Geological Evaluations
of
Natural Rhyolite Pozzolan
Twin Lakes Area

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Osoyoos Mining Division
British Columbia

Mineral Titles Reference Map M082E032
Lat. 49° 19.1' N, Long. 119° 45.4' W

-for-
owners/operators
B.N. Church and D.R. Haughton

TITLES DIVISION, MINERAL TITLES
VICTORIA, BC
MAR 2 4 2009
FILE NO.
LOG IN NO.

Prepared by
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Victoria, B.C.
December 31st, 2008

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Summary

This is part of a continuing investigation of the industrial mineral potential of the Olalla Formation in the western part of the Penticton Tertiary outlier.

The Olalla Formation is mostly altered rhyolite lava and tuff breccia capped by an obsidian dome. When these rocks are crushed and mixed with lime, the glassy fragments and rock powder react, when water is added, to form cementing calcsilicate minerals. Tests for pozzolanic activity and compressive strength produce values well within ASTM standards for pozzolanic cement.

Introduction

The Twin Lakes property is located in the central part of the Okanagan-Similkameen Regional District that extends from Osoyoos at the US border, north to Summerland and west to Manning Park. Penticton is the major center - Oliver, Princeton, Keremeos, Cawston and Hedley are other notable communities in the district. The regional economy is varied and includes agriculture, tourism, light manufacturing, forestry and mining.

This report is an update of previous research with the focus on the industrial mineral potential of rhyolite and dacitic rocks of the Penticton Tertiary outlier. In particular, several zeolite (clinoptilolite) localities were identified in a 5-km-long belt of Eocene dacitic tuff by Manuel Creek northeast of Keremeos (Church, 2002a). This was followed by examination of an area of rhyolite obsidian, previously dated as Miocene age, in the Twin Lakes area. Chemical analyses of the glassy rocks indicated a possible perlite resource (Church, 2003). The surrounding area is underlain by large thickness of breccia and tuff petrographically similar to the Manuel Creek deposit.

The current study is a survey of the Twin Lakes volcanic complex (Olalla Formation) with a view to further evaluation the perlite, zeolite and pozzolan potential of these rocks. This was achieved by chemical analyses, petrography, X-ray diffraction analysis, cation exchange capacity (CEC) estimates and pozzolanic activity- and strength-curing time testing.

The Property

The property, owned jointly by B.N. Church and D.R. Haughton consists of 14 two-post claims (Table 1) of 25 hectares each located about 14 km west of the town of Okanagan Falls in the Osoyoos Mining Divison of the southern interior of British Columbia (Figs. 1 and 2).

Figure 1

Location Map

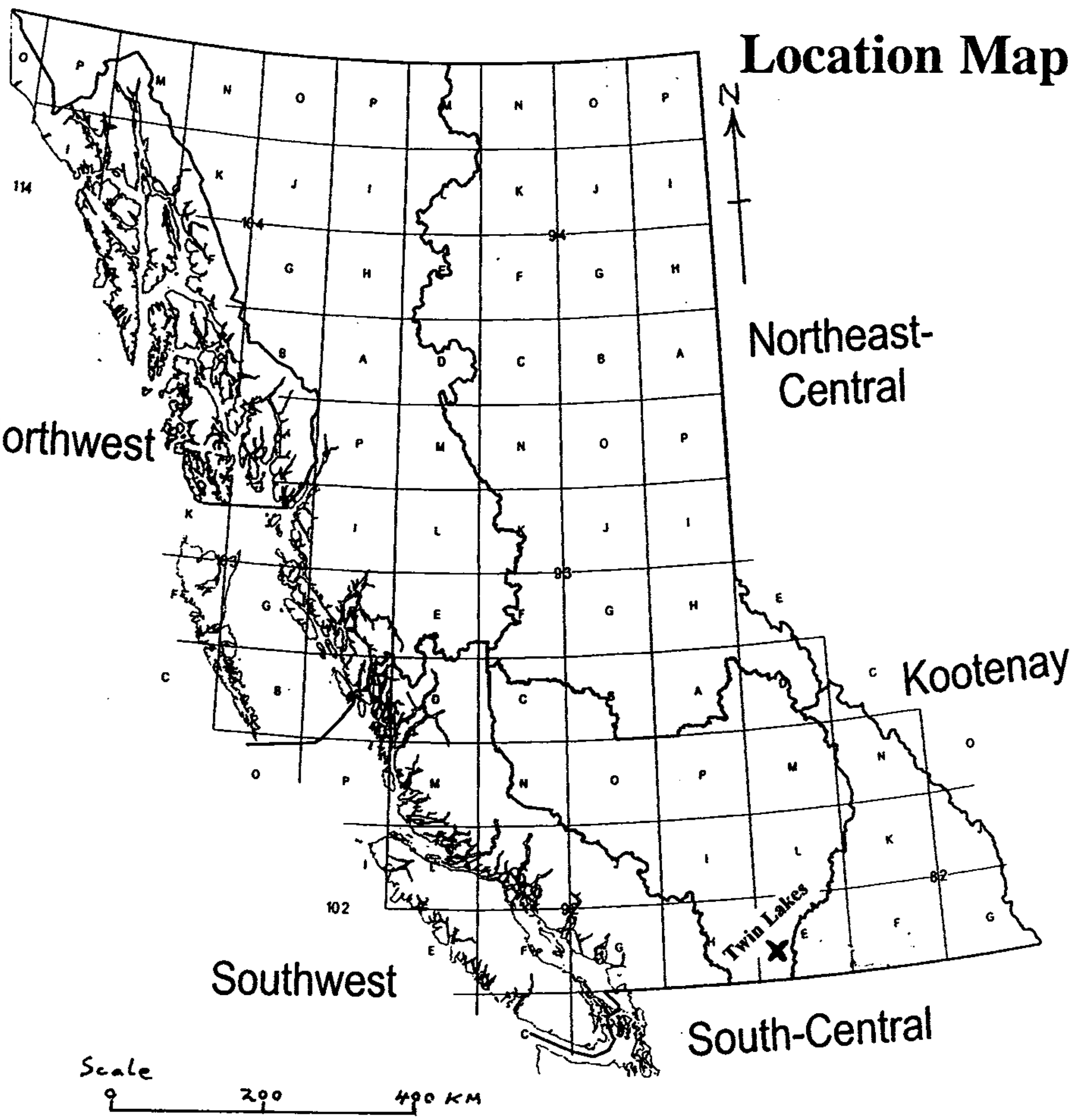
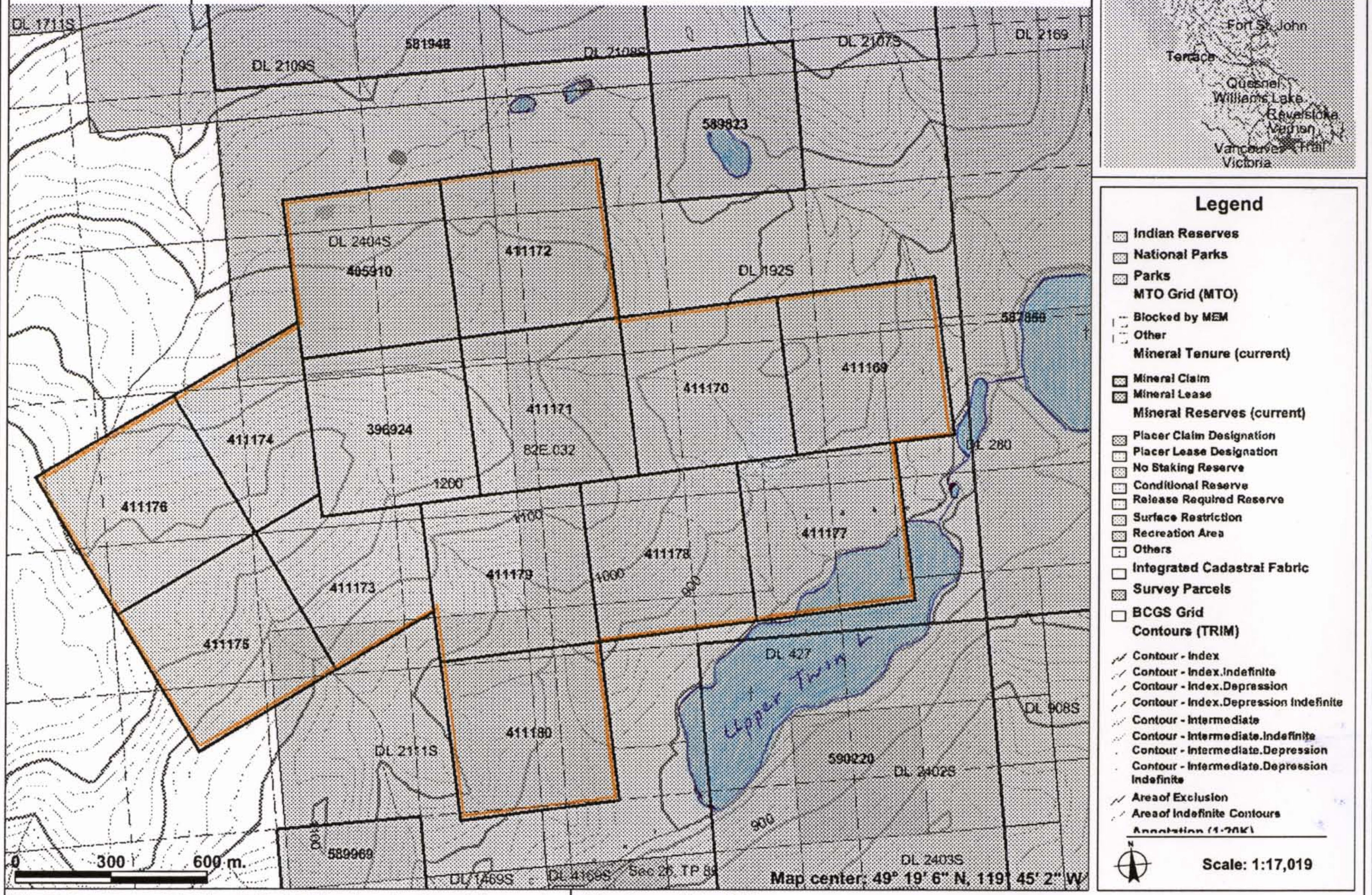


