Access

The placer claims Star 9-12 (P 02284 – P 02287) were accessed via the road from Mayo to Keno.

5. Goal

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

Placer Prospecting

1. Depth and topography of bedrock
   - Paleochannels
2. Sedimentary stratification
   - Different ground materials
3. Permafrost conditions
4. Groundwater table

6. Method

Resistivity measurements are a reliable foundation for the interpretation of the subsurface conditions at this **placer** prospection. They usually allow for good interpretation of bedrock and overburden.

Resistivity

Resistivity systems inject low frequency alternating current into the ground. Serial electrodes produce plenty of current flow fields of different size and shape which are systematically covering the subsurface below the measuring line. Material changes in the subsurface deform the electrical field which is recorded by potential electrodes measuring voltage fluctuations created by variations in the resistivity of the ground.

Resistivity is an excellent geophysical method for the detection of very shallow and deep layer interfaces in nearly all surface and subsurface conditions in Yukon/BC. Measuring shallow interfaces for a long distance is more economic than with seismic. The depth penetration is much higher than with ground penetrating radar. In ground with disturbing influences such as discontinuous permafrost, measurements with Resistivity promise more reliable interpretations as with geophysical methods purely based on signal reflection (time domain methods). Resistivity doesn't measure a signal delay, it measures a material property. A lightweight system is available for flexible use with a small crew.

7. Use of Geophysical Methods

7.1. 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: CONNECTOR SPACING: 5m [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. The equipment facilitates high mobility and rapid data acquisition.

[1] Constructed and produced by LGM (Germany)
[2] Ditto
[3] Constructed and produced by GEOANALYSIS.COM (Germany)
[4] Ditto

7.2. Data Acquisition

The **data acquisition** is carried out by 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 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.

7.3. Processing

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

7.4. Interpretation

The geophysical data collected in this survey could only tentatively be linked with other local information since the data acquired by drilling could not be located with 100% accuracy.

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 within the Arctic Geophysics team
Comparison - between geophysical and technological information found in other surveys
Observation - of surficial conditions in the field
Sources - Bedrock Geology Map[6]

7.5. 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.

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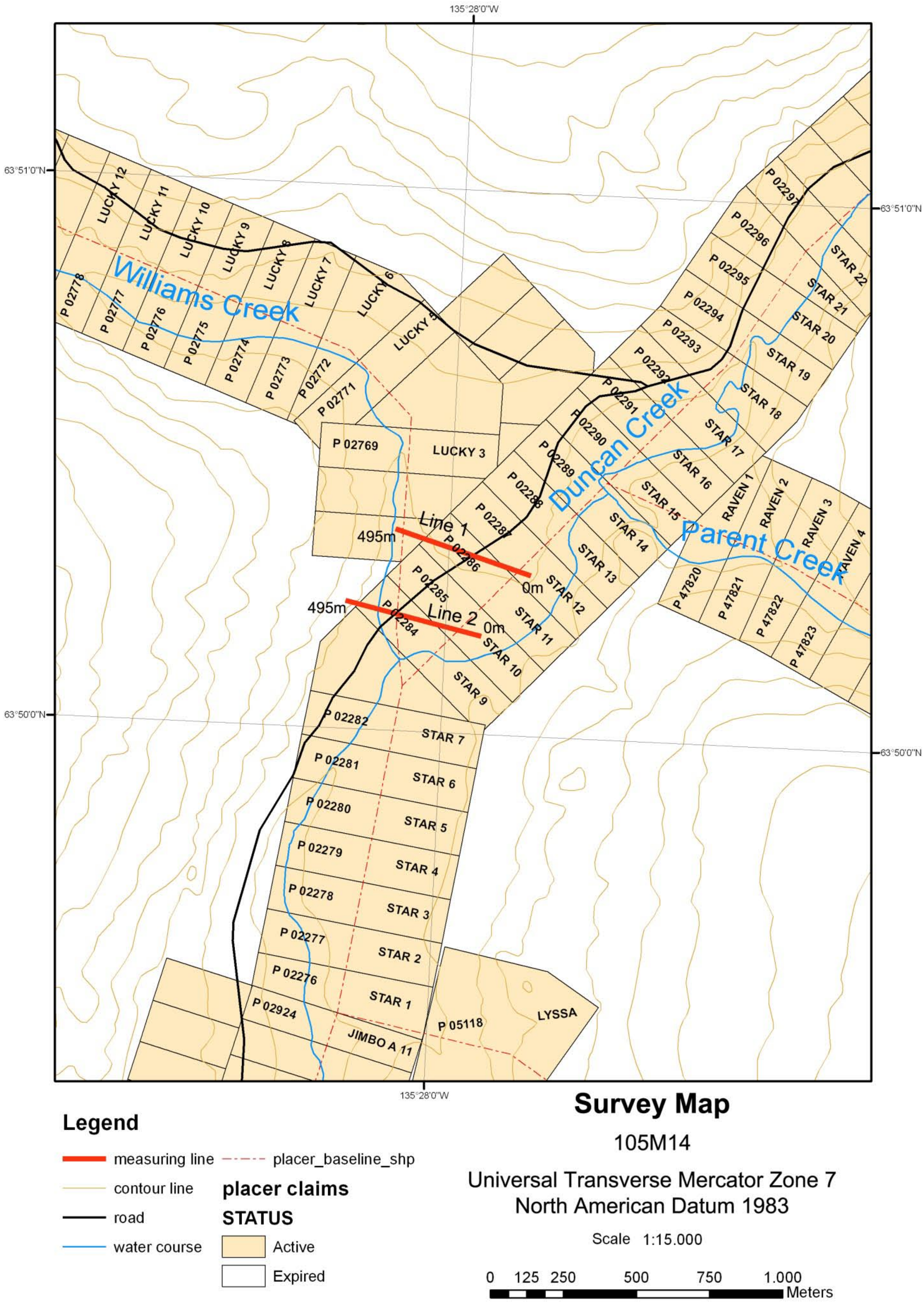
[5] Produced by GEOTOMO SOFTWARE (Malaysia)

