MEMORANDUM

AMEROK GEOSCIENCES LTD.
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To: Kim Ferguson **Date:** 12 JUL 99

From: Mike Power

Re: Arch Creek seismic survey

This memorandum is a field report describing refraction seismic surveys conducted at Arch Creek, Whitehorse Mining District from July 7-9, 1999. The surveys were conducted to determine the depth to bedrock along the creek prior to testing.

a. Location and access. The surveys were conducted on Placer Lease 1W00092 on the lower end of Arch Creek, Whitehorse Mining District. A road extending from the NWTel repeater north of Kluane Wilderness Village on the Alaska Highway to the property was washed out at the time of the survey and a helicopter was used to lift the crew and equipment into the property.

b. Personnel and equipment. A three-man crew consisting of M. Power, G. Gibson and T. Painter were provided together with the following equipment:

Instruments:	Strataview 24 Channel digital engineering seismograph. Impulse laser range finder
Data processing:	486DX66 or better laptop computer, colour printer.
Other:	F350 truck, 650W/120 V generator, VHF radios, blasting cables, chain saw, spare parts and tools, camp and groceries.

c. Survey grid. A total of 7 lines were surveyed. Line locations are shown in Figure 1. The location of L1 0N was determined with a GPS and all other line locations were calculated relative to this point with the laser range finder and compass. Lines were cut to a standard suitable for the survey and stations marked with flagging at 10 m intervals. Every 60 m (blast points) was marked with pickets along the lines. Off-line

This report has been examined by the Geological Evaluation Unit under Section 41 Yukon Placer Mining Act and is recommended as allowable representation work in the amount of $ .....

Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program for Commissioner of Yukon Territory

shots were hip chained in and their elevations determined either with hip chain and clinometer or by directly measuring the elevation with the laser rangefinder.

d. Survey specifications. The seismic refraction survey was conducted according to the following specifications:

Phone spacing:	5 m
No. of channels:	24 (total spread length 115 m)
Shot locations:	2 shots at least 60 m off either end of each spread 2 shots at either end of the spread 1 shot at mid-spread
Shots:	2 to 8 sticks of Forcite or Geogel initiated with seismic grade electrical caps (seismocaps).
Topography:	Topography along the line and the relative elevations of the lines were surveyed to a common datum with the laser range finder.
Interpretation:	Data was interpreted

e. Data processing and interpretation. The station elevations were determined by carrying elevations from L1 0N across the grid and calculating relative elevation differences in a spreadsheet. The elevation of L1 0N was arbitrarily set at 100 m to ensure that all elevations were positive. Seismic data processing was performed with the Rimrock Geophysics SIP software package originally developed by the US Geological Survey. The interpretation algorithm is a modified delay time method suitable to the survey procedure used in this project. First arrivals were picked on the computer and with the assistance of the paper shot records.

The interpretation summaries for each line are attached. These show the seismic velocities determined by analysis of the first arrivals. Velocities were not fixed and thus vary from line to line. In placer deposits, generally three layers are encountered. These include an overburden layer above the water table ($V \leq 1000$ m/s), an overburden layer below the water table ($V \leq 1800$ m/s) and bedrock ($2000 \leq V \leq 5500$ m/s). The quality of a solution and hence the degree of confidence you can place in it can partially be evaluated by looking at the velocities determined during the inversion. The depth sections show the calculated ray intersection points on each of the three horizons (two boundaries). In a good solution, the points will be tightly clustered and the profile generally quite smooth. In a poor solution, there will be a wide scatter between the points and the interpreted bedrock surface will be quite irregular. In addition, on two spread lines (240 m lines), the development of a bulge beneath the boundary between

the two lines is a suspect feature suggesting that the bedrock velocity may be a bit low. As a final note, the solutions are generally not valid near the ends of the lines, particularly if the bedrock surface is defined by the shot ray intersection point (s on the diagram). In these areas, the bedrock profile has been drawn in to correlate with surface exposures at line ends.

Figure 1 is a plot showing the location of the survey lines and depth sections for each. These were taken from the individual line profiles in the interpretation summaries. The base level for each line was adjusted so that the surface elevation would plot near (ie. immediately left) of the survey line. In each profile, the depth increases to the left away from the line. The depth to bedrock can be determined by measuring the thickness of the gray section and applying the scale factor (1 mm = 2 m). The interpretation sections should be consulted if more detail is required and to evaluate the confidence that should be placed in a given solution. Interpretation notes have been written on the sections to assist the reader.

f. Results.

