ASSESSMENT REPORT
on
THE MT. MEAGER PUMICE PROJECT
(GPC 1, 5, 6, 7, 8 AND 9 CLAIMS)
NORTH SLOPE OF MT. MEAGER
LILLOOET MINING DIVISION
N.T.S. 92J/11W + 12E
Latitude 50°41', Longitude 123°28'

for
GARTH CAREFOOT (owner)
GREAT PACIFIC PUMICE INC. (operator)
790 Millbank
Vancouver, B.C. V5Z 3Z3

Prepared by
JEFFREY P. SCHMOK, M.Sc., P. Geo.
Golder Associates Ltd.
Suite 202 - 2790 Gladwin Street
Abbotsford, B.C. V2T 4S8

Submitted to
GEOLOGICAL SURVEY BRANCH
B.C. MINISTRY OF ENERGY, MINES
AND PETROLEUM RESOURCES
VICTORIA, B.C.

JANUARY 31, 2000
VANCOUVER, B.C.

Fieldwork completed from September 17th, 1999 to September 19th, 1999
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Illustrations and Tables</td>
<td>3</td>
</tr>
<tr>
<td>Summary</td>
<td>4</td>
</tr>
<tr>
<td>Location and Access</td>
<td>5</td>
</tr>
<tr>
<td>Claim Status</td>
<td>6</td>
</tr>
<tr>
<td>History</td>
<td>7</td>
</tr>
<tr>
<td>Regional Geology</td>
<td>9</td>
</tr>
<tr>
<td>Local Geology</td>
<td>12</td>
</tr>
<tr>
<td>1999 Work Program - Ground Penetrating Radar Investigation</td>
<td>13</td>
</tr>
<tr>
<td>Conclusions and Recommendations</td>
<td>19</td>
</tr>
<tr>
<td>References</td>
<td>20</td>
</tr>
<tr>
<td>Appendix I - Statement of Qualifications</td>
<td>22</td>
</tr>
<tr>
<td>Appendix II - Statement of Costs</td>
<td>24</td>
</tr>
<tr>
<td>Appendix III - Recorded Statement of Work - November 1, 1999</td>
<td>26</td>
</tr>
<tr>
<td>Appendix IV - Test Results - Ground Penetrating Radar Investigation</td>
<td>27</td>
</tr>
</tbody>
</table>
LIST OF ILLUSTRATIONS AND TABLES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1 -</td>
<td>Location Map 1:10,000,000</td>
<td>5</td>
</tr>
<tr>
<td>Figure 2 -</td>
<td>Topographic Map 1:50,000</td>
<td>6</td>
</tr>
<tr>
<td>Figure 3 -</td>
<td>Claim Map 1:50,000</td>
<td>6</td>
</tr>
<tr>
<td>Figure 4 -</td>
<td>Survey Plan - GPC 1 and 9 1:14,000</td>
<td>6</td>
</tr>
<tr>
<td>Figure 5 -</td>
<td>Claim Map 1:10,000 - Target Study Area</td>
<td>6</td>
</tr>
<tr>
<td>Figure 6 -</td>
<td>Regional Geology 1:50,000</td>
<td>10</td>
</tr>
<tr>
<td>Figure 7 -</td>
<td>GPR Depths 1:5,000</td>
<td>27</td>
</tr>
<tr>
<td>GPR Profile RL1.pcx</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL2.pcx</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL3.pcx</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL4.pcx</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL5.pcx</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL6.PCX</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL7.PCX</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL8.PCX</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL9.PCX</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>GPR Profile RL10.PCX</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1 -</td>
<td>List of Claims</td>
<td>6</td>
</tr>
</tbody>
</table>
SUMMARY

The Mt. Meager Pumice Project has completed its 3rd year of commercial production.

The Project Prospectus was submitted by Great Pacific Pumice Inc. on January 24th, 1994, the Application for the Mine Development Certificate was submitted on July 28th, 1994 and the Mine Development Certificate was issued on March 16th, 1995. A 60 hectare Mineral Lease (No. 333937) encompassing Great Pacific's Mineral Claims GPC 2, 3 and 4 and covering the main pumice deposit was issued on May 24th, 1995 and the Mine Permit (Q-202) was issued on June 27th, 1995. Mineral Claims GPC 1, 5, 6, 7, 8, and 9 were staked in the name of Garth Carefoot.

The Mt. Meager Pumice Project is located in the upper Lillooet River Valley, about 65 km northwest of Pemberton, B.C. and 160 km north of Vancouver, B.C.

The pumice deposit is related geologically to an explosive eruption of Mt. Meager in 2350 BP, which produced the Bridge River Assemblage. The Assemblage has been subdivided into three volcanic lithologies representing different eruptive events. The first activity is characterized by felsic block, lapilli and ash fallout deposits, which in part formed the pumice deposit. Part of the pumice deposit is also related to a later, relatively low-temperature pyroclastic flow.