[6] 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)

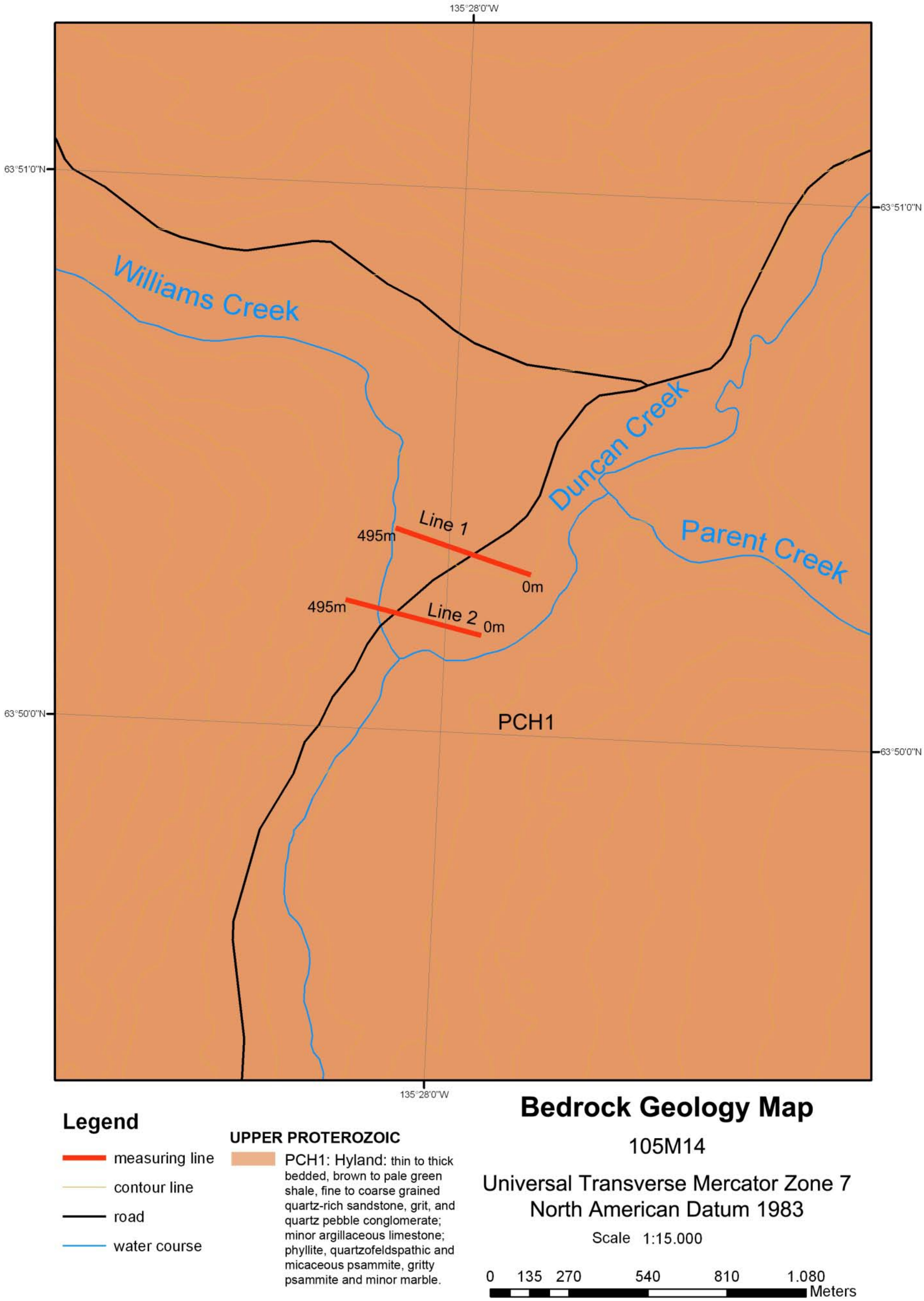
The **graphical markings** showing the interpreted layer interfaces in the profiles (using the black lines) are done accordingly to the data structure in the profile itself. This means: the layers there will also show up approximately 15% thicker than they are in reality. In the interpretation text the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