The elevation datums used for each profile line in Figure 1 are listed below. These are the elevation of the section at the profile line (ie. the plotted location of the seismic line). The elevation of bedrock relative to the overall survey datum can be calculated by determining the depth below the survey line through measurement and subtracting this from the line datum.

Line	**Section elevation (above L1 0N datum - 100 m)**
1	105 m
2	115 m
3	125 m
4	137 m
5	150 m
6	163 m
7	167 m

The following notes are pertinent to each line:

Line 1

Coordinates are reversed relative to all other lines. North is on the left and South on

the right. Coordinates numbered from 240 N (on the ground) = 0 S in the section. The data has been transformed and plotted using the same convention as all other lines in Figure 1. The data quality in the northern half of the section and the quality of the resulting interpretation is poor. Depth to bedrock averages around 20-25 m.

Line 2

Permafrost present in shot holes in the southern portion of the line. Poor overall solution but reasonable velocities. The bulge near 0N is suspect and a poor fit occurs in this area. Depth to bedrock appears to be approximately 20 m.

Line 3

Permafrost present in the southern portion of the line. Reasonable velocities determined by inversion. Solution is very poor in the southern portion of the lines (permafrost) and moderate to good in the northern portion of the line.

Line 4

Southern end of the line at bedrock bluff. Second layer velocity a bit high but could be caused by compacted gravel; other velocities are good. Moderate quality solution; estimated depth to bedrock averages around 20 m, shallowing quickly on either end.

Line 5

Reasonable velocities and moderate to good quality solution. Shot at south end was on bedrock 13 m south of line end. Layer 1 anomalously thick.

Line 6

Southern shot on bedrock, northern shots on overburden covered slope. Results suggest that the bedrock surface is slightly shallower here. This line located at the downstream end of a bowl or blowout in the creek channel. Solution quality is moderate, velocities reasonable.

Line 7

Poor to moderate solution. The bedrock probably rises on the northern end of the line. Velocities are reasonable. The quality of the solution on the southern portion of the line is poor but suggests around 20 m to bedrock there, shallowing from just a few metres at the northern end of the line.

The overall solution quality is at best moderate for the entire survey. Permafrost interfered with solutions on two lines and locally steeply dipping bedrock and noisy ground obscured first arrivals elsewhere. Layer velocity solutions suggest compacted

(old?) gravel near Line 4 and uncompacted gravel elsewhere.

The results of this survey should be tested by excavation in shallow areas to determine the degree of confidence which can be placed in this data. The spread in calculated raypath exit points on the refractors and the scatter in velocities from line to line suggests that the bedrock depth determinations will be in error by at least ± 10% across the lines.

Respectfully submitted,
AMEROK GEOSCIENCES LTD.

Mike Power M.Sc. P. Geoph.
Geophysicist

/attach.

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INVOICE

GST No.: RT89493 8588
File: 99-18

POSTED

Invoice 99051
July 12, 1999

In account with: **Kim Ferguson**
Box 378
Atlin, BC V0W 1A0

Re: Arch Creek refraction seismic surveys

Professional Services:

Mobilization / Demobilization (as per contract, exclusive of helicopter)	$2,500.00
Refraction seismic surveys 3 days @ $1,750/ day	$5,250.00
Report (as per contract)	$500.00
Subtotal	$8,250.00
Federal GST	$577.50
TOTAL	$8,827.50

Terms: Net 15 days. Interest charged at 2% per month on overdue accounts

REMIT PAYMENT TO:

TRANS NORTH HELICOPTERS

NORTH TURBO AIR LTD.
SEMAN ROAD • WHITEHORSE • YUKON • Y1A 4E6
PHONE (867) 668-2177 FAX (867) 668-3420

ACCOUNT NUMBER: AMEROCK
INVOICE NUMBER: 23086
INVOICE DATE: 14 07 99
AREA: B.C. YUKON NWT ALTA

CHARTERER: AMEROCK
MAILING ADDRESS: PO BOX 5808
Whitehorse Yukon Y1A-5L6.

A/C TYPE: 206B
AIRCRAFT REGISTRATION C: G M Y K Q

FLIGHT DATE: DAY 10 MONTH 07 YEAR 99

PURCHASE ORDER NO.