Pumice has a wide variety of uses but the three most significant local applications are as an amendment for potting soils, a geotechnical fill and an aggregate in the manufacture of lightweight concrete products and lightweight structural concrete. The Mt. Meager pumice has shown that it is a preferred replacement for the Oregon pumice previously used locally.

The purpose of the Ground Penetrating Radar Investigation was to improve the understanding of the origin and the extent of the deposit and the thickness of pumice and overburden across the pumice fan throughout the area covered by the Claims.

Respectfully submitted,

Jeffrey P. Schmok, M.Sc., P.Geo.
LOCATION AND ACCESS

The Mt. Meager Pumice Project is situated about 160 km north of Vancouver, and 65 km northwest of Pemberton. The Project is accessible on paved roads through Pemberton Meadows and then by gravel logging roads along the Upper Lillooet River valley. Active logging in the area provides seasonal but well-maintained road conditions and a bridge built in 1992 across the Lillooet River provides access to the main pumice deposit and the existing quarry. Continued logging operations will maintain access to the area.

The Project area is mountainous with Mt. Meager to the south of the deposit rising to 2850 metres. The main pumice deposit lies southwest of the Lillooet River at a 750 metre elevation, draped in an apron-shaped manner on the north shoulder of Plinth Peak. Terrain over the deposit is moderate at an average slope of 20 degrees and overburden is less than two metres.

A cut bank on the Lillooet River marks the northern edge of the deposit. This bank is about 450 metres in length and rises from 30 to 90 metres in height. The pumice deposit lies on the upper portion of the bank at an average depth of approximately 30 metres.
CLAIM STATUS

The property, which is the subject of this report, consists of six two-post claims as shown in Table 1 and Figure 3. Garth Carefoot owns 100% of the GPC claims.

TABLE 1

<table>
<thead>
<tr>
<th>Claim Name</th>
<th>Tenure No.</th>
<th>Number of Units</th>
<th>Size</th>
<th>Location Date</th>
<th>Current Expiry Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC 1</td>
<td>332441</td>
<td>1</td>
<td>Two-Post</td>
<td>Nov. 3/94</td>
<td>Nov. 2/09*</td>
</tr>
<tr>
<td>GPC 5</td>
<td>332445</td>
<td>1</td>
<td>Two-post</td>
<td>Nov. 4/94</td>
<td>Nov. 3/09*</td>
</tr>
<tr>
<td>GPC 6</td>
<td>332446</td>
<td>1</td>
<td>Two-post</td>
<td>Nov. 4/94</td>
<td>Nov. 3/09*</td>
</tr>
<tr>
<td>GPC 7</td>
<td>332447</td>
<td>1</td>
<td>Two-post</td>
<td>Nov. 4/94</td>
<td>Nov. 3/09*</td>
</tr>
<tr>
<td>GPC 8</td>
<td>332448</td>
<td>1</td>
<td>Two-post</td>
<td>Nov. 4/94</td>
<td>Nov. 3/09*</td>
</tr>
<tr>
<td>GPC 9</td>
<td>332449</td>
<td>1</td>
<td>Two-post</td>
<td>Nov. 6/94</td>
<td>Nov. 5/09*</td>
</tr>
</tbody>
</table>

* with application of assessment work documented in this report

Well-known contract stakers located the claims.
SKETCH SHOWING MINERAL CLAIMS TO BE STAKED AND THOSE TO BE SURVEYED FOR GREAT PACIFIC PUMICE INC. - MT. MEAGER PROJECT

RECOMMENDED CHANGES SO AS TO INCREASE THE POSSIBILITY OF COMPLETING IN 1994

94° 37' 30"

All distances are in metres.

TARGET STUDY AREA

GREAT PACIFIC PUMICE INC.

MOUNT MEAGER PUMICE DEPOSIT

CLAIM MAP

McGLADREY SURVEYS LTD.

* 1, 1370 MAIN STREET
NORTH VANCOUVER, B.C.
V7J 1C6
Telephone 980-0992, Fax 980-1341

ILE 555 OCT. 29, 1994 dwg.555d3.dat

○ denotes survey post set
□ denotes survey post to be set
◇ denotes claim post to be set
• denotes area to be taken to lease 1994

SCALE 1:1000

DISTRICT LOT 8735
LILLOOET DISTRICT
HISTORY

The pumice deposit has been known since at least 1910 (Robertson, 1911). In 1958, a mineral lease (Lot 8197 Lillooet District) covering the main pumice deposit was issued to Mr. J. MacIsaac. At that time the location was not accessible by road. Mr. MacIsaac died in the late 1970's and in 1980 the Ministry of Lands, Parks and Housing issued a new mineral lease (Lot 2340 Lillooet District) covering the deposit to Pemberton Pumice Mines Ltd., a company controlled by Mr. W.H. Willis.

