NELSON GRANITE LIMITED

1999 Diamond Drilling
and
Ground penetrating Radar Surveys
on
Claim K-1149856

Kilgour Lake Area
Kenora Mining Division
NTS: 52K 4SW

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GEOSCIENCE ASSESSMENT

G. Zebruck
Nov. 1999
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Introduction

Nelson Granite Limited is the registered holder of a fifteen unit unpatented mining claim K-1149856 located northeast of the City of Kenora in the Kilgour Lake Area - Claim Map G-2626.

The company carried out a 4 hole diamond drill program and a ground penetrating radar (GPR) survey in order to assess the potential for a commercial granite quarry operation on this property. Drilling was used to determine what variations would be found in texture and colour of the granite. It would also indicate the location of the main horizontal fractures and the nature of any defects encountered. Ground penetrating radar was used to determine the location and extent of horizontal jointing. Together these techniques provide useful information prior to the much more expensive phase of test quarrying.

Property Location and Access

Claim K-1149856 is located 30 kilometers north and 40 kilometers east of the City of Kenora.

Kenora
UTM: 393500 mE Zone 15
5514000 mN

K-1149856
UTM: 434000 mE Zone 15
5544000 mN

Motor vehicle access to the claim is available by proceeding from the junction of the Kenora Bypass Hwy. 17B and the Jones Road in an east-northeasterly direction up the Jones Road a hard surfaced secondary highway, to it's intersection with the CPR main line at Jones a distance of 36.9 kilometers. After crossing the rail line continue on the Jones road a further 8.3 kilometers to the junction of an old logging road on the right side. It is unmarked but known locally as the Canyon lake Road. Travel easterly on the Canyon Lake road for a further 11.4 kilometers to the junction of a secondary gravel road which is overgrown and not travelable by regular motor vehicles. A 4 wheel ATV can be used to access the claim a further distance of 6.1 kilometers.
Map 1 Claim Map

QUARRY PERMIT APPLICATION NOV. 12/96

Map Claim

1149850
Previous work

There has been no work done on the property to assess its potential for dimension stone other than some previous shallow drill samples taken by Nelson Granite. This work was not filed for assessment.

1975 - Reconnaissance scale mapping by Breaks et al.


Results of Diamond Drilling

Diamond drilling indicated that the granite encountered was very uniform in texture and colour both down the hole and between holes. A slightly more bluish colour in the matrix of K-99-02 enhanced the appearance of the rock but was not significantly different from the colour in other holes.

Defects observed on surface included streaking which was more prevalent in the southwest part of the deposit, narrow quartz veining, gneissic looking xenoliths that form dike like bands often accompanied by a fracture on one side. Streaks and xenoliths were encountered in two of the four holes.

During drilling water was lost in three of the four holes indicating an open joint. These are shown on the vertical profiles. There may be more horizontal fractures but because the core was badly broken up due to vibration they were impossible to note with any certainty. More reliance was given to the results of the ground penetrating radar in determining horizontal fracturing.

Site Description

Three areas having no overburden were gridded in the in close proximity to the drill holes. Line direction was established by compass, distances were accurately chained and the grid marked using spray paint on the rock surface. A GPS unit was used to locate holes and all holes and grid lines were accurately measured in relation to each other.
Grid Layout and radar surveys were carried out Nov. 1, to Nov 4, 1999.

Map 3 shows the location of the grids in relation to the claim boundary and the position of the diamond drill holes. All positions are referenced to the grid systems established.

**Ground penetrating Radar**

The radar system used was a Sensors & Software pulseEKKO 1000 ground penetrating radar system. The technical specifications of the unit are appended.

Ground penetrating radar is similar in principal to seismic reflection and sonar techniques. The unit produces a pulse of high frequency electromagnetic energy which is transmitted into the rock. Reflected signals are detected, amplified at the receiver and are digitized and transferred to a field computer. Pulses are transmitted at regular distance intervals along the survey line and the reflected signals produce a profile of the reflectors encountered along that line.

For our survey we used a 225 MHz antennae with a separation of .5 meters between transmitter and receiver. Step size (distance between pulses was 10 centimeters measured and triggered using an odometer wheel.

The time window setting determines how long (and therefore how deep) the radar system will probe the subsurface. Velocity of the radar wave varies through different materials and also granites having different mineralogical characteristics. However a good average for granite is .13 meters/(ns) and this value was used for the purposes of this survey. With a time window setting of 125 (ns) the depth probed was approximately 24 feet.

**Presentation of Results**

Radar reflection sections were plotted for each of the survey lines. All profile data were processed with similar parameters and presented with a time varying gain. Distance along grid lines is
<table>
<thead>
<tr>
<th>Line</th>
<th>Data File</th>
<th>Length</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid A</td>
<td>A-B</td>
<td>100</td>
<td>0 - 50M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>101</td>
<td>50 - 68M</td>
</tr>
<tr>
<td></td>
<td>C-D</td>
<td>105</td>
<td>0 - 30M</td>
</tr>
<tr>
<td></td>
<td>E-F</td>
<td>104</td>
<td>0 - 25M</td>
</tr>
<tr>
<td></td>
<td>G-H</td>
<td>103</td>
<td>0 - 25M</td>
</tr>
<tr>
<td></td>
<td>I-J</td>
<td>102</td>
<td>0 - 29M</td>
</tr>
<tr>
<td>Grid B</td>
<td>A-B</td>
<td>106</td>
<td>0 - 45M</td>
</tr>
<tr>
<td></td>
<td>C-D</td>
<td>107</td>
<td>0 - 40M</td>
</tr>
<tr>
<td></td>
<td>E-F</td>
<td>108</td>
<td>0 - 17.5</td>
</tr>
<tr>
<td></td>
<td>G-H</td>
<td>109</td>
<td>0 - 27M</td>
</tr>
<tr>
<td>Grid C</td>
<td>A-B</td>
<td>110</td>
<td>0 - 46M</td>
</tr>
<tr>
<td></td>
<td>C-D</td>
<td>111</td>
<td>0 - 14M</td>
</tr>
<tr>
<td></td>
<td>E-F</td>
<td>112</td>
<td>0 - 15M</td>
</tr>
<tr>
<td></td>
<td>G-H</td>
<td>113</td>
<td>0 - 22M</td>
</tr>
<tr>
<td></td>
<td>I-J</td>
<td>114</td>
<td>0 - 17M</td>
</tr>
</tbody>
</table>
presented in meters while depth is plotted in feet. The distance and depth could have been plotted in either metric or imperial measurements but because the survey will be used if and when test quarrying is carried out and the drillers prefer working in imperial measure depth was plotted in feet.

Specific details of the data processing for each section are presented prior to each data set. The final plotted results are appended.