8. Resistivity Survey at Duncan Creek

Survey Map 105M/14



Bedrock Geology Map 105M/14



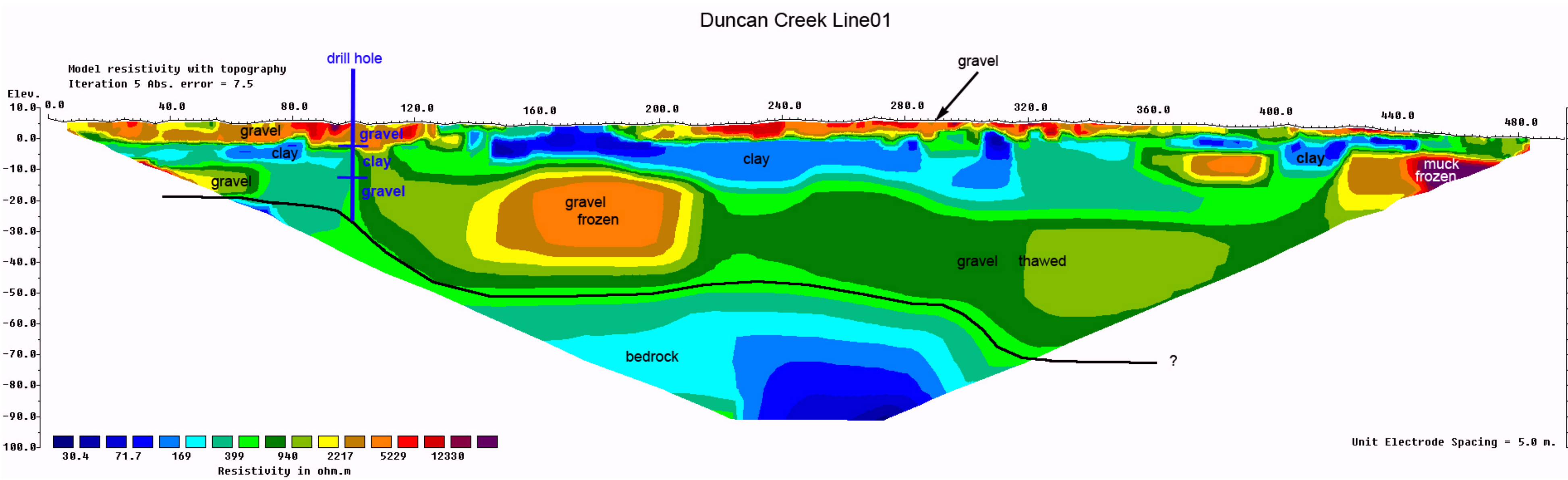
Measurements

Preliminary Note!

The subsurface information of this study is an interpretation.

Duncan Creek Line 01

Line: Cross valley	**Horizontal/vertical measure:** in [meter]	**Data acquisition:** Stefan Ostermaier
View: Downstream	**Iteration error:** in [%]	**Processing:** Philipp Moll
Electrodes: 100, spacing 5m	**Vertical exaggeration factor:** 1.00	**Interpretation:** Philipp Moll, Stefan Ostermaier



Interpretation

The **surface** around the measuring line is mostly forested with the exception of the first 50m where a levelled yard is located. To the left of the measuring line the ground slopes down to where the current stream bed is located.

In this resistivity profile a **stepped bedrock interface** is interpreted.

At 0-100m and at 140-300m the **bedrock** shows two possible steps that might be 21m and 46m deep. A possible third step seems to be located at the bottom of the right section outside of the profile and would have a depth to bedrock of probably 65m.

The **bedrock** itself might be some well conducting schist[7] that is graphitic in parts. It can be observed at an outcrop 30m upstream from the start of Profile**02**.