From 1977 to 1983, a major geothermal exploration program was undertaken in the Mt. Meager area by B.C. Hydro. They constructed roads throughout the area and more specifically they built a bridge across the Lillooet River above Salal Creek which provided access to the subject pumice deposit.

From 1981 to 1984 quarrying of pumice from the deposit took place from the southwest side of the Lillooet River above the B.C. Hydro bridge crossing. The pumice was extracted, screened and trucked to Vancouver. A stockpile was established at the upper end of Pemberton Meadows, where further screening and processing took place. The B.C. Hydro bridge over the Lillooet River washed-out in the mid-1980's, production ceased and the lease was abandoned.

Ten two-post claims were staked over the main deposit during 1988 in the name of Mr. L.C. Bustin.

In September 1990, 53 claim units were staked over other areas of the deposit on behalf of the present owner. A work program was conducted by Levelton & Associates consisting of (1) preliminary geological mapping; (2) photogeological interpretation; and (3) sample collections for laboratory tests which included (a) crushing for size fractions of production products, (b) gradation, (c) absorption, (d) density, (e) concrete and block trial mixes, (f) compressive strength, and (g) abrasion resistance. This work was reported in a Geotechnical Assessment Report in September 1991.

The Bustin claims were abandoned in September, 1991 and 19 two-post claims were subsequently staked over the main deposit on behalf of Great Pacific Pumice Inc. During 1992, further sampling and testing was undertaken to evaluate the suitability of the material for stone washing denim jeans and as a marine oil spill absorptive agent. This work was reported in an Assessment Report by New Global Resources dated December 1, 1992.
In September 1992 a new bridge over the Lillooet River was constructed by Terminal Forest Products at a canyon below Salal Creek and above Key Hole Falls. By November, 1992 a 1.0 km road was completed to the new bridge and 0.5 km from the new bridge through to the B.C Hydro road giving access to the quarry, which had been developed by Pemberton Pumice Mines Ltd.

During 1993, with approval of the Ministry of Energy, Mines and Petroleum Resources, a 1000 tonne sample (1100 cubic metres) was extracted from the quarry by the present owner, transported to a site 12 km east of Pemberton and screened and crushed into several trial products.

During 1995 the Mt. Meager pumice was evaluated for its pozzolanic activity by Agra Earth & Environmental Limited. An analysis of pumice as an aggregate in the manufacture of lightweight concrete products was also completed. These results were reported in an Assessment Report by Homegold Resources Ltd. on January 30, 1996.

All necessary permits have been obtained and production commenced in June, 1996.
REGIONAL GEOLOGY

The Mt. Meager volcanic complex is situated at the northern end of the Garibaldi Volcanic Belt (Read, 1977). Previous regional geological studies have focused on geothermal energy potential, recent volcanic stratigraphy (Green et al, 1988) and volcanic hazard potential.

Stasiuk and Russell (1990) report that the Mt. Meager volcanic complex erupted 2350 BP to produce the Bridge River Assemblage. This Assemblage comprises at least three primary volcanic lithologies representing different eruption styles. The oldest stratigraphic unit is a pyroclastic air-fall produced by five discrete phases of eruption, each beginning with phreatomagmatic activity and progressing to magmatic pyroclastic eruptions. The second unit is a pyroclastic block and ashflow deposit, which has entrained large, charred logs and pumice blocks and outcrops up to 7 km from the vent area. Dacite lavas that form steep bluffs in the present-day Lillooet valley represent the third and youngest unit. Regional subdivisions by Read (1977) in order of decreasing age are as follows:

Meager Creek Volcanic Complex

1. **Basal Breccia**: Locally preserved remnants of breccia up to 300 m thick overlie basement on the south side of the complex. Clasts of granite, grey or green aphanite volcanic, and minor metamorphic rocks lie in a tuffaceous matrix. South of Pylon Peak, where the brecia is thickest, clasts less than 0.5 m long increase in size downwards to jumbled blocks of quartz diorite up to 20 m long with less than 10 percent matrix. This area, where basement is lowest, may represent a partly exhumed vent.

2. **Porphyritic Quartz Dacite**: In the southwest corner of the map-area, a grey-green dacite with sparse phenocrysts of quartz, plagioclase and hornblende forms a remnant of subhorizontal flows up to 200 m thick. Gently dipping acid tuff and breccia overlap the older dacite along a subvertical eastern contact.

3. **Acid Tuff and Breccia**: On the south and west flanks of Pylon Peak and the Devastator is a cream to yellow ochre weathering assemblage up to 500 m thick of acid volcanic rocks. They are hydrothermally altered quartz latite with locally preserved quartz, plagioclase and biotite phenocrysts. Silicification, pyritization and the development of ubiquitous clay minerals and sporadic carbonates characterize
4. Aphanitic Flows and Minor Intrusions: Medium to dark grey aphanitic flows here and there overlie the basal breccia and acid volcanic units and a few dykes less than 50 m thick cut both units. On the south-southeast ridge of The Devasator, a lens of conglomerate composed of subrounded pebbles and cobbles of this lithology overlies the acid volcanic unit.