FUEL & OIL-X TNTA	CUST.	TNTA FUEL USED	HRS./LITRES	FROM
/		1.8		H.J.

FROM	UP/DOWN TIME	HOURS	REMARKS - NO. OF PASS - FREIGHT Kg
~~X~~ SILVER CITY			
ARCH CK			
WAVE VISUAL (X2)			
~~TO~~ SILVER CITY		1.8	

SUB	G/L	AMOUNT
1508	502	1440 00
1500	131	143 64
0000323		110 85

TERMS: PAYABLE UPON RECEIPT OF INVOICE.
2% INTEREST PER MONTH (24% PER ANNUM) WILL BE CHARGED ON ALL OUTSTANDING AMOUNTS OVER 30 DAYS. IF INTEREST IS NOT PAID, FUTURE FLIGHTS WILL BE ON A CASH BASIS.

X _____
CHARTERER'S SIGNATURE

CHARTERER'S NAME (PRINTED)

INITIALS: _____ PILOT'S SIGNATURE

ENGINEER'S NAME: CAS SPIES

1.8	@ 800-	1440	00
HOLDING TIME:	@ / HR.		
FUEL 205.20	@ .70 / LITRE	143	64
FUEL	@ / LITRE		
MEALS & LODGINGS			
OTHER			
OTHER			
SUB TOTAL		1583	64
GOODS & SERVICES TAX REGISTRATION NO. R121483135		110	85
TOTAL	$	1694	49

CARRIAGE SUBJECT TO TERMS OF PUBLISHED TARIFF.
TARIFF AVAILABLE TO PUBLIC VIEW AT TRANS NORTH OFFICE

REMIT PAYMENT TO:

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TRANS NORTH TURBO AIR LTD
20 NORSEMAN ROAD • WHITEHORSE • YUKON • Y1A 4E6
TELEPHONE (867) 668-2177 FAX (867) 668-3420

ACCOUNT NUMBER: AMC 36
INVOICE NUMBER: 36
INVOICE DATE: 14 07 99
AREA: B.C. YUKON NWT ALTA

CHARTERER: AMEROCK GEOSCIENCES Ltd.
BILLING ADDRESS: Box 5808 Whitehorse
YT Y1A 5L6

A/C TYPE: 206B
AIRCRAFT REGISTRATION C: G T N Y

FLIGHT DATE: DAY 06 MONTH 07 YEAR 99

PURCHASE ORDER NO.

FUEL & OIL-X TNTA	CUST.	TNTA FUEL USED	HRS./LITRES	FROM
X			205.2	K.B

FROM	UP/DOWN TIME	HOURS	REMARKS - NO. OF PASS - FREIGHT Kg
KLUANE LAKE			
TO ARCH CRK		0.5	1 PAX + INTERNAL LOAD
- ARCH CRK TO KLUANE VILLAGE		0.2	
- KLUANE VILLAGE TO ARCH CRK RTN		0.4	SLINGLOAD + INTERNA
- KLUANE VILLAGE TO ARCH CRK		0.2	2 PAX + INTERNAL
- RTN TO KLUANE LK.		0.5	(MIKE POWER)

SUB	G/L	AMOUNT
1508	502	1440 -
1500	131	143 64
0000323		110 85

TERMS: PAYABLE UPON RECEIPT OF INVOICE.
2% INTEREST PER MONTH (24% PER ANNUM) WILL BE CHARGED ON ALL OUTSTANDING AMOUNTS OVER 30 DAYS. IF INTEREST IS NOT PAID, FUTURE FLIGHTS WILL BE ON A CASH BASIS.