The bedrock step to the left seems to drop outside of the profile forming a hump. The bedrock hump separates the hypothetic **paleochannel** (at 100-220m in the profile) from the location of the current stream bed. Historically *Duncan Creek* most likely used this channel on the right side of the valley since it is unlikely that a channel this large could be formed by *Williams Creek* alone. The bedrock step to the right could indicate a deeper cannel which would have been the **main channel** (after 300m) of Duncan Creek in former times.

The **overburden** seems to have a trifold layering with gravel on top followed by clay and again gravel below. Glaciation[8] is the most likely cause for this kind of stratification. A drill hole whose approximate location was incorporated into the profile as accurately as possible confirms exactly this stratification.

Permafrost in the overburden seems to be discontinuous. There is apparently a larger section of frozen gravel (orange, brown) at 140-210m and another at 370-400m. Additionally there appears to be some frozen muck (red) at the right edge of the profile.

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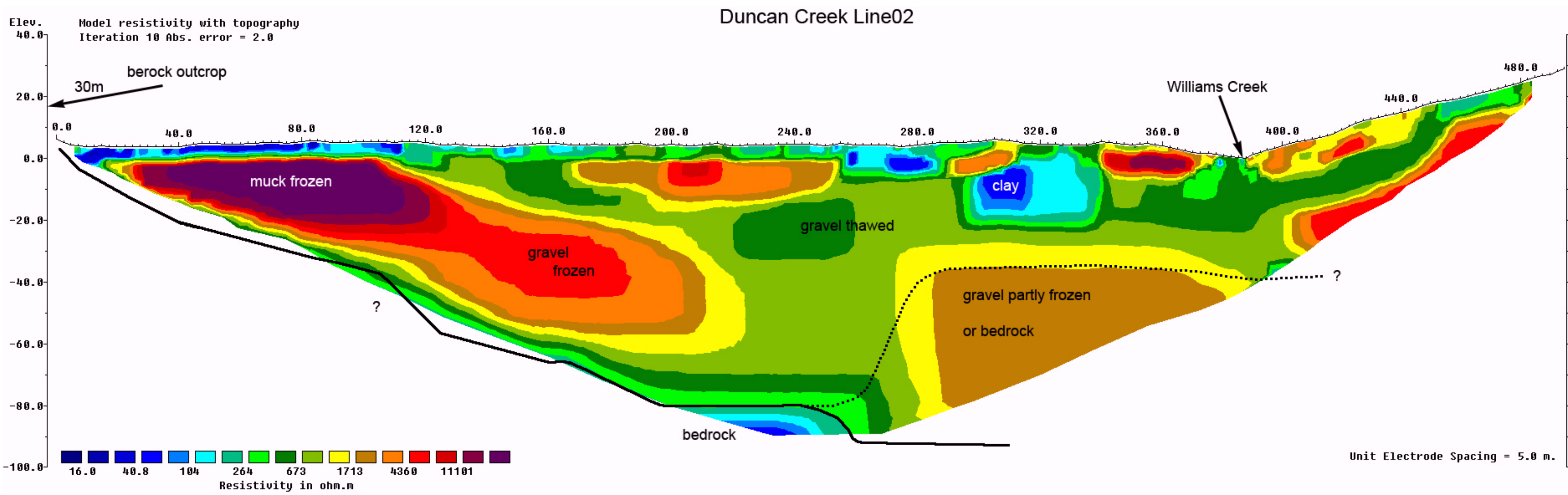
[7] Most likely the micaceous psammite of the Hyland Group as indicated in the Bedrock Geology Map.

[8] Middle Pleistocene: Cordileran and montane glacial features (ca. 200 000a)

Duncan Creek Line 02

Line: Cross valley	**Horizontal/vertical measure:** in [meter]	**Data acquisition:** Stefan Ostermaier
View: Downstream	**Iteration error:** in [%]	**Processing:** Philipp Moll
Electrodes: 100, spacing 5m	**Vertical exaggeration factor:** 1	**Interpretation:** Philipp Moll, Stefan Ostermaier



Interpretation

This resistivity profile is approximately 300m further downstream than Profile01.

From 0-360m the **surface** around the measuring line is stripped, the rest of the line is thinly forested. The current stream bed of *Duncan Creek* is again to the left of the beginning of the measuring line.

The **bedrock interface** might again represent a channel with a stepped character, however, due to the thickness of the overburden only a small part of the actual bedrock interface seems to have been measured in a depth of 70m. The interpretation of the rising bedrock on the left hand side of the profile is based on the fact that bedrock was observed at the outcrop 30m from the start of the profile – as well as that the data at the edge of the profile do suggest two steps on the way down. On the right the bedrock appears to sink down even further to a depth of probably 82m (?). Alternatively, the bedrock could rise to a depth of 34m and form a step at 280-400m, this step would necessitate a change of the bedrock type.