Figure 2 Twin Claims



This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Notes: Osoyoos Mining Division
M 082E032

Table 1 The Twin Lakes Property

Tenure Number	Claim Name	Map Number	Good To Date	Area	Registered Owner
396924	Twin1	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
405910	Twin2	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411169	Twin3	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411170	Twin4	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411171	Twin5	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411172	Twin6	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411173	Twin7	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411174	Twin8	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411175	Twin9	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411176	Twin10	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411177	Twin11	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411178	Twin12	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411179	Twin13	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%
411180	Twin14	082E032	2016/June/06	25.0	B.N. Church 50% D.R. Haughton 50%

Location and Access

The property is centered 1.5 km northwest of Upper Twin Lake (elev. 1,200 to 1,300 m) at Lat. 49° 19.1', Long. 119° 45.4'. Access to the property is approximately 5 km by paved road southwest from Highway 3A to the public wharf / parking site at the west end of Lower Twin Lake, then another 3 km proceeding westerly by dirt road to the property (Figs. 2, 3 and 4).

Physiography and Climate

The region is characterized by low mountainous terrain that is bounded by the Okanagan valley on the east (elev. ~530m), and the Similkameen and tributary valleys on the west (elev. ~550). The concordant summits surrounding Twin Lakes, rising to more than 1,300 m elev. ('The Ridge'area on Fig. 4), are remnants of a once continuous upland surface that comprises the southern extremity of the Thompson Plateau (Photo 1).

The low parts of the region and south-facing slopes are generally open ranch lands with plentiful grasses, sagebrush and cactus. The summits and north-facing slopes include rocky outcrops interspersed with pine, spruce and fir trees of sufficient density to support intermittent logging operations (Photo 2).

Climatic conditions are generally warm and dry during the summer months; freezing conditions may occur anytime from November to April. Total annual precipitation of combined rain and snowfall water equivalent is about 30 cm.

Background

Natural pozzolan is a siliceous or siliceous and aluminous geological resource, which, in a finely divided form, reacts with lime and water, at ordinary temperatures, to form cement (ACI Committee, 2002; Meheta, 1987). The ancient Greeks between 600 and 700 BC used pozzolan for construction purposes and their techniques were later passed on to the Romans (Mumpton, 1999). Glassy volcanic ash or tuff is the principal resource. The glassy nature and/or fine grain size of this material promotes reaction with calcium hydroxide to form interlocking aluminum-rich and calcsilicate mineral phases in the cementation process. Alternative pozzolanic source materials include shale, diatomite and the cinders or fly ash produced from coal burning.

According to the Canadian Minerals Yearbook annual cement production in British Columbia is approximately 2 million tonnes, most of which is Portland cement. Pozzolanic cement has special benefits but currently has found use mostly as an additive. Wider use is constrained by the limited availability of this resource.

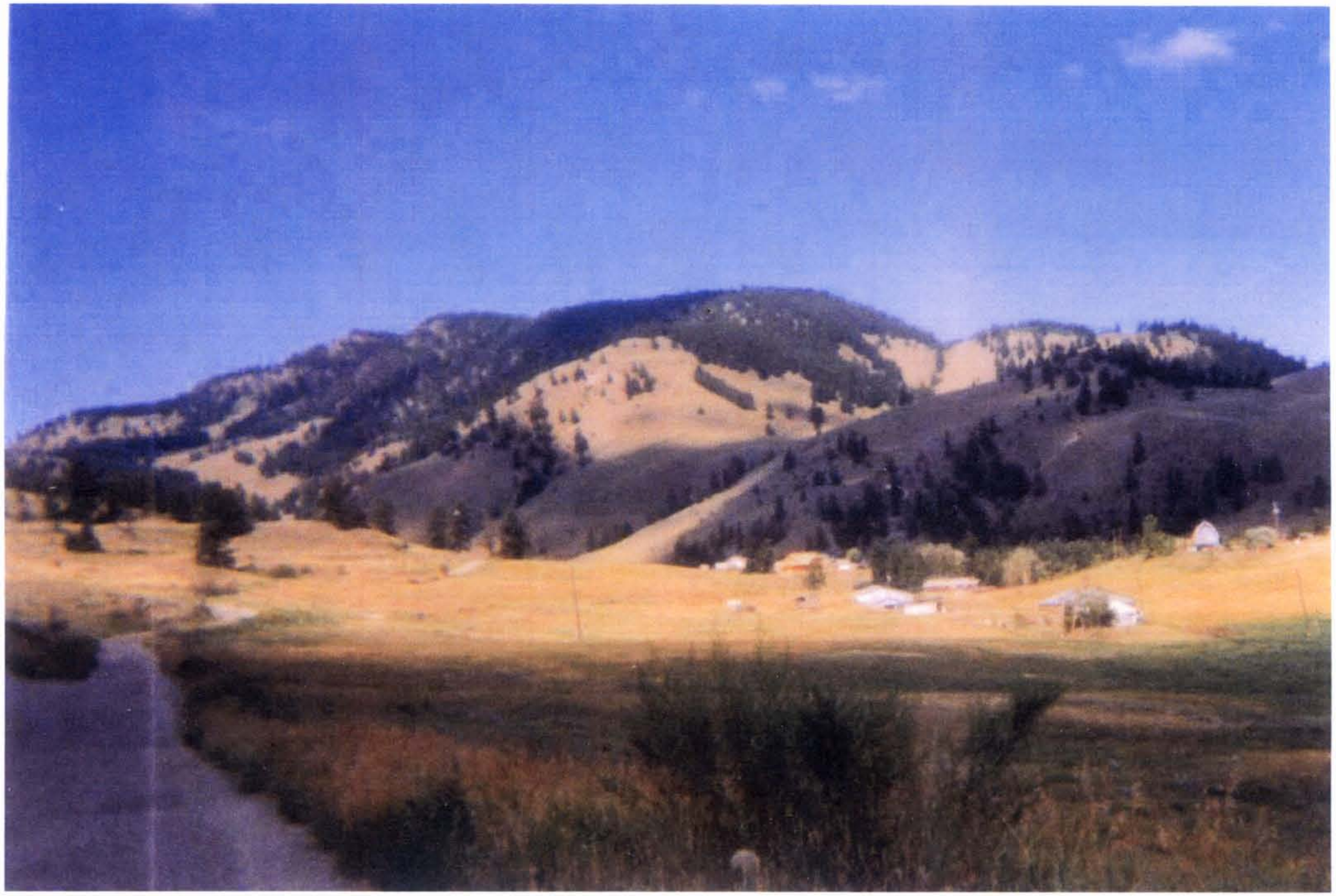


Photo 1 Panorama of Twin Lakes Volcanic Centre

Photo 2 Tuff Breccia, Olalla Formation

The benefits of using pozzolan as a replacement or partial replacement of Portland cement includes enhanced strength and textural quality of the concrete. For example, the high fines content of pozzolan reduces the permeability of the concrete lining of waterways (flumes) and water reservoirs. Also pozzolan has the advantage that it can be used to reduce the rate of heat produced during the hydration of cement while constructing massive concrete structures such as dams. Excess heat of hydration can cause cracks in concrete leading to leaking and structural failure. In addition, pozzolan is resistant to acid attack and undesirable alkali-aggregate reactions that can cause fissuring, spalling and ablation of the concrete.