Observations

Grid A

Profiles along base line A-B and all cross lines show a clear reflector at a depth of 6 to 10 feet below surface. This is interpreted as an open sub-horizontal joint dipping to the northeast. Below this to the probing depth of 24 feet there are only faint reflectors which may be hair line cracks or streaking. The sheet below appears to be thick, it's depth is unknown being deeper than the subsurface distance probed.

Grid B

Profiles along base line A-B show 2 clear reflectors, one at a depth of 6 feet and the other at 12 feet. They appear to be discontinuous. Profiles of the cross lines show a number of offset and discontinuous reflectors at various depths to 12 feet. Below 12 feet only an odd faint reflector was observed.

Grid C

Profiles along base line A-B show very few reflectors. In the western part of the grid area there are no reflectors, while to the east only faint discontinuous reflectors are found. One at 9 feet is interpreted as a discontinuous sub-horizontal joint.

Conclusions

The granite appears to be massive with wide spaced sub-horizontal sheets which dip to the northeast. The surface sheet of granite on Grid A comes to surface or near surface between Grid A and Grid C. A 3 foot ledge observed in this area may represent the western limit
of this sheet.

The granite sheet under Grid C is very thick and plunges under the surface sheet of Grid A. In the western part there are no reflectors indicating that sheet thickness is not known but is greater than 24 feet.

The area covered by Grid B shows some discontinuous and sometimes offset sub-horizontal jointing of the granite. Again granite sheets appear to dip gently to the northeast and joints are confined to the upper 12 feet. Below this the granite shows few reflectors indicating a thicker sheet at depth.

Recommendations

The combination of diamond drilling and ground penetrating radar has shown the granite to be worthy of further investigation. A program of test quarrying (block removal) is recommended.
References

1975: Breaks, F.W., Bond, W.D., McWilliams, G.H., Gower, C.F., and Findlay, D.
Operation Kenora-Sydney Lake, Gordon-Big Canyob Lakes Sheet,
District of Kenora; Ontario Div. Mines, Prelim. Map P.1031
Geol. Ser., scale 1 inch to 1 mile or 1:63,360. Geology 1974.

Technical Manual 24
Copyright 1996, Sensors & Software Inc.
CERTIFICATE OF QUALIFICATIONS

I, George Richard Zebruck, of RR#1 Airport Rd. Kenora, Ontario P9N 3W7, hereby certify that:

1. I am a graduate of Lakehead University in Thunder Bay with B.Sc. (1973) degree in Forestry.
2. I have been an active prospector in the Kenora area for nearly 20 years.
3. During the last 10 years my efforts have been directed almost exclusively to exploration and development of granite dimension stone quarries.
4. I have held positions with a number of granite companies including General Manager for Palin Granite Canada Inc.
5. I have had some quarry development training in Finland.
6. I have practical experience in the use of geophysical equipment including magnetic radiometric and ground penetrating radar equipment.
7. I received on site instruction on the use of the pulseEKKO 1000 radar system by the manufacturer and have conducted many surveys on properties held by Nelson Granite Limited both as an aid to quarry operations and in the exploration of new deposits.
8. I hold no interest in the claims covered by this survey.

Signed

This 11th day of November, 1999

at Kenora, Ontario

George R. Zebruck, B.Sc. F
APPENDIX A

Diamond Drill Logs & Profiles
**Nelson Granite Limited**

<table>
<thead>
<tr>
<th>Date Started</th>
<th>Date Completed</th>
<th>Date Logged</th>
<th>Date Submitted</th>
</tr>
</thead>
</table>

**Footage/Avancement**

<table>
<thead>
<tr>
<th>From/De</th>
<th>To/A</th>
<th>Description (Colour, grain size, texture, minerals, alteration, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>26.4</td>
<td>Medium to Coarse Grained Red Granite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red potassic feldspar crystals up to 3/4 inch long</td>
</tr>
<tr>
<td></td>
<td></td>
<td>make up 60-70% of the rock (visual estimate) in a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>medium grained matrix of grey sugary quartz 20-30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and black minerals predominantly hornblende 10%</td>
</tr>
</tbody>
</table>

**Defects**

- Black streak at 2.83 Ft.
- Horizontal Joint at 12.08 Ft.
- Xenolith at 16.6 Ft. to 17.46'
- Other than the defects listed above the granite is uniform in texture and colour from the top of the hole to bottom
- No overburden
- Core size 7/8 inch

**Address/Location where core stored**

- Nelson Granite Quarry
- Vermilion Bay, Ontario

**UTM:** 433721 E Zone 15

**Other notes:**

- For features such as foliation, bedding, schistosity, measured from the long axis of the core.
- Des crédits supplémentaires sont offerts. Consulter les réglements relatifs aux travaux d’évaluation.
- *Exemples de caractéristiques : foliation, schistosity, stratification. L’angle est mesuré par rapport à l’axe longitudinal de la carotte.*
Collared in rock
no overburden

Black Streak 2.83 ft.

Medium to Coarse Grained Red Granite

Horizontal fracture 12.08 ft.

Xenolith 16.6 - 17.46 ft.

Scale: 1 cm. = 1 ft.

End of hole 26.4 ft.
**Nelson Granite Limited**

**Date Hole Started** | Oct. 21, 1999  
**Date Completed** | Oct. 25, 1999

**Rock Type** | Granite

**Description** | Medium to Coarse Grained Red Granite

- Red potassic feldspar crystals up to 3/4 inch long
- 60-70% of the rock (visual estimate) in a medium grained matrix of bluish-grey sugary quartz
- 20-30% and black minerals predominately hornblende
- Fracture at 9.04 ft. (horizontal).
- Quartz in granite has a bluish cast.
- Granite is uniform in texture and colour from the top of the hole to bottom.
- No overburden
- Core diameter 7/8 inch

**Map Reference No.** | G-2626
**Claim No.** | K-1149856

**Location (Twp., Lot, Con., or Lat. and Long.)** | Vermilion Bay, Ontario
| UTM: 433786 E Zone 15
| 5543984 N

**Sample Footage/Length of the Core** | 25.4 ft

---

**Notes:**
- For features such as foliation, bedding, schistosity, measured from the long axis of the core.
- Examples de caractéristiques : foliation, schistosité, stratification. L'angle est mesuré par rapport à l'axe longitudinal de la carotte.

**Additional credit available. See Assessment Work Regulation.**

---

**G-2626 (03/91)**

**For features such as foliation, bedding, schistosity, measured from the long axis of the core.**

**Examples de caractéristiques : foliation, schistosité, stratification. L'angle est mesuré par rapport à l'axe longitudinal de la carotte.**
Nelson Granite Limited
Kilgour Lake Property K-1149856
DDH K-99-02 (Vertical)

Collared in rock
no overburden

Medium to Coarse Grained Red Granite

Horizontal fracture at 9.04 ft.