The **overburden** in this profile looks more heterogeneous than that in Profile01. Especially the clay seems to be closer to the surface and only does appear insular. Also, there appears to be a greater amount of black muck, which can be observed on the surface at 40-80m in the stripped part of the profile.

On the left side of the profile **permafrost** might be present in a large red zone that encompasses the muck on top and the gravel underneath.

The profile seems to show two more zones with gravel containing different amounts of permafrost: the large brown section, and the elongate red zone at the right border of the profile. Higher resistivity means more frost. The green matrix might represent thawed gravel. Frozen muck seems to be located near the surface at 170-250m (brown, orange, red) and at 350-370m (red).

9. Recommendations

The interpretation of the subsurface conditions, based on the Resistivity profiles, should be verified by technological methods such as drilling, shafting, and trenching.

This table shows some suitable locations in the profiles to verify overburden and bedrock. Due to the thickness of the overburden the most economic method would probably be drilling.

Profile	**Location in the profile [m]**	**Depth**
01	160m, 240m checking hypothetical bedrock terrace 340m checking hypothetical deepest part of the channel	47m, 45m 67m
02	220m checking hypothetical bedrock 320m checking hypothetical alternative bedrock; checking deepest part of the bedrock	70m 82m (34m)

10. References

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Maps

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11. Qualification

Stefan Ostermaier

- Study of geology, University of Tübingen, Germany
- Visit of geophysical field courses, University of Karlsruhe and University of Stuttgart, Germany
- Geological prospecting for precious metals and minerals in the Yukon and Alaska since 2001
- Geophysical Surveying for Mining Exploration in the Yukon since 2005
- Study of computer science, University of Stuttgart, Germany

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Stefan Ostermaier

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

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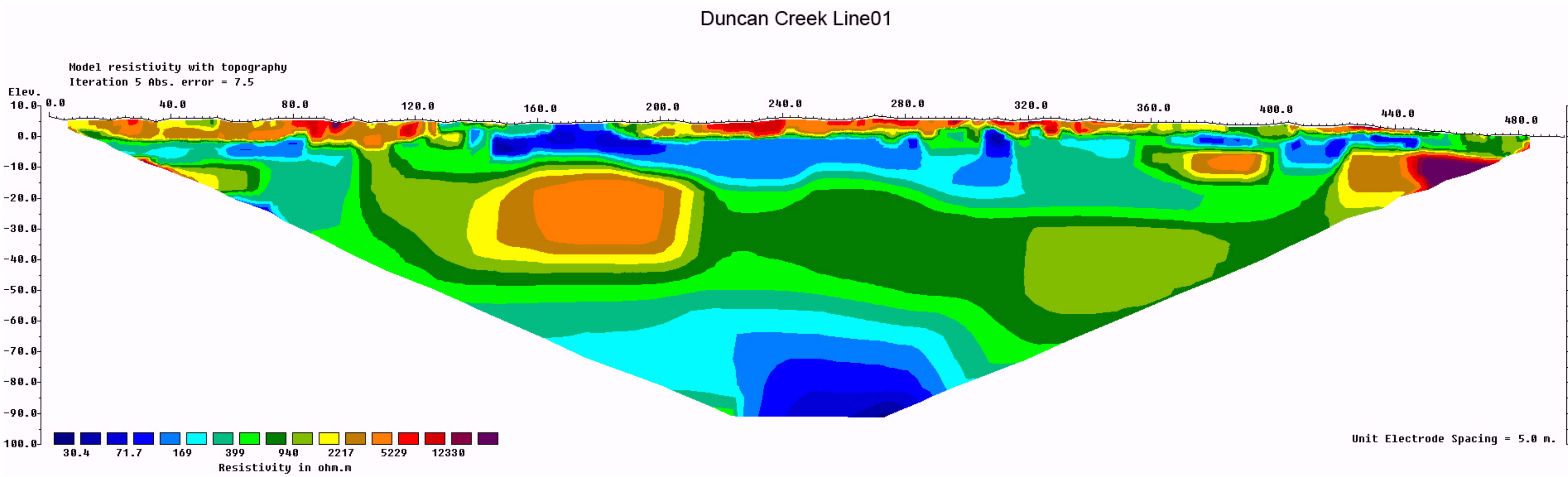
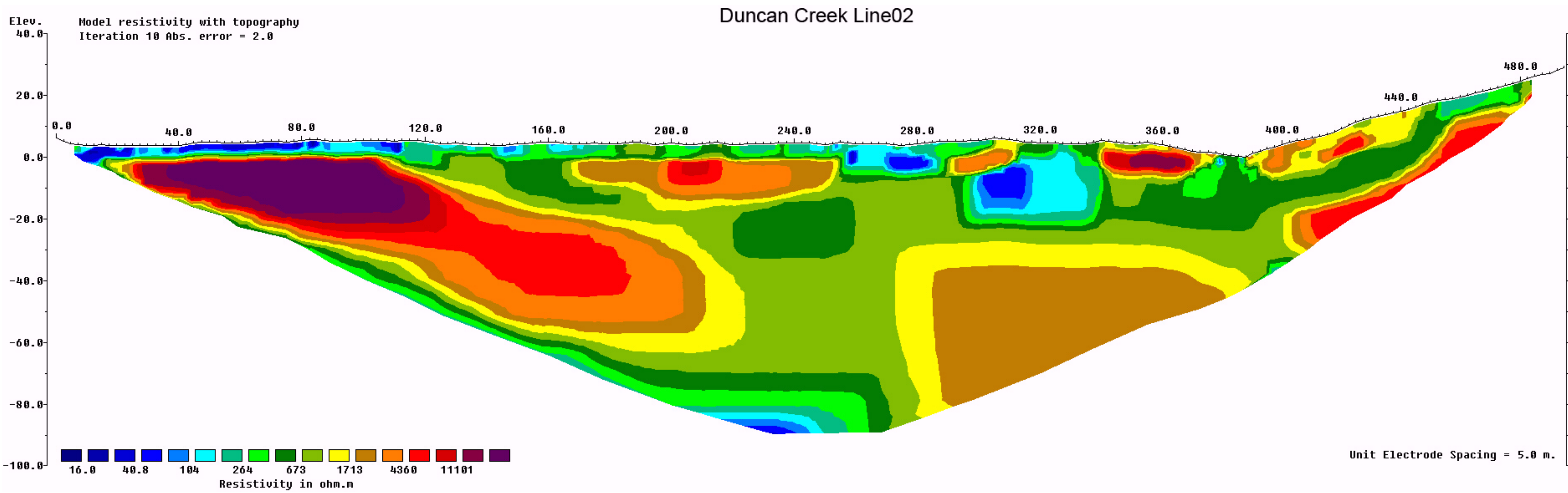
Philipp Moll