5. Porphyritic Plagioclase Andesite: Porphyritic plagioclase andesite, the most extensive unit of the complex, forms most of the southern and western parts of the complex. Best outcrops are on Pylon Peak and The Devastator. Gently dipping flows are more extensive than basal and intercalated breccia and tuff, and dykes and plugs are restricted to The Devastator and possibly Peak 7927' at the head of Job Glacier. The maximum thickness may exceed 1,200 m of flows south of Capricon Creek. Flows are commonly flow-layered or have a subparallel platy jointing and thin reddened breccia and tuff lenses may separate flows up to 20 m thick. Monomictic breccias up to a few hundred metres thick of porphyritic plagioclase andesite clasts lie at or within a hundred metres of the base of this sequence. The monomictic composition and differential weathering of the clasts distinguish this breccia from the basal breccia unit. Close to The Devastator, angular clasts up to several metres long are common in breccia. The concentration of hypabyssal intrusions and coarse volcanic breccia in the vicinity of The Devastator favour it as a major andesite vent. Potassium argon dates of 4.2 ± 0.3 m.y. and 2.1 ± 0.2 m.y. (Anderson, 1975) indicate a long period of andesite volcanism spanned by this unit.

6. Hornblende-Biotite Rhyodacite: Surrounding Mount Job in the centre of the complex is ochre-yellow weathering flows of porphyritic hornblende-biotite quartz rhyodacite. They are prominently flow-layered and locally have columnar jointing. At the head of Affliction Glacier, the unit attains a maximum thickness of 500 m. On the east side of the Glacier, it unconformably overlies porphyritic andesite and at the head of Affliction and Capricorn glaciers it is truncated by porphyritic biotite dacite of Mount Capricorn.

7. Porphyritic Biotite Dacite of Mounts Capricorn and Job: The final 600 vertical metres of Mounts Capricorn and Job are brick-red to maroon-grey weathering dacite. Coarse phenocrysts (5 mm) of plagioclase, quartz and biotite characterize
Figure 6  Local geology and sample locations (modified from Stasiuk et al., 1994)
this vesicular dacite. Angular clasts of dacite up to 2 m long form a basal breccia up to 100 m thick. Similar breccia is interspersed throughout the dacite. On Mount Job, local platy and columnar jointing and layering suggest that flows form the bulk of the massif, but their absence on Mount Capricorn may favour this as a source of the eruptive rocks.

8. Porphyrritic Dacite of Plinth and Meager Mountains: The top 600 m of Meager Mountain and the bulk of Plinth consists of a light grey porphyritic dacite with medium-grained (2-4 mm) phenocrysts of plagioclase, quartz, minor biotite and rare hornblende. The dacite is commonly vesicular, has a glassy matrix and is distinguished from other dacites by scattered, rounded inclusions of fine-grained hornblende anesite. On Meager Mountain, the absence of flows or breccia, and the development of steeply inclined flow layering suggest that it is a plug or lava dome. In contrast, Plinth Mountain consists of prominent columnar-or platy-jointed flows and widespread breccia and ash on its northern flank.

The Bridge River ash (which in part composes the pumice deposit) incompletely blankets the area between the north and east ridges of Plinth. Within this area, crudely stratified breccia and ash deposits are up to 20 m deep on some ridges. Over 90 percent of the clasts are cream-weathering, porphyritic (plagioclase, hornblende, pyroxene) dacite pumice. They range in maximum size from 100 mm on the summit of Plinth Mountain (Nasmith et al., 1967) through 1 m at the 6,500 foot level on the north ridge crest to 4 m blocks on the north side of the creek crossing the Fall Property at 4965'. Two percent of the clasts are subrounded pebbles and cobbles of a porphyritic quartz monzonite exposed along the creek. These data strongly indicate the lower part of the valley as the source of the Bridge River ash.

Fall Creek flows down the southern margin of a scoriaceous dacite flow, which floors the present valley. Because Bridge River ash is absent, the flow must be younger than the ash and probably covers the ash vent. Much of the edifice of Plinth Mountain is probably postglacial and that of Meager Mountain may be as well.

9. Olivine Basalt: A sparsely porphyritic plagioclase and olivine basalt underlies part of the ridge separating Job and Mosaic creeks. Flat-lying to southeasterly dipping flows parallel the present topography. On the northwest side of the ridge, basalt scoria and bombs comprise a breccia, which overlies the flows, and till.
LOCAL GEOLOGY

The Bridge River Assemblage consists of three primary lithologies (in order of deposition): airfall pumice; pyroclastic block and ash flow; and dacite lavas. The eruption is believed to have originated from the northeastern shoulder of Plinth Peak at an elevation of approximately 1500 metres.