Scale: 1 cm. = 1 ft.

End of hole 25.4 ft.
Nelson Granite Limited

Date Started: Oct. 26, 1999
Date Completed: Oct. 28, 1999

Exploration Co., Owner or Optionee:
Nelson Granite Limited

Rock Type: Medium to Coarse Grained Red Granite

Description:
Red potassic feldspar crystals up to 3/4 inch long
make up 60-70% of the rock (visual estimate) in a
medium grained matrix of grey sugary quartz 20-30%
and black minerals predominately hornblende 10%

Lost core 18.5 to 19.4 Ft.

Granite is uniform in texture and colour from the
top of the hole to the bottom.

No overburden

Core diameter 7/8 inch
Collared in rock
no overburden

Medium to Coarse Grained
Red Granite

Lost core 18.5 to 19.4 ft.

Scale: 1 cm. = 1 ft.

End of hole. 25.4 ft.
<table>
<thead>
<tr>
<th>Company</th>
<th>Collar Elevation</th>
<th>Boring of hole from true North/Position du forage par rapport au nord vrai</th>
<th>Total Footage/Avancement total du forage</th>
<th>Dip of Hole at Collar/Eclinaison du forage au Collar</th>
<th>Address/Location where core stored/Adresse/endroit où la carotte est stockée</th>
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</thead>
<tbody>
<tr>
<td>Nelson Granite Limited</td>
<td></td>
<td></td>
<td>Vertical 10.7 ft.</td>
<td>0°</td>
<td>Nelson Granite Quarry Vermilion Bay, Ontario UTM: 433593 E Zone 15 5543841 N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exploration Co., Owner or Optionee/Compagnie d'exploration, propriétaire ou titulaire d'option</th>
<th>From/De</th>
<th>To/A</th>
<th>Rock Type/Type de roche</th>
<th>Description (Colour, grain size, texture, minerals, alteration, etc.)/Description (Couleur, granulométrie, texture, minéraux, transformation, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson Granite Limited</td>
<td>0.00</td>
<td>10.7</td>
<td>Granite</td>
<td>Medium to Coarse Grained Red Granite&lt;br&gt;Red potassic feldspar crystals up to 3/4 inch long&lt;br&gt;make up 60-70% of the rock (visual estimate) in a&lt;br&gt;medium grained matrix of grey sugary quartz 20-30%&lt;br&gt;and black minerals predominately hornblende 10%&lt;br&gt;Defects&lt;br&gt;Xenolith 4.27-4.46 Ft.&lt;br&gt;Horizontal fracture at 4.54 Ft.&lt;br&gt;Other than the defects listed above the granite is&lt;br&gt;uniform in texture and colour from the top of the&lt;br&gt;hole to bottom.&lt;br&gt;No overburden&lt;br&gt;Core diameter 7/8 inch</td>
</tr>
</tbody>
</table>

*For features such as foliation, bedding, schistosity, measured from the long axis of the core.<br>Examples de caractéristiques : foliation, schistosité, stratification. L'angle est mesuré par rapport à l'axe longitudinal de la carotte.

<table>
<thead>
<tr>
<th>Address/Location where core stored/Adresse/endroit où la carotte est stockée</th>
<th>G-2626  K-1149856</th>
<th>Map Reference No./N° de référence sur la carte</th>
<th>N° de concession minière</th>
<th>N0 de concession minière</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson Granite Quarry Vermilion Bay, Ontario</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional credit available. See Assessment Work Regulation.
Des crédits supplémentaires sont offerts. Consulter les règlements relatifs aux travaux d'évaluation.
Nota : Dans cette formule, lorsqu'il désigne des personnes, le masculin est utilisé au sens neutre.
NELSON GRANITE LIMITED
KILGOUR LAKE PROPERTY K-1149856
DDH K-99-04 (Vertical)

Collared in rock
no overburden

Xenolith 4.27 to 4.46 ft.
Horizontal fracture at 4.54 ft.

Medium to Coarse Grained
Red Granite

End of hole 10.7 ft.

Scale: 1 cm. = 1 ft.
APPENDIX B

pulseEKKO 1000 specifications
pulseEKKO 1000A addresses high resolution subsurface mapping applications. The pulseEKKO 1000A is optimized for use in urban settings and near man-made structures. This system operates over a frequency range of 110 MHz to 1200 MHz. Applications for use include: utility detection, non-destructive testing, forensics, archeology and road and pavement surveys.

This system offers many features and benefits including:

**Features:**

- fully digital timing control & data acquisition (10 ps to 32000 μs)
- interchangeable shielded antennas with frequencies ranging from 110 MHz to 1200 MHz
- CMP acquisition with antenna separations to 60m
- reduced receiver noise
- remote triggering
- integrated software
- data display as survey is conducted
- seismic stable processing
- PC control
- bistatic configuration
- ergonomic antenna carts
- odometer control
- lightweight, modular, compact design
- 12V battery operation
- backwards compatibility with all pulseEKKO 1000 systems

**Benefits:**

- high quality repeatable results
- adaptable to many shallow mapping applications
- survey optimization and depth control
- improved data quality and timing depth
- permits acquisition from a variety of control sources
- fast, high quality data presentation
- instant assessment of subsurface conditions
- exact definition of subtle features
- simple, user-friendly operation on any IBM compatible PC
- enables CMP & imaging tomography surveys
- spend time getting results and not fighting logistics
- gives quick, reliable positioning and allows for user-definable station spacing
- easy to store, ship and use in tight places
- operate anywhere, without concern for power supply
- extends customer investment longevity
The pulseEKKO 1000 can generate a scan continuously by programming the computer to sequence through continuously increasing time steps and averaging (if needed) at each time point. The result is a scan rate controlled by the speed of the computer.

Number of traces per second that can be collected with the pulseEKKO™ 1000 system, shown with the solid line, using different computer processors (200 pts/trace) are displayed in the figure below.
At Sensors & Software Inc. we continually strive to improve our GPR system performance by investing in product development. Our R & D program has substantially enhanced the pulseEKKO 100 and pulseEKKO 1000 systems, resulting in the designation of new systems as pulseEKKO 100A and pulseEKKO 1000A.