12. Addendum

Profiles raw





Duncan Creek Line02
Elev.
Model resistivity with topography
Iteration 10 Abs. error = 2.0
40.0
20.0
0.0
-20.0
-40.0
-60.0
-80.0
-100.0
0.0
40.0
80.0
120.0
160.0
200.0
240.0
280.0
320.0
360.0
400.0
440.0
480.0
16.0
40.8
104
264
673
1713
4360
11101
Resistivity in ohm.m
Unit Electrode Spacing = 5.0 m.

GPS-Data

Duncan Creek Line1

Accuracy 3m

Profile [m]	Latitude / Longitude
0	N63 50 17.8 W135 27 39.2
5	N63 50 17.8 W135 27 39.4
10	N63 50 17.8 W135 27 40.1
15	N63 50 17.9 W135 27 40.3
20	N63 50 18.0 W135 27 40.7
25	N63 50 18.0 W135 27 41.1
30	N63 50 18.1 W135 27 41.5
35	N63 50 18.1 W135 27 41.8
40	N63 50 18.1 W135 27 42.2
45	N63 50 18.2 W135 27 42.5
50	N63 50 18.2 W135 27 42.8
55	N63 50 18.3 W135 27 43.2
60	N63 50 18.3 W135 27 43.6
65	N63 50 18.4 W135 27 43.9
70	N63 50 18.4 W135 27 44.2
75	N63 50 18.5 W135 27 44.6
80	N63 50 18.5 W135 27 45.0
85	N63 50 18.5 W135 27 45.4
90	N63 50 18.6 W135 27 45.7
95	N63 50 18.6 W135 27 46.2
100	N63 50 18.6

Profile [m]	Latitude / Longitude
	W135 27 46.4
105	N63 50 18.7 W135 27 46.6
110	N63 50 18.8 W135 27 47.0
115	N63 50 18.8 W135 27 47.4
120	N63 50 18.8 W135 27 47.7
125	N63 50 18.9 W135 27 48.1
130	N63 50 18.9 W135 27 48.5
135	N63 50 19.0 W135 27 48.8
140	N63 50 19.0 W135 27 49.1
145	N63 50 19.0 W135 27 49.4
150	N63 50 19.0 W135 27 49.8
155	N63 50 19.0 W135 27 50.3
160	N63 50 19.1 W135 27 50.6
165	N63 50 19.1 W135 27 51.0
170	N63 50 19.2 W135 27 51.3
175	N63 50 19.2 W135 27 51.7
180	N63 50 19.3 W135 27 52.1
185	N63 50 19.3 W135 27 52.4
190	N63 50 19.3 W135 27 52.7
195	N63 50 19.3 W135 27 53.0
200	N63 50 19.4 W135 27 53.3