There are cost and environmental benefits achievable by replacing a portion of the Portland cement with natural pozzolan. To make Portland cement the key process is the production of lime (CaO) by calcination of limestone ($CaCO_3$) and, by this process, each tonne of limestone yields approximately 0.78 tonnes of carbon dioxide (CO_2) - a major greenhouse gas. The energy consumption is equivalent to about six million British Thermal Units (BTUs).

Natural pozzolan has cementing properties, complementary to Portland cement, and requires no energy consumption for calcination and there is no carbon dioxide byproduct.

Geological Setting

Glassy volcanic rocks and zeolites are commonly preserved in the Tertiary formations owing to the usual low metamorphism of these young rocks (Simandl et al., 1996). The interior plateau area of British Columbia is underlain by deeply dissected early Tertiary lava, associated pyroclastic rocks and interbedded sedimentary units. These units occur within a northwesterly-trending belt about 150 km wide, extending 800 km from the Republic Mining District in Washington State to the Babine Lake area of central British Columbia. The thickness of these rocks ranges from less than 100 m to more than 1,200 m. The base of the Tertiary succession, where fully developed, is composed of fluvial sandstone and conglomerate. The upper boundary is generally coincident with an upland surface that locally marks an unconformity with Miocene volcanics of the Chilcotin Gp.

The Penticton Tertiary outlier, type area of the (Eocene) Penticton Group, covers approximately 430 km^2 between the town of Penticton and Okanagan Falls in the Okanagan Valley and village of Keremeos in the Similkameen Valley (Church, 2002b). The Springbrook Formation, at the base of the group, is a polymictic conglomerate containing clasts derived by stream erosion of a geologically diverse pre-Tertiary metamorphic terrane. In the Twin Lakes area this unit is overlain by the Marron Formation (1,700 m thick) consisting of phonolite, trachyte, andesite, and basalt lava flows, tuff and breccia deposits. Above this sequence, the Marama Formation comprises an array of dacitic lava domes that are scattered across the area. In the east part of the Penticton outlier the White Lake Formation (1000 m thick) is a succession of fluvial, lacustrine, lahar and volcanic breccias developed unconformably on the Marron and Marama Formations. Completing the Penticton Group, the Skaha Formation is a mainly chaotic landslide breccia at the top of the Eocene succession.

The Olalla Formation is a rhyolite volcanic complex resting unconformably on inclined and deeply eroded Marron F. – in particular, the Yellow Lake phonolite, Kitley trachyandesite, Kearns Creek basalt and Nimpit trachyte lava members (Fig. 3). The formation covers an area of about two square kilometres on the slopes northwest of Upper Twin Lake. These rocks include massive chalky-white lava, obsidian, altered tuff and tuff-breccia (Photos 3A, B, C) with accessory quartz, feldspar and fine-grained biotite. Chemical analyses of the fresh obsidian (sta. 2 *on* Fig. 4) gives a typical rhyolite composition: SiO_2 68.94 %, TiO_2 0.103, Al_2O_3 13.36, Fe_2O_3 0.34, FeO 0.23, MnO 0.164, MgO 0.17, Ca 1.50, Na_2O 2.934, K_2O 3.705, $+H_2O$ 4.28, $-H_2O$ 3.34, CO_2 <0.11, SO_3 <0.005, P_2O_5 <0.15, BaO 0.14, SrO 0.04 (Church, 2003).

Obsidian occurs in young volcanic assemblages. Natural glass slowly crystallizes to fine grained rock or it may decompose while absorbing moisture. No obsidian is very old.

Two K/Ar dates are available for the Olalla F. – both Miocene age (Appendix B-1). The best date, based on analyses of fine biotite from the obsidian, yields 24.1 ± 0.7 Ma. A second sample of somewhat altered obsidian yields a whole rock date of 13.0 ± 1.8 Ma.

Structural control of these rocks is a north-south stress scheme related to the oblique subduction of the Pacific plate under the North American craton (Dostal et al. 2003). This stress engine was active throughout the Cordillera during the early Tertiary. The result is a complex inter-relationship of shears, tension faults and folds and the simultaneous development of grabens, folding and thrusting. In overall scheme the rocks of the Penticton Tertiary outlier dip easterly towards major gravity faulting in the Okanagan Valley to form a trap-door-like half graben structure. The Twin Lakes area is at the west end of the easterly plunging White Lake syncline. The plunging syncline is the result of a combination north-south compression and easterly downward rotation (~25°) during the development of the half graben. Field evidence showing easterly dip of the Olalla F. suggests that an important component of the down faulting was Miocene or post-Miocene

Work Done

The present study, completed July 29-31, 2008, is a response to an earlier program of prospecting in the Twin Lakes area at which time a Miocene felsic volcanic center (Olalla F.) was ontlined (Church, 2003 and 2006). What at first appeared to be alteration related to epithermal vein mineralization, became manifest as a young obsidian dome complete with altered rhyolite lava and tuff breccia substructure with industrial mineral (pozzolan/ zeolite) potential - the tuffaceous rocks of this complex being similar to the nearby Manuel Creek zeolite occurrence (Church, 2002a).

For this study 22 stations were established to further delineate and quantify the Ollala Formation (Fig. 4, Table 2).