**pulseEKKO 100A**

- Enhanced digital time base
  - minimum sampling interval = 10 ps
    - (80 times smaller)
  - maximum time window = 32 µs
    - (16 times larger)

- Enhanced fiber optics drive
  - allows up to 80 m with standard plastic cable
  - enables cable use to 1000 m with low cost glass cable

- Availability of plug compatible glass cable for unique long cable applications

**pulseEKKO 1000A**

- Enhanced digital time base
  - minimum sampling interval = 10 ps
    - (10 times smaller)
  - maximum time window = 32 µs
    - (160 times larger)

- Enhanced cable drives for improved timing stability

- new receiver technology reduces receiver noise

Existing owners can upgrade their pulseEKKO 100 and pulseEKKO 1000 systems through our upgrade program.
BASE SYSTEM

The pulseEKKO 1000 system operates over a frequency range from 110 MHz to 1400 MHz. The base system is configured with a centre operating frequency of 450 MHz. In order to operate the system, the user must have an IBM compatible PC computer operating under MS DOS version 3.3 or higher and a 12V power source. The computer must have an RS232 port for data transfer, a minimum of CGA graphics for data display and a disk drive for data storage.

The base system comes complete with the items listed below. Optional items for the pulseEKKO 1000 system are then presented.

pulseEKKO 1000 Control Unit: is the heart of the radar system and operates from a 12V DC power source. It controls the digital processing and the digital time sequencing of the transmitter and receiver units and also provides power to these units. It also manages communications with the controlling IBM compatible PC. Front panel connections are available for external odometer wheels, control switches such as the Auxiliary Beep er and Remote Trigger Unit, and high speed data transfer.

pulseEKKO 1000 Transmitter Module: is a self-contained electronics unit which receives its power from the pulseEKKO 1000 control unit. On command from the pulseEKKO 1000 control unit the transmitter generates a 200 volt pulse which drives onto an antenna. A light on this unit indicates when data are being collected. A port is available on this unit to initiate data collection either with a manual trigger (see Auxiliary Beep er and Remote Trigger Unit) or from an external odometer or to enter a fid marker. An identical port is available on the console.

pulseEKKO 1000 Receiver Module: plugs into the pulseEKKO 1000 control unit and receives both its power and timing acquisition signals from the control unit. A light on this unit indicates data are being collected. The receiver module digitizes the incoming radar signals and transmits the digital data back to the control unit. A port is available to connect an Auxiliary Beep er.

450 MHz Antennas: are shielded and come complete with a frame kit which will fix the antenna separation at 25 cm. In addition the antennas can be mounted independently to do CMP, transillumination and multi-fold surveys using the Bi-Static Antenna Frame Kit. The centre frequency is nominally 450 MHz with an approximate bandwidth of 450 MHz.

Bi-Static Antenna Frame Kit: permits the pulseEKKO 1000 electronics modules to be attached to any set of antennas so that antennas can be moved independently. When carrying out tomography or CMP surveys, the handles attach directly to the frame kit.

Adjustable Antenna Handle: attaches to all the antenna frame kits. The antenna handle gives a variable length handle for moving the antennas over the ground or for holding the antennas against a wall or roof. The remote trigger and auxiliary beeper (see below) can be fitted into the antenna handle.

30 m Transducer Cable: connects either the transmitter or receiver electronics modules to the control unit. This multi conductor cable is lightweight and flexible.
Control Unit to External Power Cable: is a cable with a standard pulseEKKO console connector which plugs into the pulseEKKO 1000 control unit. The other end of the cable has a pair of alligator clips which permits attaching the unit to a 12 volt battery or power supply.

Control Unit to Computer RS232 Cable: has a connector which plugs into the pulseEKKO 1000 control unit at one end and a 9-pin female RS232 connector at the other end designed to plug into a standard serial port on an IBM compatible PC.

Auxiliary Beepier and Remote Trigger Unit: plugs into the pulseEKKO 1000 console or into the transmitter module. The beeper portion of the unit beeps when the radar system is acquiring data. This unit is particularly useful if data acquisition in an acoustically noisy environment is anticipated. This allows the operator to know when radar data are being acquired and when to move the antennas. The trigger allows the radar system to be activated from either the antenna location or the console location. The unit can also be connected to the receiver module for the beeper function.

Basic pulseEKKO System Software: provides a complete acquisition through to report quality plotting capability. Hard copy data display is by black and white wiggle trace. In addition the package facilitates data editing and annotation as well as topography compensation, various time gain functions and simple filtering. The base software provides the ability to export data in a variety of formats such as SEG-Y and ASCII to third party programs such as VISTA (see below).

The base software contains:

**EKKO RUN:** The program which controls the pulseEKKO 1000, displays the data with a variety of time gains and stores data on the PC disk for post acquisition processing and plotting. Black and white wiggle trace as well as colour displays are supported.

**EKKO PLOT:** A report quality data display and hard copy generation program. Data can be plotted on any PC compatible printer with a graphics capability. Hard copy display is in wiggle trace format.

**EKKO EDIT:** A general purpose data file editing and manipulation program. Deleting, relabelling, and topographic compensation entry are some of the features of this program.

**EKKO SGY:** This program provides the capability of exporting pulseEKKO data to other processing software. Output in the SEG-Y seismic standard format and in ASCII listing are available.

System User Manual: provides complete instructions for assembly and operation of the pulseEKKO 1000 as well as the operation of software and manipulation of data.
OPTIONAL ITEMS

ANTENNAS

225 MHz Antennas: are shielded and come complete with a frame kit which will fix the antenna separation at 0.5 m. The antenna separation can be adjusted by using the bi-static frame kit (see above) so the antennas can be moved independently to do CMP and multi-fold data acquisition. The centre frequency is nominally 225 MHz with a bandwidth of about 225 MHz. These antennas connect to the pulseEKKO 1000 Transmitter and Receiver Modules in place of the standard 450 MHz antennas supplied with the system.

900 MHz Antennas: are shielded and come complete with a frame kit which will fix the antenna separation at 16.5 cm. The antenna separation can be adjusted by using the bi-static frame kit (see above). In addition the antennas can be moved independently to do CMP and multi-fold data acquisition. The centre frequency is nominally 900 MHz with a bandwidth of about 900 MHz.

POWER SUPPLY

pulseEKKO 1000 Battery Pack: is a custom packaged rechargeable lead acid gel cell unit which attaches directly to the pulseEKKO 1000 console. The battery pack is capable of operating the system for 4 hours. This unit is particularly convenient if operating in areas where power is not available. In addition the integrated package makes operation simple and error proof.

pulseEKKO 1000 110/220 A/C Power Pack: has the same package format as the pulseEKKO 1000 battery pack but has a cord which plugs into the standard 110 or 220 volt power mains. This power pack attaches to the pulseEKKO 1000 console and provides operation of the whole radar system from A/C power.

Control Unit to Power Pack Cable: is a cable with pulseEKKO compatible connectors at both ends which connects the radar control console to either the pulseEKKO 1000 12 volt power pack or the pulseEKKO 1000 110/220 A/C Power Pack.