As the eruption occurred, the pumice was carried away from the vent to form a plume that trends to the northeast with an axial direction of approximately 63 degrees Azimuth. The pumice was deposited in a thick mantle on the existing topography overlying a rock avalanche. Much of the airfall pumice was deposited on near vertical rock faces and subsequent effect of creep and sliding has resulted in small scale laminations within the pumice deposit. The upper layers of pumice overlays a reworked layer of pumice and clay.

The pumice deposit can be described as being composed of angular, well-sorted pumice clasts forming a matrix free, open framework. The pumice itself is light in colour, usually white to reddish/orange and fibrous in texture. Large pumice clasts often display 'breadcrust' texture. The pumice also contains accidental clasts of Plinth Assemblage volcanic rocks, quartz monzonite, and soil. Pumice clasts of up to 40 cm have been observed.

Accidental lithic clasts compose approximately 2 percent of the deposit and include clasts of Plinth Assemblage lavas, breadcrusted grey clasts petrographically identical to the pumice, rounded granite cobbles, and rare baked to charred, clay-rich soil clasts.

All rocks of the Bridge River Assemblage share a common mineralogy. Glass is a major constituent and comprises 80-90 percent of the rocks and is generally colourless. Plagioclase is the most common mineral with other minerals including orthopyroxene, amphibole, and biotite.

In 1994, two reports added significantly to the understanding of the Mt. Meager Volcanic Complex. Stasiuk et al (1994) mapped the Bridge River Volcanic Assemblage identifying new deposits and stratigraphic relationships for 10 km along the Lillooet River above Meager Creek. Luty (1994) investigated the characteristics of the Mt. Meager airfall pumice in regard to the eruption, layering and sorting of the pumice.
REPORT ON THE 1999 GROUND PENETRATING RADAR INVESTIGATION

This report presents the results of a geophysical investigation conducted by Golder Associates Ltd (Golder) between September 16 and 19, 1999 at the Mt. Meager Pumice Project site. The site is located approximately 65 kilometres northwest of Pemberton and south of the Lillooet River (Figure 1). The GPR survey profiles were completed in the area of the planned new quarry and across the pumice fan to the east and south of the existing quarry.

The purpose of the GPR investigation was to determine the thickness of pumice overburden on profiles across the area of a proposed new quarry and across the pumice fan. The profiles would provide a 2D indication of the pumice distribution on the fan.

The survey area is mostly overgrown with thick vegetation, therefore limiting the survey lines to road surfaces cut through the forest. The pumice is expected to overlie a colluvial paleosol developed during the Holocene up to the time of the pumice eruption approximately 2350 B.P. Further soil development has occurred on top of the pumice fan, varying in thickness between a few decimetres to over a metre, depending on the surface slope and gravity driven accumulation/depletion.

The GPR method was selected for this investigation since dry, porous pumice will be relatively transparent to GPR while the underlying paleosol will be relatively reflective. In addition, GPR provides good vertical and lateral resolution of subsurface reflectors compared to most other techniques. Dr. J.K. Russell had obtained trial GPR profiles at a nearby site with good results.

No boreholes have drilled on the pumice fan, so calibration of the GPR traces against known stratigraphy was limited to exposures cut by the Lillooet River and in the existing quarry. The main limitation to GPR in this environment is the possibility of clayey materials in the surface soils that would limit GPR penetration into the pumice deposit. The trial GPR profiles obtained near the pumice quarry do show that penetration to a strong underlying paleosol reflector was not possible with the PulseEKKO IV system with 100 MHz antennas and a 400 volt transmitter.

2. GROUND PENETRATING RADAR METHODOLOGY

The GPR technique uses electromagnetic (radar) pulses directed into the ground to map stratigraphy and changes in subsurface conditions along a profile line. The radar pulses are produced by a transmitting antenna at the ground surface. These pulses travel into the subsurface as a wavefront and are partially reflected from interfaces and other subsurface features. Reflections arise due to contrasts in the dielectric constant of subsurface materials. These contrasts are usually due to stratigraphic variations in soil moisture content, and there are often reflectivity contrasts between porous materials and relatively impervious materials, particularly in moist environments. The reflected waves return to the surface, and are detected with a receiver antenna. The response at the receiver antenna is recorded as a function of time, creating a GPR trace at each station along line.
Individual traces are displayed side by side, creating a profile of the subsurface below the line.

Depth is determined by calibration to an object, or interface, of known depth, or by assigning a typical velocity for the type of subsurface materials present. Stationing along line is recorded with the data stream, making it possible to map and locate interpreted features observed on the records. The GPR interpretation is typically presented in cross-sectional view as annotated GPR records.

The maximum depth of penetration of GPR is determined by the electrical conductivity of subsurface materials. The electrical conductivity is generally greater with increasing moisture content, an increasing concentration of dissolved salts, and an increase in the fraction of clay minerals present. As conductivity increases, the intrinsic attenuation increases, thus reducing the effective radar sounding range. In the pumice soils of Mt Meager, the amount of liquid water present is greatly reduced, and for this reason penetration on the order of tens of meters could be expected.