Photo 3A Scallop weathering

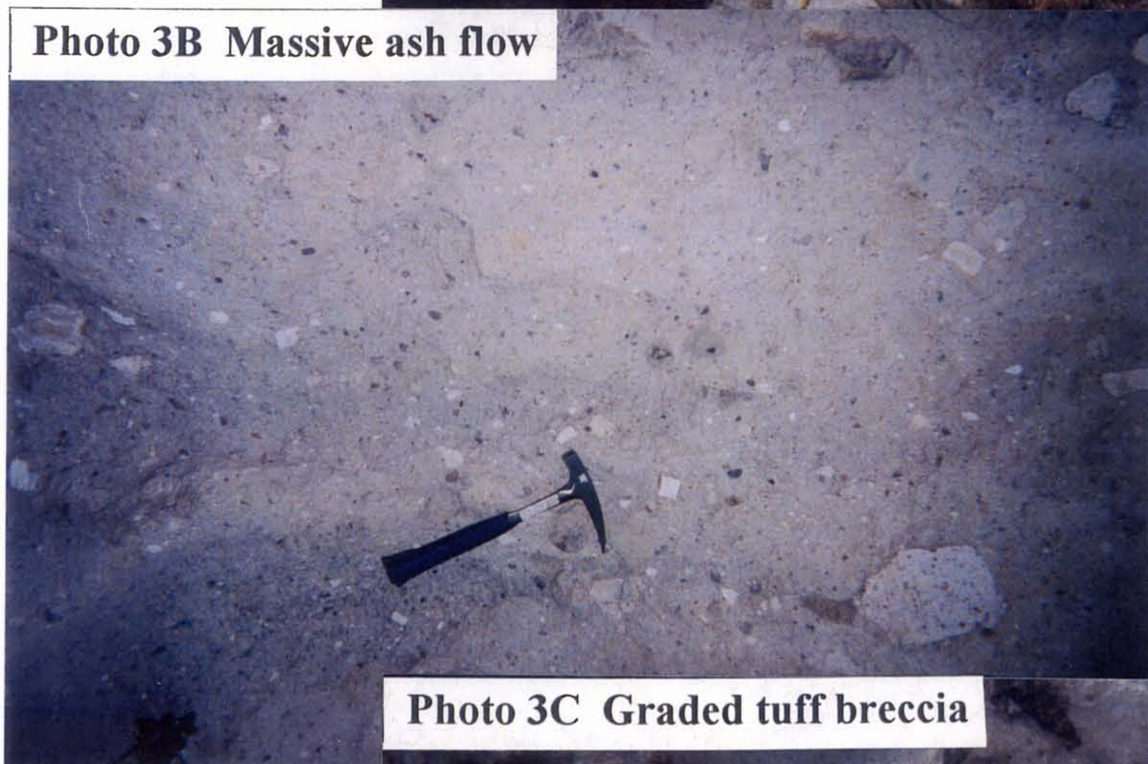


Photo 3B Massive ash flow

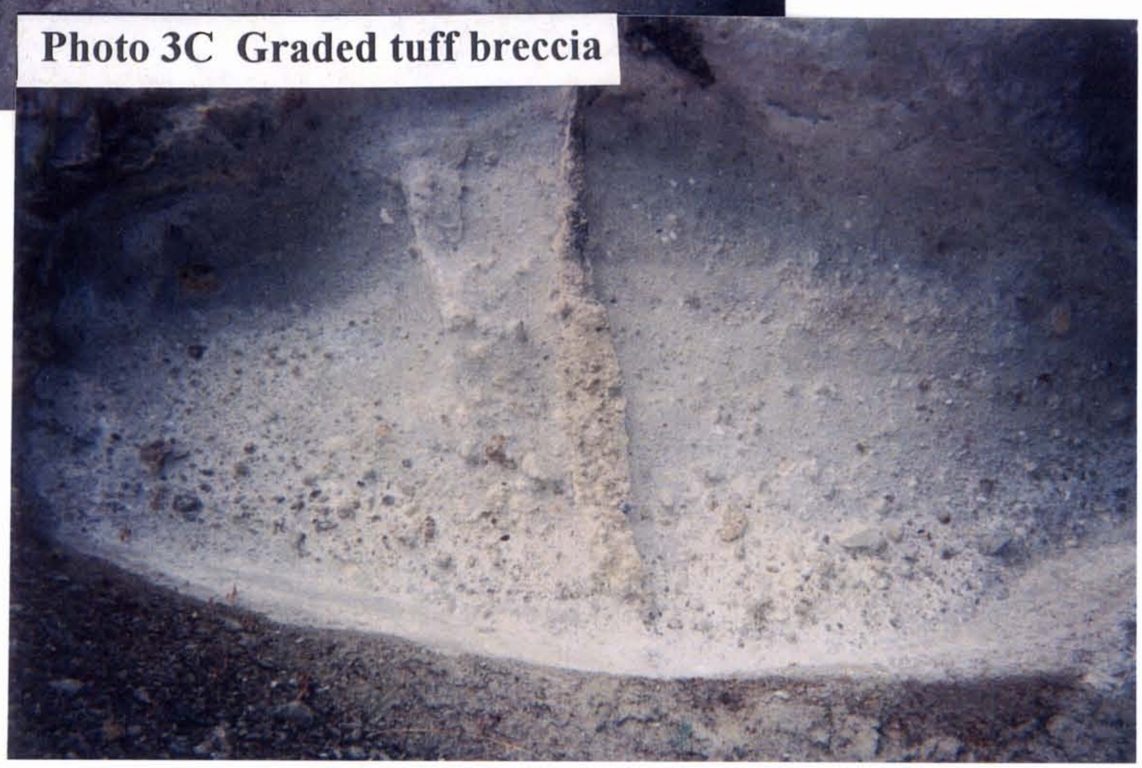
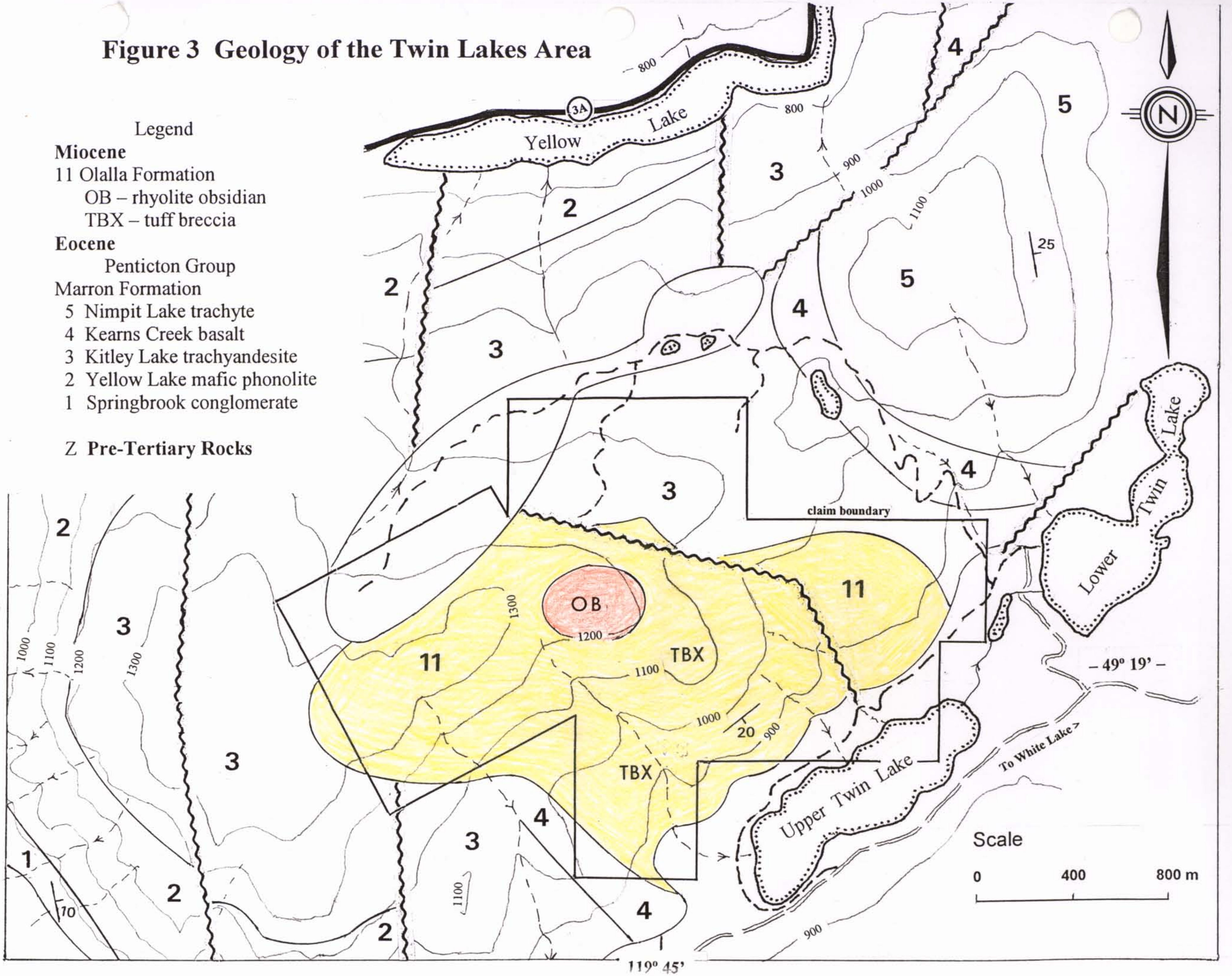


Photo 3C Graded tuff breccia

Figure 3 Geology of the Twin Lakes Area



Geochemistry
Two rock samples from the Olalla F. were submitted to Acme Laboratories Ltd. for silicate analyses. These are TL-04-0 and TW-13 that correspond to survey stations 1 and 3 on Fig. 4 and Table 2.

At Acme the samples were analysed for the 10 major oxides SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, CaO, Na_2O, K_2O, P_2O_5 plus LOI, C and S and the 45 minor elements Au, Ag, As, Ba, Be, Bi, Cd, Ce, Co, Cs, Cu, Dy, Er, Eu, Ga, Gd, Hf, Hg, Ho, La, Lu, Mo, Nb, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Se, Sm, Sn, Ta, Tb, Th, Tl, Tm, U, V, W, Y, Yb, Zn, Zr. Details on the methods of whole rock silicate analyses are provided in Acme's brochure entitled 'Services & Fees 2008', pages 16 and 17 (Appendix B-2).

The results for TW-13, the rhyolite from sta. 3 on 'The Ridge', are similar to the previously analysed obsidian from sta. 2 at 'Glass Hill'. For example, the important ratios and sums are very similar comparing stas. 2 and 3 respectively, i.e. Al_2O_3/SiO_2 = 0.19 vs. 0.18; $Na_2O + K_2O$ = 6.64 vs 7.13; $Fe_2O_3 + ½(MgO + CaO)$ = 1.41 vs 1.42. Another characteristic of the rhyolite is the low carbon and sulphur (less than 0.02 %) and very low levels of many other elements (near or below detection levels) including As (0.5 ppm), Be (1 ppm), Bi (0.1 ppm), Cd (0.1 ppm), Co (0.2 ppm), Hg (0.04 ppm), Mo (0.4 ppm), Sb (0.1 ppm), Se (0.5 ppm), Sn (1 ppm), Tl (0.1 ppm), V (8 ppm). The single major difference between the rhyolite TW-13 and the obsidian is the amount LOI ($H_2O + CO_2$) that is 1.2 % and 7.62 %, respectively.

The results for sample TL-04-0, the tuff breccia from sta. 1 at the base of 'The Ridge', show anomalously high iron content and generally moderate minor element levels suggesting rhyodacite composition. This apparent increase in basicity, compared to the rhyolite, is probably due to the inclusion of accidental fragments from the underlying Marron volcanic rocks during explosive eruption of the Olalla rhyolite.

Mineralogy
Mineral analyses of rhyolite TW-13 and the tuff breccia samples TL-04-0 and T-160 (survey stas. 3, 1 and 4 respectively on Fig. 4, Table 2) was completed by Global Discovery Labs of Teck Cominco Ltd. using X-ray diffraction methods (Appendix B-3). A review of the diffraction patterns for all samples indicate a simple mineralogy – a strong set of lines suggesting abundant quartz and distinct but weaker albite lines accompanied by accessory clay minerals (kaolinite and montmorillanite?). The rhyolite sample has some mica and the tuff breccia, minor carbonate minerals (calcite and dolomite).