MISCELLANEOUS

String Odometer Kit: is a simple device which feeds out a thread and produces a trigger for the pulseEKKO system at switch selectable intervals from 1 cm to 10 m. By fixing the odometer chassis to the antenna unit and fastening the string to a stake or fixed point at the end of a survey line, the string odometer enables acquisition of data at fixed spatial intervals.

Cable Reel: is a custom assembly designed to carry two 30 m pulseEKKO 1000 transducer cables. The reel is designed to allow the user to pull out as much cable as is needed for a particular application and leave the remaining part of the cable on the reel and still allow connection to the control unit.
High Speed Acquisition Kit: is designed to allow the user to acquire data at a much higher rate than is possible over the standard RS232 communications port on the PC. The kit consists of an electronics module and optimized high speed software. The high speed acquisition kit is most useful if the radar system is to be towed or carried by a vehicle to acquire data in a "continuous" fashion.

The high speed EKKO RUN program is designed to support the high speed acquisition option of the pulseEKKO 1000 system. This program, when combined with the high speed adapter, uses a high performance IBM PC compatible with VGA graphics to provide high speed acquisition and display of GPR data from the pulseEKKO 1000 system.

The "Fast Port" PC printer port adapter is a small box with a pulseEKKO console compatible connector on one end and a 25-pin connector which plugs into the standard IBM compatible PC printer port. This unit provides a high speed data transfer from the radar control console to the controlling computer. This port gives much higher data transfer rates and hence higher radar tranverse speeds are possible.

EKKO SOFTWARE

EKKO SYN: is a synthetic radar program providing the ability to simulate the response of the ground assuming flat-lying layers. The user enters the dielectric properties and attenuation for any number of layers in the ground and the program generates the impulse response including all multiples. The program also enables convolution with a number of different shaped pulses (including the pulseEKKO pulse) to create a synthetic radargram.

EKKO CMP: is a velocity analysis radar program which allows the user to automatically analyze a CMP sounding to estimate velocity. The individual traces of a CMP sounding are stacked assuming a constant move-out velocity and the program sweeps through a suite of move-out velocities. Optimal stacking velocity is an indication of the best RMS velocity for a given reflector.

EKKO RANG: is a radar range program which allows the user to estimate the depth of exploration of a radar system for a given set of ground conditions and target geometries. This package is a must for any user who wants to attempt to predict performance in various geologic settings.

EKKO COLOR: is color plotting software which allows the user to generate a variety of color displays of GPR data. A color palette of 256 colors selected from a range of 16 million colors can be used for presenting GPR data. In addition the output files are compatible with Geosoft geophysical plotting software and hence are adaptable to a wide variety of image and graphics editing.

EKKO TOOLS: is a library of programs which allows the user to edit and process data. Basic features include spatial and temporal filtering a variety of time gains, section merging, addition and subtraction, attribute analysis and a host of other GPR specific analysis tools. This package is invaluable to the user who plans to do extensive data manipulation and processing.

VISTA GPR: is a complete seismic processing package which operates on an IBM compatible PC. The GPR basic package provides standard filtering both spatial and temporal as well as features such as deconvolution and a variety of gain and scaling functions. The GPR advance module provides the capability of image processing such as FK migration, FK filtering, and other related full section processing. The trace plot and programmer modules are optional items which allow plotting and user programming of functions within the VISTA GPR environment. (See VISTA GPR brochure)
APPENDIX C

Grid A Profiles
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:

Data File = C:\EKKO42\QAR-VB\100.hd

KILGOUR LAKE
LINE A-B 45 DEG
03/11/99

NUMBER OF TRACES = 500
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 49.9000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection

COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:

Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
Position = all
Picture Id : 11/03/99-07:12:32

PLOT LAYOUT PARAMETERS:

Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
   Data File = C:\EKK042\QAR-VB\101.hd
   1
   KILGOUR LAKE
      LINE A-B 45 DEG 50-70M
   03/11/99
   NUMBER OF TRACES = 181
   NUMBER OF PTS/TRC = 312
   TIMEZERO AT POINT = 39
   TOTAL TIME WINDOW = 125
   STARTING POSITION = 0.0000
   FINAL POSITION = 18.1000
   STEP SIZE USED = 0.1000
   POSITION UNITS = feet
   NOMINAL FREQUENCY = 225.00
   ANTENNA SEPARATION = 0.5000
   PULSER VOLTAGE (V) = 200
   NUMBER OF STACKS = 1
   SURVEY MODE = Reflection
   COLLECTED BY PE1000 - CON: 990227 RX: 990228
                               TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
   Trace Stacking : 3
   Points Stacking : 1
   Trace Differencing: N
   Correction : DEWOW
   Gain Type : CONSTANT
      Factor : 10.000
   Selection : Time = all
                  Position = all
   Picture Id : 11/03/99-07:20:26

PLOT LAYOUT PARAMETERS:
   Traces per Inch : 10.000
   Width/Spacing Ratio: 2.000
   Trace Position : 1.000" to 6.000"
   Left/Right Margin : 0.500" / 0.000"
   Border Size : 0.500"
   Page Length/Width : 10.000" / 8.500"
   Printer Name : HP DeskJet 300 dpi
Depth (Ft) \( v = 0.426 \text{ Ft/ns} \)
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:

Data File = C:\EKKO42\QAR-VB\102.hd

1

KILGOUR LAKE
LINE I-J 135 DEG
03/11/99

NUMBER OF TRACES = 291
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 29.0000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection

COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:

Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW

Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
            Position = all

Picture Id : 11/03/99-07:24:43

PLOT LAYOUT PARAMETERS:

Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
Depth (Ft) \( v = 0.426 \text{ Ft/ns} \)
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKK042\QAR-VB\103.hd
1
KILGOUR LAKE
LINE G-H 135 DEG
03/11/99
NUMBER OF TRACES = 251
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 37
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 25.0000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
          Position = all
Picture Id : 11/03/99-07:29:46

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKKO42\QAR-VB\104.hd
1
KILGOUR LAKE
LINE E-F 135 DEG
03/11/99
NUMBER OF TRACES = 250
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 24.9000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
Position = all
Picture Id : 11/03/99-07:35:15