Geology and/or soil conditions can only be interpreted from geophysical data if there is an understanding of the relationship between these variables and the physical property being measured. In a GPR investigation the physical property being measured is the dielectric contrast which produces the GPR reflections. GPR reflections discussed above are generated by changes in the dielectric constant of the ground. Conditions that produce changes in the dielectric constant are generally similar to the conditions that produce changes in the electrical conductivity/resistivity.

3. GPR EQUIPMENT AND PROCEDURES

The GPR survey was conducted with a PulseEkko 100 radar system, manufactured in Canada by Sensors and Software Inc. The PulseEkko 100 is generally considered to be the most efficient GPR on the market, achieving better penetration and signal-to-noise ratios than other comparable systems. The PulseEkko system is controlled from a laptop computer where all system variables are determined, and collected data is displayed and written directly to the computer during acquisition. The Mt Meager survey was conducted with the standard 1000 volt transmitter combined with the 50 MHz antenna set at both the transmitter and receiver.

The GPR survey lines were run along the available roads across the pumice deposit and along a cut-line through the undergrowth. Wooden stakes labeled with line number, station, and flagged with orange flagging tape were left at critical locations on each line. The individual GPR lines are labeled according the line number and station location. Position marks along each GPR line correspond to the distance from the line start, usually the north end of the line. No geodetic survey of the GPR line locations was conducted, however the lines were identified on low level air photos and local maps with adequate accuracy for interpretation.

The GPR survey was conducted on foot by moving along the survey line and acquiring stacked GPR data at a fixed spacing. A step size or station spacing of 0.5 metres was used for the majority of surveys, and expanded to 1.0 metres on a few line ends. Antenna
separation was kept constant at 2 metres for the 50 MHz surveys using a fixed antenna handle. The console electronics, computer, and batteries were transported using a plastic and wood wheelbarrow with a pneumatic tire.

Each trace was stacked 32 to 64 times to improve the signal to noise ratio, and a time window of up to 3000 nanoseconds was collected for each trace. No acquisition filters were applied to the data and the GPR data were saved directly to the computer. A single common mid point (CMP) survey was conducted and radar velocity determined using the $X^2T^2$ method. Without borehole logs for a velocity calibration, the final GPR velocity estimate was determined from other relatively dry porous material at 0.095 metres per nanosecond. It must be noted that without a borehole to calibrate the GPR stratigraphy the depths given on the GPR sections could vary by as much as 10-20 percent.

The ground topography along the GPR lines was taken from the available contour maps of the site, and incorporated into the data files during post-processing. Comparison with field observations of the line slopes indicates that the contour map topography is too inaccurate for reliable interpretations. Consequently the lines are presented here without topographic correction.

The GPR processing stream included line stretch correction, profile reversal, file merging, low pass filtering, topographic correction, and gain adjustment. The profiles were initially plotted with AGC (automatic gain control) in order to find and examine all reflectors, then plotted with SEC (spreading and exponential compensation) in the final plots to make comparisons easier.

Data interpretation begins by identifying the ground surface on the profiles as the first radar arrival. Then using an average radar velocity for the ground, a depth scale is plotted on the vertical axis of the GPR data plot. The horizontal axis corresponds to the trace position along the line and is labeled in metres. In general, contiguous and coherent reflectors are interpreted in this survey as the underlying paleosol contact. Small boulders/cobbles and discontinuous sedimentary structures cause scattering or chaotic returns, and this character can also be used to distinguish different sedimentary units even without contiguous reflectors. Hyperbolic reflections produced by boulders, silt lenses, and vertical discontinuities within the pumice (as well as tree trunks above the ground surface) are virtually non-existent.

Direct observations of the subsurface stratigraphy are normally required for physical interpretation of reflectors. As with other remote sensing techniques, the GPR profiles are interpreted in terms of soil and ground materials through ground-truth information obtained by direct sampling. This is used directly to constrain and substantiate the interpretation.

4. GPR FIELD RESULTS

A total of 2410 line-metres of GPR data were collected in step acquisition mode, including 5 short lines collected within the existing quarry floor (Figure 1). In the area of the proposed new quarry, GPR data were collected on three lines running generally across the
slopes and one line approximately perpendicular to these. The GPR lines are labeled RL1 to RL10, and distances on each line are in metres from the line start.

All the GPR profiles are included as an Appendix to this report. The GPR results for RL1.pcx to RL5.pcx have been plotted on Figure 7. All data were processed and plotted using the PulseEkko radar software system, and some exploratory analysis was undertaken using the Gradix radar processing package from Interpex.

The following general comments can be made about the acquired GPR data and their interpretation for subsurface features of interest:

- In essence, the GPR data quality is controlled less by depth of penetration and more by clutter from within the pumice deposits, usually in the form of discontinuous reflections.