Miles Industrial Minerals Research provides a comparison of tuffaceous samples from the Twin Lakes area (Olalla F.) and the Manuel Creek deposit (results courtesy of Liz Butler-Henderson, Appendix B-4). By this study, using X-ray diffraction analyses, the Twin Lake sample is estimated to contain 35 % quartz, ~35 % feldspar, ~20 % clinoptilolite (zeolite) and 10 % kaolinite. The Manuel Creek tuff contains <5 % quartz, ~20 % feldspar, ~30 % clinoptilolite and ~ 45 % montmorillonite (smectite clay).

From these data an estimate of the cation exchange capacity (CEC) can be calculated based on the values of 200 meq/100g for pure clinoptilolite and about 100 meq/100g for pure montmorillonite. Accordingly, the CEC for the Twin Lakes and Manuel Creek samples are ~40 meq/100g and ~105 meq/100g, respectively.

It is noted that the CEC result for the Manuel Creek sample is keeping with previous findings (Church, 2002a), however, the CEC of 40 meq/100g for the Twin Lakes sample is new and unexpected, as is the presence of clinoptilolite in these rocks.

Petrographic Descriptions
Obsidian is found on 'Glass Hill' east of 'The Ridge' and northeast of Upper Twin Lake (stas. 2, 16 and 21 on Fig. 4). The area of exposure is an elliptical zone (300 x 500 m) of about 12 hectares, mostly above 1200 m elevation. This is believed to be the remnant of a rhyolite dome that occupies the central vent of the Twin Lakes volcanic complex (Olalla F.).

Hand specimens of the obsidian are characterized by conchoidal fractures and radial splintering when hammered. The fresh glass is normally speckled and mottled greenish gray with a vitreous greasy luster. Where weathered, the rock is waxy cream coloured with a dull gleam.

Vancouver Petrographics Ltd. reports the composition as 10 % minerals and 90 % glass and glass alteration products (courtesy of Liz, Butler-Henderson; Appendix B-5). Under the microscope the rock has a patchy fabric that consists of roughly (2/3) pinkish gray isotropic glass and (1/3) light coloured alteration patches developed around cracks and some phenocrysts. The phenocrysts consist of plagioclase 5-7 %, quartz 2-3 %, biotite 1-2 %, plus minor opaque grains and dust. Plagioclase occurs as clusters of phenocrysts and randomly oriented solitary laths up to 2 mm in length. Rounded quartz grains, 0.5 to 1.5 mm across, are scattered throughout. Biotite is present as pleochroic dark brown, corroded books, 0.3 to 0.8 mm across, often associated with granular opaque minerals.

The rock has the right composition (69 % SiO_2), shows perlitic arcuate fractures and contains sufficient water (> 1 %) to apply the name 'perlite'. However, unlike perlite, tests show no 'pop-corn' expansion properties when samples are heated.

Pozzolan Tests
Two samples of rock from the Twin Lake property were submitted to AMEC Earth & Environmental Laboratories to determine pozzolanic activity and compressive strength variation with time of curing. Tests for natural pozzolan are listed in 'Supplementary Cementing Materials' (CSA, 1998). The two samples submitted were designated Twin 49-18-47 (tuff breccia) and TW-112 (rhyolite obsidian). The results of testing (replacing 20 % of the cement with these pozzolanic materials) are listed in Appendix B-6 of this report. These results are illustrated in Figure 5 that shows (1) percent pozzolanic activity versus curing time (days) and (2) compressive strength versus days.

Figure 4 Survey Stations

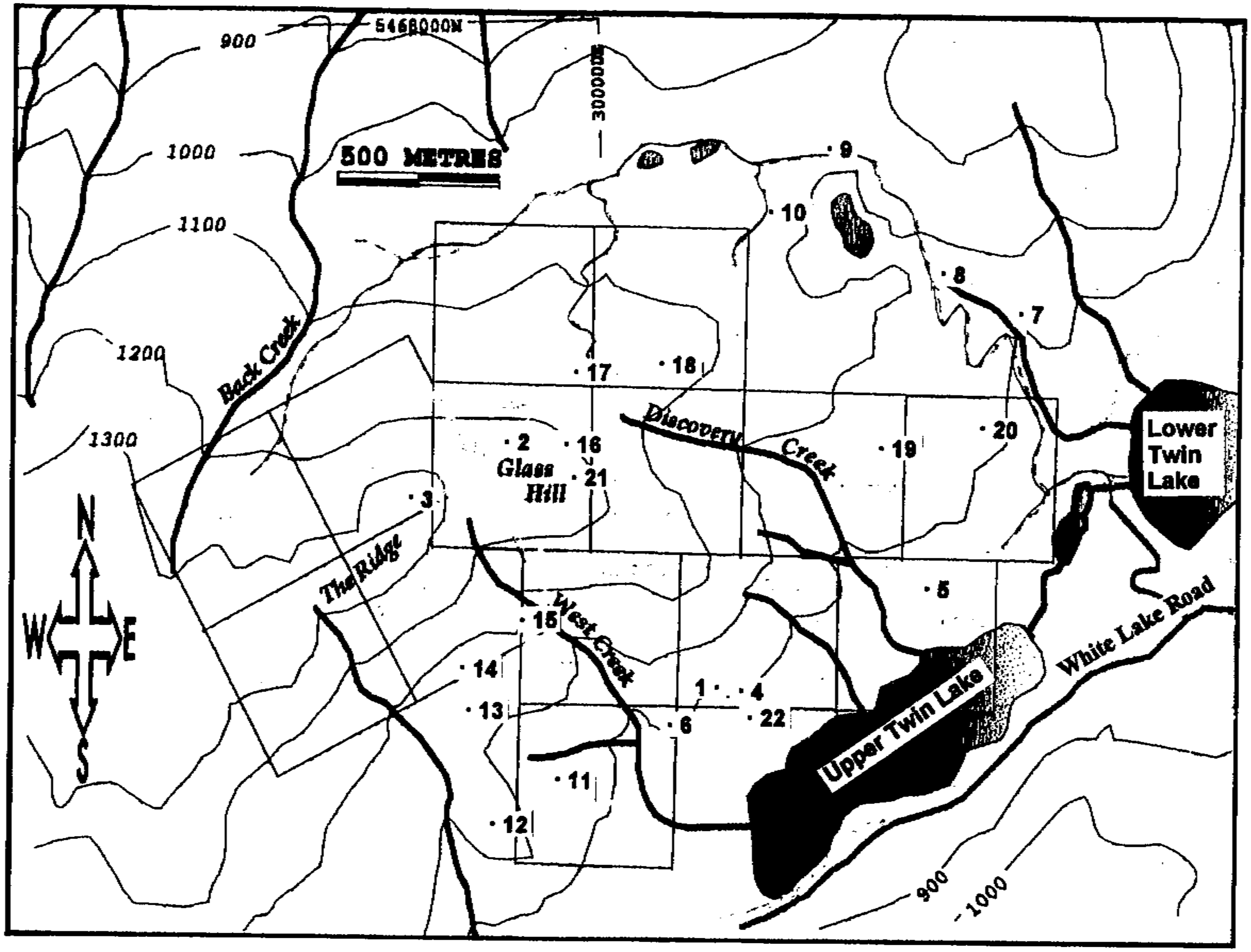


Table 2 Notes to Accompany Figure 4

Map Sta.	Field No.	Co-ordinates Lat.	Long.	Descriptions
-1-	TL-04-0	49^18.81'	119^44.80'	tuff breccia
-2-	TW-12	49^19.14'	119^45.45'	obsidian
-3-	TW-13	49^19.13'	119^45.69'	bone white rhyolite lava
-4-	T-160	49^18.82'	119^44.80'	tuff breccia
-5-	OK-163	49^19.01'	119^44.23'	quartz-eye rhyolite, small biotite
-6-	OK-164	49^18.72'	119^44.84'	tuff breccia
-7-	OK-165	49^19.43'	119^44.08'	brown vesicular basalt
-8-	OK-166	49^19.50'	119^44.26'	basalt
-9-	OK-167	49^19.70'	119^44.50'	basalt
-10-	OK-169	49^19.60'	119^44.70'	trachyte
-11-	OK-173	49^18.64'	119^45.19'	slightly rusted rhyolite
-12-	OK-174	49^18.58'	119^45.36'	feldspathic trachyandesite
-13-	OK-175	49^18.73'	119^45.42'	vesicular basalt
-14-	OK-176	49^18.78'	119^45.40'	quartz-eye rhyolite with feldspar laths
-15-	OK-177	49^18.89'	119^45.30'	tuff breccia
-16-	OK-178	49^19.16'	119^45.40'	rhyolite obsidian
-17-	OK-179	49^19.34'	119^45.14'	obsidian
-18-	OK-180	49^19.38'	119^44.94'	rubble, trachytic tuff
-19-	OK-181	49^19.21'	119^44.34'	rhyolite
-20-	OK-182	49^19.80'	119^44.14'	fine grained light brown trachyte
-21-		49^19.13'	119^45.69'	obsidian
-22-		49^18.74	119^44.80'	tuff breccia

Pozzolanic Activity: This is a measure of a sample's cementing properties relative to standard Portland cement. It is well established that pozzolanic materials normally gain strength up to the limit of the usual 28 day testing period. In the present case, testing the pozzolanic activity of the obsidian and tuff breccia samples, from 7 to 56 days, shows that both samples exceed the minimum 75% ASTM strength activity standard at all the tested curing time intervals including and beyond 7 days. Indeed, the measured pozzolanic activity is at 92.9 % (compared to a control sample) for the tuff breccia at 28 days and at 89.6 % for the rhyolite obsidian at 56 days.