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO  Data Sheet

DATA FILE #1 PARAMETERS:
  Data File   = C:\EKKO42\QAR-VB\105.hd
  1
  KILGOUR LAKE
  LINE C=D 135 DEG
  03/11/99
  NUMBER OF TRACES    = 307
  NUMBER OF PTS/TRC   = 312
  TIMEZERO AT POINT   = 38
  TOTAL TIME WINDOW   = 125
  STARTING POSITION   = 0.0000
  FINAL POSITION      = 30.6000
  STEP SIZE USED      = 0.1000
  POSITION UNITS      = feet
  NOMINAL FREQUENCY   = 225.00
  ANTENNA SEPARATION  = 0.5000
  PULSER VOLTAGE (V)  = 200
  NUMBER OF STACKS    = 1
  SURVEY MODE         = Reflection
  COLLECTED BY PE1000 - CON: 990227 RX: 990228
                       TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
  Trace Stacking : 3
  Points Stacking : 1
  Trace Differencing: N
  Correction      : DEWOW
  Gain Type       : CONSTANT
                   Factor : 10.000
  Selection       : Time = all
                   Position = all
  Picture Id      : 11/03/99-07:40:00

PLOT LAYOUT PARAMETERS:
  Traces per Inch  : 10.000
  Width/Spacing Ratio: 2.000
  Trace Position   : 1.000" to 6.000"
  Left/Right Margin: 0.500" / 0.000"
  Border Size      : 0.500"
  Page Length/Width: 10.000" / 8.500"
  Printer Name     : HP DeskJet 300 dpi
Depth (ft) \( v = 0.426 \text{ ft/ns} \)
### PulseEKKO Data Sheet

**DATA FILE #1 PARAMETERS:**

Data File  = C:\EKKO42\QAR-VB\106.hd

1

- **KILGOUR LAKE AREA B**
- **LINE A-B 70 DEG 45M**
- 04/11/99
- **NUMBER OF TRACES** = 452
- **NUMBER OF PTS/TRC** = 312
- **TIMEZERO AT POINT** = 38
- **TOTAL TIME WINDOW** = 125
- **STARTING POSITION** = 0.0000
- **FINAL POSITION** = 45.1000
- **STEP SIZE USED** = 0.1000
- **POSITION UNITS** = feet
- **NOMINAL FREQUENCY** = 225.00
- **ANTENNA SEPARATION** = 0.5000
- **PULSER VOLTAGE (V)** = 200
- **NUMBER OF STACKS** = 1
- **SURVEY MODE** = Reflection

**COLLECTED BY PE1000** - CON: 990227 RX: 990228

| TX: 990229 ANT: 971232/33 |

**PROCESSING SELECTED:**

- Trace Stacking : 3
- Points Stacking : 1
- Trace Differencing: N
- Correction : DEWOW
- Gain Type : CONSTANT
- Factor : 10.0000
- Selection : Time = all
- Position = all

**Picture Id : 11/04/99-08:20:34**

**PLOT LAYOUT PARAMETERS:**

- Traces per Inch : 10.000
- Width/Spacing Ratio: 2.000
- Trace Position : 1.000" to 6.000"
- Left/Right Margin : 0.500" / 0.000"
- Border Size : 0.500"
- Page Length/Width : 10.000" / 8.500"
- Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKKO42\QAR-VB\107.hd

KILGOUR LAKE AREA B
LINE C-D 160 DEG
04/11/99
NUMBER OF TRACES = 400
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 39.9000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
             Position = all
Picture Id : 11/04/99-08:27:51

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
Depth (ft) \( v = 0.426 \text{ ft/ns} \)
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKKO42\QAR-VB\108.hd
1
KILGOUR LAKE AREA B
LINE E-F 160 DEG
04/11/99
NUMBER OF TRACES = 177
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 17.6000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
           TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
          Position = all
Picture Id : 11/04/99-08:36:52

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
DATA FILE #1 PARAMETERS:

Data File = C:\EKKO42\QAR-VB\109.hd

KILGOUR LAKE AREA B
LINE G-H 160 DEG
04/11/99

NUMBER OF TRACES = 267
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 37
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 26.6000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection

COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 10.000
Selection : Time = all
           Position = all
Picture Id : 11/05/99-07:32:26

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
APPENDIX E

Grid C Profiles
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKKO42\QAR-VB\110.hd
1
KILGOUR LAKE AREA C
LINE A-B 65 DEG 46M
04/11/99
NUMBER OF TRACES = 459
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 45.8000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PB1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 5.000
Selection : Time = all
  Position = all
Picture Id : 11/05/99-07:08:45

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio : 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:

Data File = C:\EKK042\QAR-VB\111.hd

KENGOUR LAKE AREA C
LINE C-D 155 DEG 14M
04/11/99
NUMBER OF TRACES = 138
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 38
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 13.8000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 5.000
Selection : Time = all
Position = all
Picture Id : 11/05/99-07:15:34

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
  Data File = C:\EKKO42\QAR-VB\112.hd
  KILGOUR LAKE AREA C
  LINE E-F 155 DEG 15M
  04/11/99
  NUMBER OF TRACES = 152
  NUMBER OF PTS/TRC = 312
  TIMEZERO AT POINT = 38
  TOTAL TIME WINDOW = 125
  STARTING POSITION = 0.0000
  FINAL POSITION = 15.1000
  STEP SIZE USED = 0.1000
  POSITION UNITS = feet
  NOMINAL FREQUENCY = 225.00
  ANTENNA SEPARATION = 0.5000
  PULSER VOLTAGE (V) = 200
  NUMBER OF STACKS = 1
  SURVEY MODE = Reflection
  COLLECTED BY PE1000 - CON: 990227 RX: 990228
                          TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
  Trace Stacking : 3
  Points Stacking : 1
  Trace Differencing: N
  Correction : DEWOW
  Gain Type : CONSTANT
  Factor : 5.000
  Selection : Time = all
              Position = all
  Picture Id : 11/05/99-07:18:52

PLOT LAYOUT PARAMETERS:
  Traces per Inch : 10.000
  Width/Spacing Ratio: 2.000
  Trace Position : 1.000" to 6.000"
  Left/Right Margin : 0.500" / 0.000"
  Border Size : 0.500"
  Page Length/Width : 10.000" / 8.500"
  Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
Data File = C:\EKKO42\QAR-VB\113.hd
1
KILGOUR LAKE AREA C
LINE G-H 155 DEG 22M
04/11/99
NUMBER OF TRACES = 217
NUMBER OF PTS/TRC = 312
TIMEZERO AT POINT = 37
TOTAL TIME WINDOW = 125
STARTING POSITION = 0.0000
FINAL POSITION = 22.0000
STEP SIZE USED = 0.1000
POSITION UNITS = feet
NOMINAL FREQUENCY = 225.00
ANTENNA SEPARATION = 0.5000
PULSER VOLTAGE (V) = 200
NUMBER OF STACKS = 1
SURVEY MODE = Reflection
COLLECTED BY PE1000 - CON: 990227 RX: 990228
TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
Trace Stacking : 3
Points Stacking : 1
Trace Differencing: N
Correction : DEWOW
Gain Type : CONSTANT
Factor : 5.000
Selection : Time = all
            Position = all
Picture Id : 11/05/99-07:22:10