Profile [m]	Latitude / Longitude
205	N63 50 19.4 W135 27 53.5
210	N63 50 19.4 W135 27 53.9
215	N63 50 19.4 W135 27 54.3
220	N63 50 19.5 W135 27 54.7
225	N63 50 19.5 W135 27 55.0
230	N63 50 19.6 W135 27 55.3
235	N63 50 19.6 W135 27 55.7
240	N63 50 19.7 W135 27 56.1
245	N63 50 19.8 W135 27 56.5
250	N63 50 19.9 W135 27 56.9
255	N63 50 19.9 W135 27 57.2
260	N63 50 20.0 W135 27 57.5
265	N63 50 20.1 W135 27 57.8
270	N63 50 20.2 W135 27 58.1
275	N63 50 20.2 W135 27 58.4
280	N63 50 20.2 W135 27 58.8
285	N63 50 20.2 W135 27 59.2
290	N63 50 20.2 W135 27 59.6
295	N63 50 20.3 W135 27 59.9
300	N63 50 20.3 W135 28 00.3
305	N63 50 20.4

Profile [m]	Latitude / Longitude
	W135 28 00.6
310	N63 50 20.5 W135 28 00.9
315	N63 50 20.5 W135 28 01.2
320	N63 50 20.6 W135 28 01.5
325	N63 50 20.7 W135 28 01.9
330	N63 50 20.7 W135 28 02.3
335	N63 50 20.8 W135 28 02.6
340	N63 50 20.8 W135 28 03.0
345	N63 50 20.9 W135 28 03.4
350	N63 50 20.9 W135 28 03.8
355	N63 50 20.9 W135 28 04.1
360	N63 50 21.0 W135 28 04.4
365	N63 50 21.0 W135 28 04.7
370	N63 50 21.0 W135 28 05.1
375	N63 50 21.1 W135 28 05.4
380	N63 50 21.1 W135 28 05.8
385	N63 50 21.2 W135 28 06.1
390	N63 50 21.2 W135 28 06.4
395	N63 50 21.3 W135 28 06.8
400	N63 50 21.3 W135 28 07.1
405	N63 50 21.5 W135 28 07.6

Profile [m]	Latitude / Longitude
410	N63 50 21.5 W135 28 07.7
415	N63 50 21.5 W135 28 08.3
420	N63 50 21.5 W135 28 08.5
425	N63 50 21.6 W135 28 08.8
430	N63 50 21.6 W135 28 09.1
435	N63 50 21.7 W135 28 09.5
440	N63 50 21.7 W135 28 10.0
445	N63 50 21.7 W135 28 10.2
450	N63 50 21.8 W135 28 10.5
455	N63 50 21.8 W135 28 10.9
460	N63 50 21.9 W135 28 11.4
465	N63 50 21.9 W135 28 11.8
470	N63 50 22.0 W135 28 12.2
475	N63 50 22.0 W135 28 12.4
480	N63 50 22.0 W135 28 12.8
485	N63 50 22.1 W135 28 13.0
490	N63 50 22.1 W135 28 13.3
495	N63 50 22.2 W135 28 13.7

Duncan Creek Line2

Accuracy 3m

Profile [m]	Latitude / Longitude
0	N63 50 10.8 W135 27 50.9
5	N63 50 10.9 W135 27 51.2
10	N63 50 10.9 W135 27 51.6
15	N63 50 10.9 W135 27 52.0
20	N63 50 11.0 W135 27 52.3
25	N63 50 11.0 W135 27 52.6
30	N63 50 11.0 W135 27 52.9
35	N63 50 11.1 W135 27 53.3
40	N63 50 11.1 W135 27 53.6
45	N63 50 11.1

Profile [m]	Latitude / Longitude
	W135 27 54.0
50	N63 50 11.2 W135 27 54.3
55	N63 50 11.3 W135 27 54.6
60	N63 50 11.3 W135 27 55.0
65	N63 50 11.3 W135 27 55.3
70	N63 50 11.3 W135 27 55.7
75	N63 50 11.3 W135 27 56.0
80	N63 50 11.3 W135 27 56.3
85	N63 50 11.4 W135 27 56.7
90	N63 50 11.5 W135 27 57.1

Profile [m]	Latitude / Longitude
95	N63 50 11.5 W135 27 57.4
100	N63 50 11.5 W135 27 57.8
105	N63 50 11.6 W135 27 58.1
110	N63 50 11.6 W135 27 58.5
115	N63 50 11.7 W135 27 58.9
120	N63 50 11.7 W135 27 59.2
125	N63 50 11.7 W135 27 59.6
130	N63 50 11.8 W135 28 00.0
135	N63 50 11.8 W135 28 00.3
140	N63 50 11.8