Compressive Strength: The results for the compressive strength tests for the concrete mixtures are also shown in Fig. 5. The graphs show a gain in concrete strength for both pozzolanic mixtures at all intervals in the curing period. It is noted that at 28 days the concrete prepared using the tuff breccia pozzolanic mixture acquired the strength of 38.1 Mpa; the concrete prepared using the rhyolite obsidian attained a slightly lower strength of 34.3 Mpa at 28 days. However, at 56 days the concrete made with rhyolite obsidian attained higher 41.2 Mpa compressive strength, showing a more rapid rise in strength compared to the concrete made using the tuff breccia that had acquired a somewhat lower figure of 38.6 Mpa.

Conclusions and Recommendations

The project investigates the industrial mineral potential of the Miocene age Ollala volcanic complex, Twin Lakes area, Penticton Tertiary outlier (Church, 2002b). The Olalla Formation consists of massive rhyolite lava, a central obsidian dome and crudely stratified tuff breccia. The glassy dome (~12 hectares) overlies a much larger deposit (~200 m thick) of tuff breccia of similar chemical composition (Photo 2).

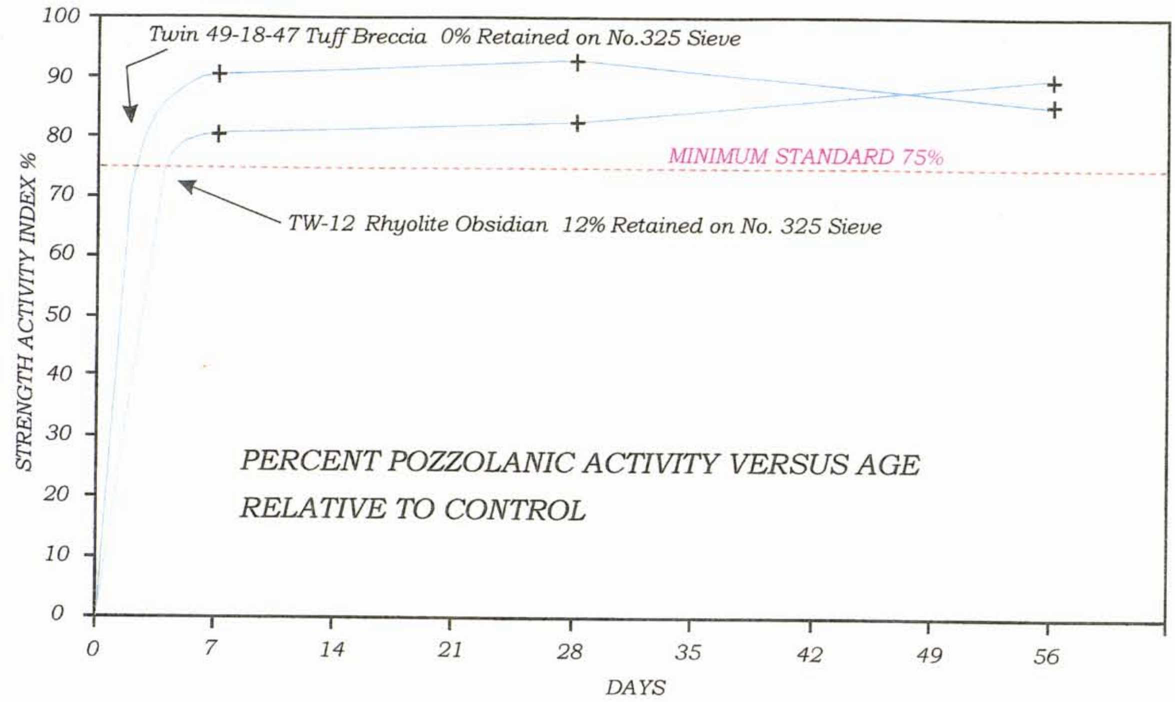
Chemical and X-ray diffraction analyses of the rhyolite shows low minor elements and simple mineralogy.

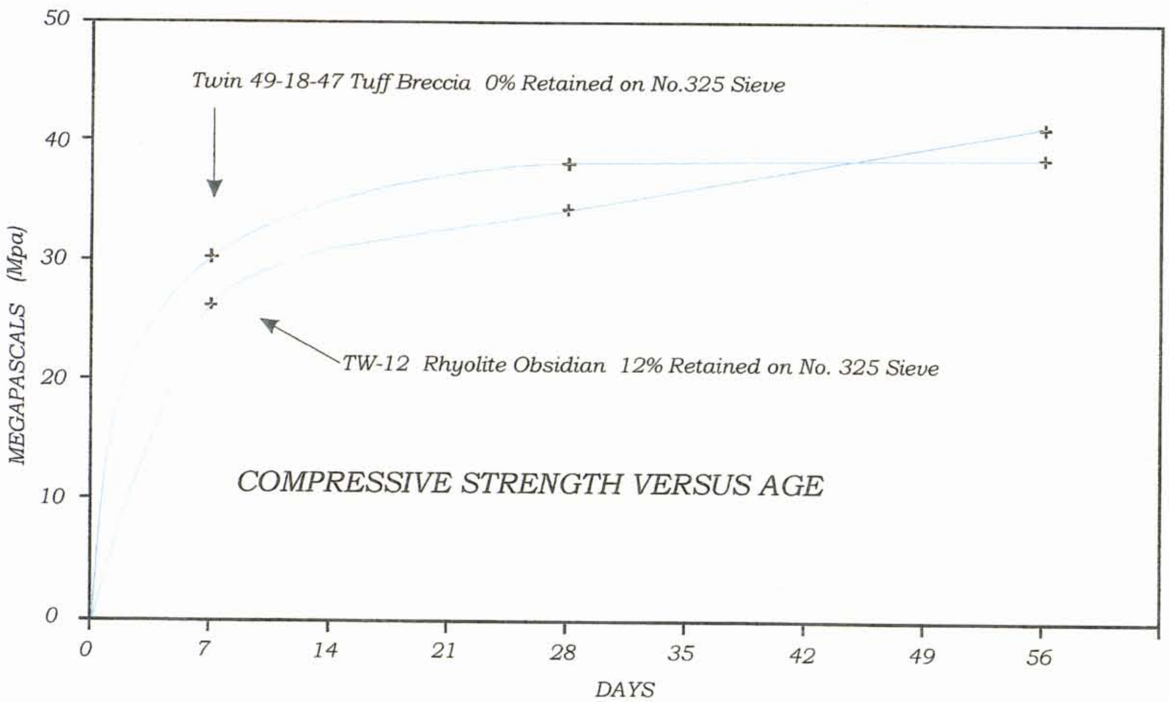
The chemical data also shows that the glassy rocks contain 4 % structural water - this is somewhat higher than the average water content of obsidian but within the usual range for perlite (although additional testing is required to prove the expansion properties, typical of perlite, when samples are heated).

Further analyses indicate the obsidian and tuff breccia hold promise as a significant pozzolan resource. When these rocks are mechanically crushed and mixed with lime, the glassy fragments and rock powder react, when water is added, to form cementing minerals - tests for pozzolanic activity and compressive strength produce values within ASTM standards for pozzolanic cement.

Other suggested tests needed to prove full use of the pozzolan as a replacement-addition to Portland cement include the effect of fineness of grind on strength gain, determination of optimal water content, optimal slump or flow values and drying shrinkage properties. Both physical and compositional tests for specific concrete design may be considered as standard practice in order to obtain best performance and economy of the concrete mix.