- The multiple reflections and scattering seen within the pumice deposit can be used to typify these materials, and distinguish the pumice from the underlying glacially derived paleosols and local bedrock.

- The maximum penetration through the surface soils and pumice deposit is approximately 25 metres, as seen on the lines immediately upslope of the pumice cut bank on the Lillooet River.

- The surficial layer of soils limited penetration on portions of some lines, and proved to be most difficult on the RL2 line cut through the undergrowth for this survey.

- The paleosol surface underlying the pumice is generally apparent in most of the GPR profiles as a contiguous reflector layer above which exists a characteristic scatter of discontinuous reflectors identified as the pumice deposit.

6. INTERPRETATION OF GPR RESULTS

Interpretation of the GPR survey profiles is based on geophysical principles and experience, combined with stratigraphic exposures in the pit wall and riverbank, and a general geomorphology of the pumice deposit. The line by line description begins with GPR profiles with the most obvious interpretation and is followed by the more complex profiles. This is then followed by a final comment on the overall interpretation of the deposit based on the GPR profiles.

6.1 GPR profile RL3

A bedrock exposure can be seen in the roadcut at the western end of this line. The pumice is very thin until a distance of 110 metres where a strong reflector dips to a depth of approximately 15 metres within a line distance of 40 metres. This reflector is interpreted as the paleosol delineating the base of pumice.
The pumice thickness reaches a maximum thickness of approximately 20 metres at a line distance of 380 metres. The 20 metre thickness is perpendicular to the underlying slope, and is not the vertical thickness.

Between 500 and 565 line-metres, the paleosol reflector rises to less than a metre from the surface, indicating little or no pumice. By 630 line-metres, the pumice thickness increases to 12-14 metres. By the end of the GPR line, two more shallowing undulations of the paleosol reflector are apparent.

6.2 GPR profile RL5

Profile RL5 begins at the eastern end of RL3, and the same reflector interpreted as the base of pumice can be traced on the RL5 line. The beginning of RL5 is immediately upslope of the pumice cutbank exposed by the Lillooet River. A maximum perpendicular thickness of approximately 20 metres corresponds to the interpreted paleosol reflector. It should be noted that an alternate interpretation of the pumice base is possible here, using the presence/absence of scatters, and would yield a possible pumice thickness of up to 25 metres.

The pumice thins to zero at a line distance of 260 metres, and then a pocket reappears on the section between 310 and 400 line-metres. This pocket reaches a thickness of up to 12 metres.

6.3 GPR profile RL4

Profile RL4 begins at the intersection of RL3 and RL5, then extends upslope and away from the pumice cutbank. The quality of GPR data is not as good in this slope parallel orientation, possibly indicative of pumice imbrication or some other non-isotropic property in the pumice deposit.

A base of pumice reflector can be interpreted on RL4 and maintains a depth of approximately 12-15 metres for much of its length. By 300 line-metres the pumice reflector is close to, or at the ground surface.

6.4 GPR profile RL1

Profile RL1 begins at westernmost switchback on the quarry road, and continues along the quarry road to intersect profile RL5. The profile passes immediately upslope of the south quarry wall between 100 and 165 line-metres, and intersects profile RL2 at 208 line-metres.

The paleosol reflector used to identify the base of pumice in the previous lines is not as clear in RL1 as before. Two and sometimes three contiguous reflectors can be traced through much of the RL1 profile. A shallow reflector at depths varying between 4 and 8 metres occurs within the scatterers thought to be characteristic of the pumice materials, and therefore is interpreted as a layer within the pumice.
A deeper reflector extends to a depth of approximately 25 metres, but is not contiguous across the section. It is possible that the GPR energy is not penetrating beyond the organic surface soils in some places and results in gaps in the base of the pumice reflector. This reflector is at a depth of up to 25 metres where it passes above the current quarry. Eastwards of this, the pumice appears to become thinner, although gaps in the reflectors may be a result of the wetter organic soils at the ground surface.

6.5 GPR profile RL2

This profile begins at the 208 metre mark of profile RL1 and extends upslope along a cutline through the dense avalanche-slope underbrush. Again, the slope-parallel line orientation appears to be reacting to some non-isotropic property of the pumice deposit, and degrades the GPR data quality.

A shallow reflector can be traced at depths of 8 to 12 metres along most of the profile. A deeper reflector appears to reach depths of up to 40 metres, however there is too much noise in the GPR profile to assess the stratigraphic significance of it.

6.6 GPR profiles RL6-10

These profiles are all short lines acquired on the floor of the current pumice quarry. They provide confirmation of the layered internal stratigraphy and non-isotropic character of the pumice deposit, however they are too short to interpret reflectors on the basis of contiguousness.
CONCLUSIONS AND RECOMMENDATIONS

The overall interpretation of the Mt Meager GPR profiles can be summarized as follows:

1. The objective of the GPR investigation was to determine if GPR could be used to delineate the thickness of pumice colluvium on the north slopes of Mt Meager.