PLOT LAYOUT PARAMETERS:
Traces per Inch : 10.000
Width/Spacing Ratio: 2.000
Trace Position : 1.000" to 6.000"
Left/Right Margin : 0.500" / 0.000"
Border Size : 0.500"
Page Length/Width : 10.000" / 8.500"
Printer Name : HP DeskJet 300 dpi
PulseEKKO Data Sheet

DATA FILE #1 PARAMETERS:
  Data File = C:\EKKO42\QAR-VB\114.hd
  KILGOUR LAKE AREA C
  LINE I-J 155 DEG 17M
  04/11/99
  NUMBER OF TRACES = 166
  NUMBER OF PTS/TRC = 312
  TIMEZERO AT POINT = 38
  TOTAL TIME WINDOW = 125
  STARTING POSITION = 0.0000
  FINAL POSITION = 16.5000
  STEP SIZE USED = 0.1000
  POSITION UNITS = feet
  NOMINAL FREQUENCY = 225.00
  ANTENNA SEPARATION = 0.5000
  PULSER VOLTAGE (V) = 200
  NUMBER OF STACKS = 1
  SURVEY MODE = Reflection
  COLLECTED BY PE1000 - CON: 990227 RX: 990228
                        TX: 990229 ANT: 971232/33

PROCESSING SELECTED:
  Trace Stacking : 3
  Points Stacking : 1
  Trace Differencing: N
  Correction : DEWOW
  Gain Type : CONSTANT
              Factor : 5.000
  Selection : Time = all
              Position = all
  Picture Id : 11/05/99-07:26:20

PLOT LAYOUT PARAMETERS:
  Traces per Inch : 10.000
  Width/Spacing Ratio: 2.000
  Trace Position : 1.000" to 6.000"
  Left/Right Margin : 0.500" / 0.000"
  Border Size : 0.500"
  Page Length/Width : 10.000" / 8.500"
  Printer Name : HP DeskJet 300 dpi
APPENDIX F

GPR Grid Locations and DDH Location Map
Declaration of Assessment Work
Performed on Mining Land
Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Ontario Ministry of Northern Development and Mines

Transaction Number (office use)

KILGOUR LAKE 900

Instructions: - For work performed on Crown Lands before recording a claim, use form 0240.
- Please type or print in ink.

1. Recorded holder(s) (Attach a list if necessary)

<table>
<thead>
<tr>
<th>Name</th>
<th>Client Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carter B. Nelson</td>
<td>175007</td>
</tr>
<tr>
<td>P.O. Box 178</td>
<td>(807) 227-2650</td>
</tr>
<tr>
<td>Vermilion Bay, Ontario POV 2VO</td>
<td></td>
</tr>
</tbody>
</table>

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

- Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
- Physical: drilling, stripping, trenching and associated assays
- Rehabilitation

<table>
<thead>
<tr>
<th>Work Type</th>
<th>Office Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond Drilling</td>
<td></td>
</tr>
</tbody>
</table>

Dates Work Performed From 19 10 99
Global Positioning System Data (if available)
UTM: 433721 mE Zone 15
5543920 mN

3. Person or companies who prepared the technical report (Attach a list if necessary)

<table>
<thead>
<tr>
<th>Name</th>
<th>Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>George R. Zebruck</td>
<td>(807) 548-4298</td>
</tr>
<tr>
<td>RR#1 Airport Rd. Kenora, Ont. P9N 3W7</td>
<td></td>
</tr>
</tbody>
</table>

4. Certification by Recorded Holder or Agent

George R. Zebruck, do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent

Date Nov. 11, 1999

Agent's Address

RR#1 Airport Rd. Kenora, Ont. P9N 3W7

<table>
<thead>
<tr>
<th>Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(807) 548-4298</td>
</tr>
<tr>
<td>(807) 548-1584</td>
</tr>
</tbody>
</table>

Agent's Address

RR#1 Airport Rd. Kenora, Ont. P9N 3W7
5. Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

<table>
<thead>
<tr>
<th>Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.</th>
<th>Number of Claim Units. For other mining land, list hectares.</th>
<th>Value of work performed on this claim or other mining land.</th>
<th>Value of work applied to this claim.</th>
<th>Value of work assigned to other mining claims.</th>
<th>Bank. Value of work to be distributed at a future date.</th>
</tr>
</thead>
<tbody>
<tr>
<td>eg</td>
<td>16 ha</td>
<td>$26,825</td>
<td>N/A</td>
<td>$24,000</td>
<td>$2,825</td>
</tr>
<tr>
<td>1234567</td>
<td>12</td>
<td>$24,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1234568</td>
<td>2</td>
<td>$8,892</td>
<td>$4,000</td>
<td>0</td>
<td>$4,892</td>
</tr>
<tr>
<td>K-1149856</td>
<td>15 units</td>
<td>$4,426</td>
<td>$4,426</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Column Totals: $4,426 $4,426 0 0

I, George R. Zebruck, do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing

Nov. 11, 1999

6. Instructions for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- [ ] 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- [ ] 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- [ ] 3. Credits are to be cut back equally over all claims listed in this declaration; or
- [ ] 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.
1. Recorded holder(s) (Attach a list if necessary)
   Name: Carter B. Nelson
   Address: P.O. Box 178
   Vermilion Bay, Ontario POV 2VO
   Client Number: 175007
   Telephone Number: (807) 227-2650
   Fax Number: (807) 227-2722

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.
   ✓ Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
   □ Physical: drilling, stripping, trenching and associated assays
   □ Rehabilitation

   Work Type: Geophysical Ground Penetrating Radar Survey

   Dates Work Performed: From 01 11 99 To 11 11 99
   Global Positioning System Data (if available):
   UTM: 433721 mE Zone 15 Township/Area:
   5543920 mN Kilgour Lake Area
   NTS Reference: G-2626

   Office Use
   Commodity: 
   Total $ Value of Work Claimed: 7886
   NTS Reference: 
   Mining Division: Kenora
   Resident Geologist: 
   District: 

   Please remember to:
   - obtain a work permit from the Ministry of Natural Resources as required;
   - provide proper notice to surface rights holders before starting work;
   - complete and attach a Statement of Costs, form 0212;
   - provide a map showing contiguous mining lands that are linked for assigning work;
   - include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)
   Name: George R. Zebruck
   Address: RR#1 Airport Rd. Kenora, Ont. P9N 3W7
   Telephone Number: (807) 548-4298
   Fax Number: (807) 548-1584

4. Certification by Recorded Holder or Agent
   I, George R. Zebruck (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

   Signature of Recorded Holder or Agent:
   Date: Nov. 11, 1999

   Agent's Address: RR#1 Airport Rd. Kenora, Ont. P9N 3W7
   Telephone Number: (807) 548-4298
   Fax Number: (807) 548-1584

   (Evidenced by) Deemed 1 Feb. 13/2000
5. Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.  