Figure 5 Pozzolanic Activity and Strength Tests





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Appendix A
Statement of Costs

Labour:	- geological engineer, B.N. Church, P.Eng. July 29-31st, 2008; 3 days @ 500/day	$1,500.00
	- D.R. Haughton & E. Butler-Henderson @ 500/day	$3,000.00
Accomodation/Meals:	geologist and assistant (6x100/day)	600.00
Vehicle costs:	@ 0.45/km	445.05
	Fuel	114.42
Ferry costs:		86.00
Chemical analyses:	(Acme Analytical Laboratories Ltd.)	152.64
Petrographic analyses:	(Vancouver Petrographics Ltd.)	209.00
X-ray analyses:	(Teck Cominco Ltd.)	262.35
Cation Exchange Capacity:	(Miles Industrial Minerals Research)	200.00
Pozzolan Testing:	(AMEC Earth & Environmental Laboratories Ltd.)	300.00
Report preparation:		2,500.00
	Total	$ 9,369.46

Received Feb 12/08

Acme Analytical Laboratories (Vancouver) STATEMENT
852 East Hastings St.
Vancouver, BC V6A 1R6
Canada

CUSTOMER NO.:	CHU100	**CUSTOMER NO.:**	CHU100
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Victoria, BC V8Z 6N7
Canada

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A..E ANALYTICAL LABORATO
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UC - Unapplied Cash
RF - Refund

Total ➪ 152.64 | **Total ➪** 152.64

1 - 30 DAYS O/DUE	31 - 60 DAYS O/DUE	61 - 90 DAYS O/DUE	OVER 90 DAYS O/DUE
0.00	152.64	0.00	0.00

Acme Analytical Laboratories (Vancouver) Ltd.

Appendix B-1 K/Ar Dates

K-Ar

Sample Number(s) and Reference(s)	decay constants:	material	Date	1σ error
Lab No: OK-178		(Whole Rx)	13.0	± 1.8 Ma
#20037 M	☐ 4.72/.584/1.19	( )		± Ma
Ref: Church B.N.	☐ 4.72/.584/1.18	( )		± Ma
BCDM.	■ 4.96/.581/1.167	( )		± Ma
Record No:				
Suite No:	☐ not reported			

Sample Name: Twin Lakes Rhyolite.

Latitude: Longitude: (X° Y' Z" or X° Y.Y')

(49° 18.9' N, 119° 45.4' W (±);

UTM Zone ___ ___ E ___ N; Province B.C.

Sec.___, T.___, R.___; ___ Co., State___.

(NTS___) ___ Map Area, Scale___

Location: Just northwest of Twin Lakes in the western part of White Lake Ba

Source Type:

Rock: Twin Lakes Rhyolite.

Geologic Unit:

Geologic Age:

Material Analyzed: Whole rock (-20+50) quality very fine.

Analytical Data: (list duplicate analyses or indicate n = 2, n = 3, etc.)

K = $\bar{X}$ = 3.10 ± 0.07, n = 3 ? %; (Ar^{40*} = 1.5660 x10^{-6} cc/gm)
K_2O= % 0.6988 x10^{-10} mol/gm); (7.3 %ΣAr^{40})

K = %; (Ar^{40*}= x10^{-6} cc/gm); (%ΣAr^{40})
K_2O= % x10^{-10} mol/gm)

K = %; (Ar^{40*}= x10^{-6} cc/gm); (%ΣAr^{40})
K_2O= % x10^{-10} mol/gm)

K = %; (Ar^{40*}= x10^{-6} cc/gm)
K_2O= % x10^{-10} mol/gm); (%ΣAr^{40})

Comment on Analyses:

Interpretation: Could be the youngest volcanic in the White Lake Bas.

Collected by: B.N. Church.

Dated by: J.E. Harakal.

Listed by: ___ (name, institution) Date: 5-4-79

(NTS ____________)

K-Ar

Sample Number(s) and Reference(s)

Lab No: TWIN LAKES

Ref:

decay constants:
- ☐ 4.72/.584/1.19
- ☐ 4.72/.584/1.18
- ■ 4.96/.581/1.167
- ☐ not reported

material	Date	1σ error	
(Biotite)	20.0	± 0.7 Ma	Run
(Biotite)	24.1	± 0.7 Ma	Run:
( )		± Ma	
( )		± Ma	

Record No:

Suite No:

Sample Name:

Latitude: Longitude: (X° Y' Z" or X° Y.Y')

(49° 19' " N, 119° 44.2' " W (±);

UTM Zone ____ ________ E ________ N; Province ________

Sec. ____, T. ____, R. ____; ____________ Co., State ________.

(NTS ________) ________________ Map Area, Scale ________

Location:

Source Type:

Rock: Light cream-colored devitrified rhyolite

Geologic Unit:

Geologic Age:

Material Analyzed: Biotite, quality fine.

Analytical Data: (list duplicate analyses or indicate n = 2, n = 3, etc.)

K = $\bar{X}$ = 6.79 ± 0.01 %; (Ar^{40*} = 5.317 x10^{-6} cc/gm)
K_2O = n = 2 % 2.373 x10^{-10} mol/gm); (52.0 %ΣAr^{40}) Run

K = $\bar{X}$ = 6.79 ± 0.01 %; (Ar^{40*} = 6.397 x10^{-6} cc/gm); (54.6 %ΣAr^{40}) Run
K_2O = n = 2 % 2.854 x10^{-10} mol/gm)

K = %; (Ar^{40*} = x10^{-6} cc/gm); (%ΣAr^{40})
K_2O = % x10^{-10} mol/gm)

K = %; (Ar^{40*} = x10^{-6} cc/gm)
K_2O = % x10^{-10} mol/gm); (%ΣAr^{40})

Comment on Analyses:
Run 1 resulted in an incomplete fusion.

Interpretation:

Collected by: W. H. Mathews

Dated by: J. Harakal

Listed by: ________________ Date: 11.26.81
(name, institution)

Appendix B-2 Geochemistry

AcmeLabs ACME ANALYTICAL LABORATORIES LTD.

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Phone (604) 253-3158 Fax (604) 253-1716

www.acmelab.com

Client: **Church, B. Neil**
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Submitted By: B. Neil Church
Receiving Lab: Acme Analytical Laboratories (Vancouver) Ltd.
Received: September 06, 2007
Report Date: November 27, 2007

CERTIFICATE OF ANALYSIS VAN07001029.1

CLIENT JOB INFORMATION

Project: None Given
Shipment ID:
P.O. Number
Number of Samples: 2

SAMPLE DISPOSAL

Acme does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Method Code	Number of Samples	Code Description	Test Wgt (g)	Report Status
R150	2	Crush, split and pulverize rock to 150 mesh		
4A&4B	2	LiBO2/Li2B4O7 fusion ICP-ES analysis	0.2	Completed

ADDITIONAL COMMENTS

-27-

Invoice To: Church, B. Neil
600 Parkridge St.
Victoria
BC V8Z 6N7
Canada

CC:

BRITISH COLUMBIA CERTIFIED ASSAYER
Clarence Leong

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Client: Church, B. Neil
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

CERTIFICATE OF ANALYSIS VAN07001029.1

		Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B
		Analyte	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
		Unit	%	%	%	%	%	%	%	%	%	%
		MDL	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.001	0.01
TWIN-13	Rock		75.65	13.58	0.98	0.28	0.78	3.79	3.34	0.14	0.033	0.04
TL-04-0	Rock		65.81	13.03	2.38	1.74	3.40	2.20	4.13	0.30	0.149	0.23

		Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B
		Analyte	Cr2O3	Ni	Sc	LOI	Sum	Ba	Be	Co	Cs	Ga
		Unit	%	ppm	ppm	%	%	ppm	ppm	ppm	ppm	ppm
		MDL	0.002	20	1	-5	0.01	1	1	0.2	0.1	0.5
TWIN-13	Rock		<0.002	<20	3	1.2	99.81	1279	<1	<0.2	1.8	14.7
TL-04-0	Rock		0.004	<20	8	6.4	99.77	1331	3	4.3	2.6	14.6

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Client: Church, B. Neil
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

CERTIFICATE OF ANALYSIS VAN07001029.1

		Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B
		Analyte	Hf	Nb	Rb	Sn	Sr	Ta	Th	U	V	W	Zr	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Dy
		Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.1	0.1	0.1	1	0.5	0.1	0.2	0.1	8	0.5	0.1	0.1	0.1	0.1	0.02	0.3	0.05	0.02	0.05	0.05
TWIN-13	Rock		3.9	8.3	74.5	1	100.8	0.6	7.3	2.4	<8	1.1	82.8	21.3	13.1	26.1	3.22	13.2	2.35	0.43	2.37	3.08
TL-04-0	Rock		3.5	17.8	96.8	2	515.0	1.1	10.8	3.7	57	1.4	106.7	24.5	30.1	55.1	6.29	22.7	4.38	0.97	3.72	4.28

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BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

CERTIFICATE OF ANALYSIS VAN07001029.1

		Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	2A C/S	2A C/S	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX
		Analyte	Tb	Ho	Er	Tm	Yb	Lu	C/TOT	S/TOT	Mo	Cu	Pb	Zn	Ni	As	Cd	Sb	Bi	Ag	Au	Hg
		Unit	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm
		MDL	0.01	0.02	0.03	0.01	0.05	0.01	0.02	0.02	0.1	0.1	0.1	1	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.01
TWIN-13	Rock		0.46	0.66	2.27	0.37	2.51	0.40	<0.02	<0.02	0.4	2.2	0.8	23	1.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	0.04
TL-04-0	Rock		0.69	0.87	2.51	0.47	2.84	0.43	1.34	0.06	3.1	10.9	21.6	102	13.3	4.6	1.4	0.1	0.3	0.1	<0.5	0.04