X _____
CHARTERER'S SIGNATURE

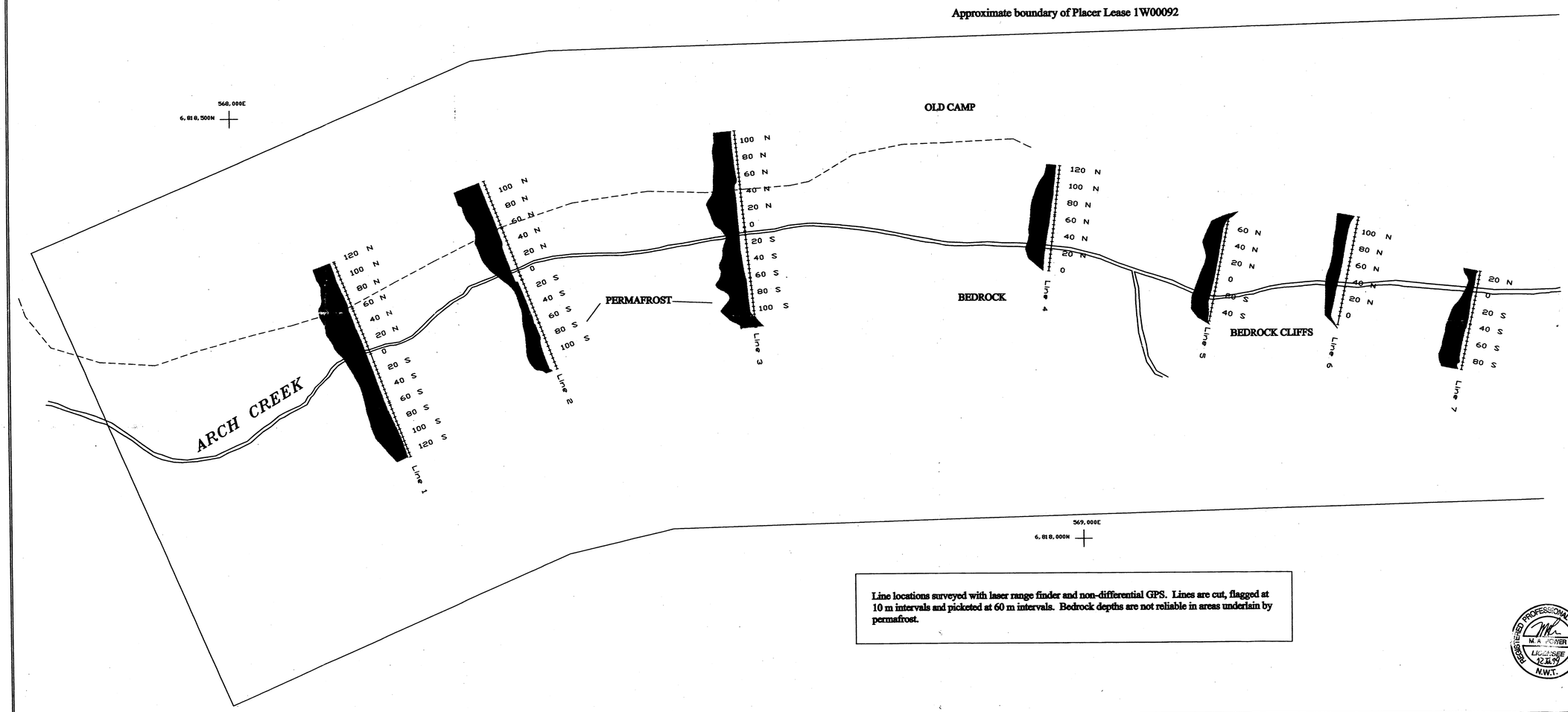
CHARTERER'S NAME (PRINTED)

INITIALS: RWM PILOT'S SIGNATURE

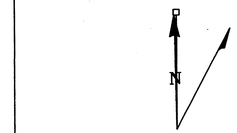
ENGINEER'S NAME: RWM

1.8	@ 800-	1440	00
HOLDING TIME:	@ / HR.		
FUEL 205.20	@ .80 / LITRE	164	16
FUEL	@ / LITRE		
MEALS & LODGINGS			
OTHER			
OTHER			
SUB TOTAL		1604	16
GOODS & SERVICES TAX REGISTRATION NO. R121483135		112	29
TOTAL	$	1716	45

CARRIAGE SUBJECT TO TERMS OF PUBLISHED TARIFF.
TARIFF AVAILABLE TO PUBLIC VIEW AT TRANS NORTH OFFICE



Line locations surveyed with laser range finder and non-differential GPS. Lines are cut, flagged at 10 m intervals and picketed at 60 m intervals. Bedrock depths are not reliable in areas underlain by permafrost.



No vertical exaggeration.
Vertical scale: 1 mm = 2 m

6, 600, 000N – UTM registration point

0 160
metres
Scale: 1:2,000

KIM FERGUSON

ARCH CREEK PLACER LEASE

SEISMIC REFRACTION SURVEY
DEPTH SECTIONS
FIGURE 1.

NTS: 115 G/5	Datum: NAD1927
Mining District: Whitehorse, YT	
Job: 99–18	Date: 11 JUL 99

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