Profile [m]	Latitude / Longitude
	W135 28 00.6
145	N63 50 11.9 W135 28 01.0
150	N63 50 11.9 W135 28 01.4
155	N63 50 11.9 W135 28 01.7
160	N63 50 12.0 W135 28 02.1
165	N63 50 12.0 W135 28 02.5
170	N63 50 12.1 W135 28 02.7
175	N63 50 12.1 W135 28 03.1
180	N63 50 12.1 W135 28 03.4
185	N63 50 12.2 W135 28 03.7

Profile [m]	Latitude / Longitude
190	N63 50 12.2 W135 28 04.1
195	N63 50 12.3 W135 28 04.4
200	N63 50 12.3 W135 28 04.8
205	N63 50 12.3 W135 28 05.1
210	N63 50 12.3 W135 28 05.5
215	N63 50 12.4 W135 28 05.8
220	N63 50 12.4 W135 28 06.2
225	N63 50 12.5 W135 28 06.5
230	N63 50 12.5 W135 28 06.8
235	N63 50 12.5

Profile [m]	Latitude / Longitude
	W135 28 07.2
240	N63 50 12.6 W135 28 07.6
245	N63 50 12.6 W135 28 08.0
250	N63 50 12.7 W135 28 08.3
255	N63 50 12.7 W135 28 08.7
260	N63 50 12.7 W135 28 09.0
265	N63 50 12.8 W135 28 09.4
270	N63 50 12.8 W135 28 09.8
275	N63 50 12.8 W135 28 10.0
280	N63 50 12.9 W135 28 10.5
285	N63 50 12.9 W135 28 10.8
290	N63 50 12.9

Profile [m]	Latitude / Longitude
	W135 28 11.2
295	N63 50 13.0 W135 28 11.5
300	N63 50 13.0 W135 28 11.9
305	N63 50 13.0 W135 28 12.2
310	N63 50 13.0 W135 28 12.6
315	N63 50 13.2 W135 28 13.0
320	N63 50 13.2 W135 28 13.2
325	N63 50 13.2 W135 28 13.6
330	N63 50 13.3 W135 28 13.8
335	N63 50 13.3 W135 28 14.2
340	N63 50 13.3 W135 28 14.5
345	N63 50 13.4

Profile [m]	Latitude / Longitude
	W135 28 14.9
350	N63 50 13.4 W135 28 15.3
355	N63 50 13.4 W135 28 15.6
360	N63 50 13.5 W135 28 16.0
365	N63 50 13.5 W135 28 16.3
370	N63 50 13.5 W135 28 16.8
375	N63 50 13.5 W135 28 17.2
380	N63 50 13.6 W135 28 17.5
385	N63 50 13.6 W135 28 17.9
390	N63 50 13.5 W135 28 18.2
395	N63 50 13.6 W135 28 18.5
400	N63 50 13.6

Profile [m]	Latitude / Longitude
	W135 28 18.8
405	N63 50 13.7 W135 28 19.2
410	N63 50 13.7 W135 28 19.6
415	N63 50 13.7 W135 28 19.9
420	N63 50 13.8 W135 28 20.2
425	N63 50 13.8 W135 28 20.4
430	N63 50 13.9 W135 28 20.8
435	N63 50 13.9 W135 28 21.1
440	N63 50 13.8 W135 28 21.6
445	N63 50 13.9 W135 28 21.9
450	N63 50 13.9 W135 28 22.3
455	N63 50 13.9

Profile [m]	Latitude / Longitude
	W135 28 22.6
460	N63 50 14.0 W135 28 22.9
465	N63 50 14.0 W135 28 23.3
470	N63 50 14.0 W135 28 23.6
475	N63 50 14.1 W135 28 23.9
480	N63 50 14.1 W135 28 24.4
485	N63 50 14.2 W135 28 24.7
490	N63 50 14.2 W135 28 25.0
495	N63 50 14.1 W135 28 25.4

Cost

Arctic Geophysics Inc.

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Mel Zeiler

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Date: July 17, 2010

Services provided:

Quantity	Description	Amount $CAN
Transportation		
2 1/3 days	Vehicle @ $CAN 40.00 / day	93.33
122 Km	Km @ $CAN 0.45	54.90
Geophysical Survey		
2 days	Geoelectrical 2D-Resistivity Survey @ $ CAN 600.00 / day	1200.00
1 day	Report @ $CAN 250.00 / day	250.00
1	Printing, Postage	50.00
	NET Amount	**$1,648.23**
GST Number 846363216RT0001	**G.S.T.**	**$ 111.63**
	Total Due	**$1,730.64**