2. GPR profiles RL3 and RL5 reveal a contiguous subsurface reflector that can be interpreted as the base of pumice. These lines cross the entire width of the pumice deposit, and reveal a series of undulating paleosurfaces with pumice thicknesses of up to 25 metres, perpendicular to the paleosurface slope.

3. GPR profiles RL1, RL2, and RL4 are not as easily interpreted, however there are subsurface reflectors that correlate with the interpretations from profiles RL3 and RL5. Lines RL2 and RL4 are oriented slope-parallel and reveal a strong non-isotropic character within the pumice deposit.

4. The surface soil overburden is variable in thickness (up to 2 metres) and moisture content, and in places is significant enough to block penetration of the GPR signal.

5. The stratigraphic and depth interpretation of GPR profiles can be refined if drilling logs become available, and the pumice velocity of 0.095 m/ns in particular would be improved and provide more accurate depth estimates.

Respectfully submitted,

Jeffrey R. Schmok, M.Sc., P.Geo.
REFERENCES


Stasiuk, M.V. and Russell, J.K., 1990. The Bridge River Assemblage in the Meager
Mountain Volcanic Complex, Southwestern British Columbia. Geological Survey

---------------------, 1994. Preliminary studies of Recent volcanic deposits in
southwestern British Columbia using ground penetrating radar. Geological Survey

--------------------- and Hickson, C.J., 1994. Influence of Magma Chemistry
on Eruption Behavior from the Distribution and Nature of the 2400 Y.B.P.
Eruption Products of Mount Meager, British Columbia, Geological Survey of
Canada Open File 2843, 38 pp.
APPENDIX I

STATEMENT OF QUALIFICATIONS

Jeffrey P. Schmok, M.Sc., P.Geo.

MOUNT MEAGER PUMICE PROJECT
STATEMENT OF QUALIFICATIONS

I, Jeffrey P. Schmok of Golder Associates Ltd., in the City of Abbotsford, in the Province of British Columbia, do hereby certify:

1. I am a graduate of the University of British Columbia, M.Sc. (1986) in Geophysics/Geomorphology and the University of Ottawa (Honours BA, 1983).

2. I have over 16 years experience in geophysical methods, including exploration for base and precious metals and other commodities in the Cordillera of Western North America.

3. I am a member in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (Member No. 19195).

4. I am an independent consulting geophysicist employed since November, 1993 by Golder Associates Ltd.


6. I have visited the property, and personally conducted the Ground Penetrating Radar investigation and supervised the subsequent interpretation. I am familiar with the geological and volcanological work conducted on the Mount Meager pumice property.

7. I do not own or expect to receive any interest (direct, indirect or contingent) in the property described herein nor in securities of Great Pacific Pumice Inc. in respect to services rendered in preparation of this report.

8. I consent to authorize the use of the attached report and my name in the company's Statement of Material Facts or other public documents.

Dated at Vancouver, British Columbia, this 27th day of January, 2000.

Jeffrey P. Schmok, M.Sc., P.Geo.
APPENDIX II

STATEMENT OF COSTS

August 15, 1999 to October 27, 1999

GPC 1, 5, 6, 7, 8 and 9 Claims
Lillooet Mining Division

Prepared by Garth Carefoot (owner)
Great Pacific Pumice Inc. (operator)
VALUATION OF WORK

Site Visit by M. Maxwell Phd.,P.Geo.,R.M.C. - Goldent Associates $500.00

Jeff Schmok + Two Field Assistants
  Admin/Logistics/Prep: 4 hours @ $110/hour ----------------------------- 440.00
  Field Work - GPR: J. Schmok 20 hours @ $110/hour - two day survey 2,200.00
  - Field Assistants - two @ $975 - three days 2,925.00
  Site Clearance for Survey - Hough 100C Loader - 3 hours @ $110/hour 330.00
  Equipment - GPR + 2 antenna - 2 days @ $600/day ----------------------------- 1,200.00
  - Misc. equipment 50.00
  - Consumables 25.00
  - Mob/Demob 150.00
  Data Analysis/Interpretation - 16 hours @ $110/hour 1,760.00
  Travel Time to Site - 8 hours @ $110/hour 880.00
  Field Vehicle - 3 days @ $75/day 225.00
  Per Diem - 3 people @ $90/day - two days 540.00
  Communication/Courier 90.00
  Report Writing - 6 hours @ $110/hour 660.00
  Drafting, Word Processing - 2 hours @ $65/hour 130.00
  Review - 1.5 hours - two @ $130 195.00
Subtotal $12,300.00

GST @ 7% 861.00
TOTAL COSTS FOR ASSESSMENT $13,161.00
APPENDIX IV

TEST RESULTS

GROUND PENETRATING RADAR INVESTIGATION