<table>
<thead>
<tr>
<th>Number of Claim Units. For other mining land, list hectares.</th>
<th>Value of work performed on this claim or other mining land.</th>
<th>Value of work applied to this claim.</th>
<th>Value of work assigned to other mining claims.</th>
<th>Bank. Value of work to be distributed at a future date.</th>
</tr>
</thead>
<tbody>
<tr>
<td>eg TB 7827 16 ha</td>
<td>$26,825</td>
<td>N/A</td>
<td>$24,000</td>
<td>$2,825</td>
</tr>
<tr>
<td>eg 1234567 12</td>
<td>$24,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>eg 1234568 2</td>
<td>$8,892</td>
<td>$4,000</td>
<td>0</td>
<td>$4,892</td>
</tr>
<tr>
<td>1 K-1149856 15 units</td>
<td>$3,460</td>
<td>$3,460</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Column Totals $3,460 $3,460 0 0

1. George R. Zebruck, do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing Date Nov, 11, 1999

6. Instructions for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- 3. Credits are to be cut back equally over all claims listed in this declaration; or
- 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Deemed Approved Date Date Notification Sent

Date Approved Total Value of Credit Approved

Approved for Recording by Mining Recorder (Signature)
Statement of Expenditures

All diamond drilling work, ground penetrating radar surveys and report was done by George R. Zebruck
RR#1 Airport Rd.
Kenora, Ontario
P9N 3W7
Tel. (807) 548-4298
Fax. (807) 548-1584

Diamond Drilling

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours Worked</th>
<th>Mileage</th>
<th>Work Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 19/99</td>
<td>10</td>
<td>121 Kms.</td>
<td>Mobilization of drill</td>
</tr>
<tr>
<td>20</td>
<td>10½</td>
<td>123</td>
<td>Drilling</td>
</tr>
<tr>
<td>21</td>
<td>10½</td>
<td>125</td>
<td>Drilling</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>123</td>
<td>Drilling</td>
</tr>
<tr>
<td>26</td>
<td>10½</td>
<td>123</td>
<td>Drilling</td>
</tr>
<tr>
<td>27</td>
<td>9</td>
<td>118</td>
<td>Drilling</td>
</tr>
<tr>
<td>28</td>
<td>8½</td>
<td>146</td>
<td>Break down - Mapping</td>
</tr>
<tr>
<td>29</td>
<td>8</td>
<td>147</td>
<td>repair drill Demob</td>
</tr>
<tr>
<td>Nov. 5</td>
<td>3</td>
<td>-</td>
<td>Log Drill Core</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>-</td>
<td>Report</td>
</tr>
</tbody>
</table>

88 hrs. 1026 Kms.

Expenditure Summary

Wages 88 Hours at $24.328/hr. ................................... $2,140.86
Benefits 30% .......................................................... 642.26
Mileage 1026 Kms at .30/ Km. ..................................... 307.80
Consumables 5 drill bits at $100/bit ................................ 500.00
1 reaming shell at $225 ........................................... 225.00
1 2ft. core barrel .................................................. 50.00
4 Wheel ATV including gas 8 days at $40/day ...................... 320.00
Boyles X-ray drill incl. pumps, hose and gas 8 days at $80/day ........................................ 640.00

Total $4,425.92

Ground Penetrating Radar

<table>
<thead>
<tr>
<th>Date</th>
<th>Hours Worked</th>
<th>Mileage</th>
<th>Work Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1/99</td>
<td>8</td>
<td>142 Km</td>
<td>Mob and establish grid</td>
</tr>
<tr>
<td>2</td>
<td>10½</td>
<td>143</td>
<td>Radar &amp; grid</td>
</tr>
<tr>
<td>3</td>
<td>10½</td>
<td>166</td>
<td>Radar &amp; grid</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>147</td>
<td>Radar &amp; grid</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>-</td>
<td>Report</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>26</td>
<td>Report</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>624</td>
<td></td>
</tr>
</tbody>
</table>
Expenditure Summary

Wages 60 Hours at $24.328/hr......................... $1,459.68
Benefits 30%................................................. 437.90
Mileage 624 Kms. at .30/km............................... 187.20
Radar Unit $275/day x 4 days............................. 1,100.00
Computer $25/day x 5 days............................... 125.00
4 Wheel ATV. 4 days at $40/day includes gas........... 160.00

Total $3,459.78

RECEIVED
NOV 15 1999
GEOSCIENCE ASSESSMENT OFFICE
February 7, 2000

CARTER BRENt NELSON
BOX 178 - 66 ARMSTRONG STREET
VERMILION BAY, Ontario
P0V-2V0

Dear Sir or Madam:

Submission Number: 2.19840

Subject: Transaction Number(s):
W9910.00158 Approval

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice. Allowable changes to your credit distribution can be made by contacting the Geoscience Assessment Office within this 45 Day period, otherwise assessment credit will be cut back and distributed as outlined in Section #6 of the Declaration of Assessment work form.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact BRUCE GATES by e-mail at bruce.gates@ndm.gov.on.ca or by telephone at (705) 670-5856.

Yours sincerely,

Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section

Visit our website at:
www.gov.on.ca/MNDM/MINES/LANDS/mlsmnpge.htm
## Work Report Assessment Results

**Submission Number:** 2.19840  
**Date Correspondence Sent:** February 07, 2000  
**Assessor:** BRUCE GATES

<table>
<thead>
<tr>
<th>Transaction Number</th>
<th>First Claim Number</th>
<th>Township(s) / Area(s)</th>
<th>Status</th>
<th>Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>W9910.00158</td>
<td>1149856</td>
<td>KILGOUR LAKE</td>
<td>Approval</td>
<td>February 07, 2000</td>
</tr>
</tbody>
</table>

**Section:**  
16 Drilling PDRILL  
18 Other OGEOT

**Correspondence to:**  
Resident Geologist  
Kenora, ON

**Recorded Holder(s) and/or Agent(s):**  
George R. Zebruck  
KENORA, ONTARIO

**Assessment Files Library:**  
Sudbury, ON

CARTER BRENT NELSON  
VERMILION BAY, Ontario
NELSON GRANITE LIMITED

GROUND PENETRATING RADAR

GRID LOCATION

DIAMOND DRILL HOLE LOCATIONS

K-1149856

GRID A

GRID B

GRID C

 Scale 1:500

Kilgour Lake