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600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

CERTIFICATE OF ANALYSIS

VAN07001029.1

	Method	1DX	1DX
	Analyte	Tl	Se
	Unit	ppm	ppm
	MDL	0.1	0.5
TWIN-13	Rock	<0.1	<0.5
TL-04-0	Rock	<0.1	1.0

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Client: **Church, B. Neil**
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

QUALITY CONTROL REPORT VAN07001029.1

	Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B
	Analyte	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Cr2O3	Ni	Sc	LOI	Sum	Ba	Be	Co	Cs	Ga
	Unit	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	%	%	ppm	ppm	ppm	ppm	ppm
	MDL	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.002	20	1	-5	0.01	1	1	0.2	0.1	0.5
Reference Materials																					
STD CSC	Standard																				
STD CSC	Standard																				
STD DS7	Standard																				
STD DS7	Standard																				
STD SO-18	Standard	58.11	14.12	7.63	3.33	6.38	3.69	2.15	0.69	0.805	0.39	0.548	31	26	1.9	99.75	495	<1	26.0	6.7	17.1
STD SO-18	Standard	58.10	14.13	7.63	3.34	6.38	3.69	2.15	0.69	0.802	0.39	0.548	44	26	1.9	99.75	501	<1	25.8	6.8	17.0
STD CSC Expected																					
STD DS7 Expected																					
STD SO-18 Expected		58.47	14.23	7.67	3.35	6.42	3.71	2.17	0.69	0.83	0.39	0.55	44	25			514		26.2	7.1	17.6
BLK	Blank																				
BLK	Blank																				
BLK	Blank	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.002	<20	<1	0.0		<1	<1	<0.2	<0.1	<0.5
Prep Wash																					
G1	Prep Blank	67.49	15.74	3.53	1.06	3.43	3.57	3.73	0.35	0.148	0.09	<0.002	<20	5	0.6	99.75	889	1	3.4	4.7	17.7
G1	Prep Blank	67.44	15.85	3.57	1.15	3.47	3.71	3.60	0.38	0.175	0.09	<0.002	<20	5	0.3	99.75	860	<1	3.6	4.5	19.5

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600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

QUALITY CONTROL REPORT VAN07001029.1

	Method	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B
	Analyte	Hf	Nb	Rb	Sn	Sr	Ta	Th	U	V	W	Zr	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	Dy
	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	MDL	0.1	0.1	0.1	1	0.5	0.1	0.2	0.1	8	0.5	0.1	0.1	0.1	0.1	0.02	0.3	0.05	0.02	0.05	0.05
Reference Materials																					
STD CSC	Standard																				
STD CSC	Standard																				
STD DS7	Standard																				
STD DS7	Standard																				
STD SO-18	Standard	9.6	19.9	27.6	15	399.7	7.1	9.8	16.2	200	14.7	269.9	31.5	11.9	26.6	3.40	13.7	2.87	0.85	2.84	2.83
STD SO-18	Standard	9.5	20.1	28.1	15	403.2	7.0	10.9	16.4	202	14.9	273.5	31.8	12.4	26.1	3.42	13.6	2.93	0.86	2.77	2.91
STD CSC Expected																					
STD DS7 Expected																					
STD SO-18 Expected		9.8	20.9	28.7	15	407.4	7.4	9.9	16.4	200	15.1	280	33	12.3	27.1	3.45	14	3	0.89	2.93	3
BLK	Blank																				
BLK	Blank																				
BLK	Blank	<0.1	<0.1	<0.1	<1	<0.5	<0.1	<0.2	<0.1	<8	<0.5	<0.1	<0.1	<0.1	<0.1	<0.02	<0.3	<0.05	<0.02	<0.05	<0.05
Prep Wash																					
G1	Prep Blank	3.7	19.3	127.3	<1	730.1	1.2	10.4	7.2	50	<0.5	112.3	14.8	28.7	54.1	6.12	21.9	3.57	0.91	2.35	2.68
G1	Prep Blank	4.4	20.8	126.3	2	736.2	1.4	9.2	3.8	52	<0.5	126.9	16.0	32.5	61.7	7.09	25.7	4.07	1.15	2.65	2.63

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Client: **Church, B. Neil**
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

QUALITY CONTROL REPORT VAN07001029.1

Method		4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	4A&4B	2A C/S	2A C/S	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX	1DX
Analyte		Tb	Ho	Er	Tm	Yb	Lu	C/TOT	S/TOT	Mo	Cu	Pb	Zn	Ni	As	Cd	Sb	Bi	Ag	Au	Hg
Unit		ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm
MDL		0.01	0.02	0.03	0.01	0.05	0.01	0.02	0.02	0.1	0.1	0.1	1	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.01
Reference Materials																					
STD CSC	Standard							3.11	4.16												
STD CSC	Standard							3.19	4.19												
STD DS7	Standard									19.3	103.7	65.0	382	54.3	48.6	6.0	5.0	4.5	0.5	55.7	0.25
STD DS7	Standard									19.0	102.0	65.9	397	58.1	49.6	6.4	4.9	4.5	0.8	49.2	0.21
STD SO-18	Standard	0.51	0.60	1.75	0.29	1.65	0.26														
STD SO-18	Standard	0.52	0.62	1.76	0.29	1.75	0.27														
STD CSC Expected								3.13	4.19												
STD DS7 Expected										20.92	109	70.6	411	56	48.2	6.38	5.86	4.51	0.89	70	0.2
STD SO-18 Expected		0.53	0.62	1.84	0.29	1.79	0.27														
BLK	Blank							<0.02	<0.02												
BLK	Blank									<0.1	<0.1	<0.1	<1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	<0.01
BLK	Blank	<0.01	<0.02	<0.03	<0.01	<0.05	<0.01														
Prep Wash																					
G1	Prep Blank	0.46	0.51	1.45	0.25	1.63	0.28	<0.02	<0.02	0.2	2.0	2.9	53	4.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.5	0.08
G1	Prep Blank	0.47	0.55	1.83	0.29	1.67	0.29	<0.02	<0.02	0.2	2.1	2.4	52	4.3	<0.5	<0.1	<0.1	<0.1	<0.1	0.8	0.06

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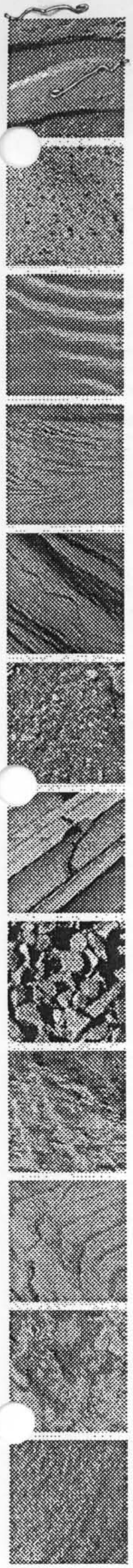
Client: Church, B. Neil
600 Parkridge St.
Victoria
BC V8Z 6N7 Canada

Project: None Given
Report Date: November 27, 2007

QUALITY CONTROL REPORT VAN07001029.1

	Method	1DX	1DX
	Analyte	Tl	Se
	Unit	ppm	ppm
	MDL	0.1	0.5
Reference Materials			
STD CSC	Standard		
STD CSC	Standard		
STD DS7	Standard	4.1	4.2
STD DS7	Standard	4.1	4.3
STD SO-18	Standard		
STD SO-18	Standard		
STD CSC Expected			
STD DS7 Expected		4.19	3.5
STD SO-18 Expected			
BLK	Blank		
BLK	Blank	<0.1	<0.5
BLK	Blank		
Prep Wash			
G1	Prep Blank	0.4	<0.5
G1	Prep Blank	0.4	0.6

VERSION 1.0



AcmeLabs

Services & Fees 2008

Geochemical
Whole Rock Major & Trace Element Analyses

Group 4A
Whole Rock by ICP

A cost-effective rock characterization package comprising four separate analytical tests.

Total abundances of the major oxides and several minor elements are reported on a 0.1 g sample analysed by ICP-emission spectrometry following a Lithium metaborate/tetrabortate fusion and dilute nitric digestion. Loss on ignition (LOI) is by weigh difference after ignition at 1000°C.

Unique to our lab is the addition of total carbon and sulphur analysis by Leco.

Group 4A	Cdn
Any 1 element	$14.60
Full Suite (20 parameters)	$26.70
Extended Package* (Full Suite + Ce Co Cu Ta Zn)	$30.40

Group 4B
Total Trace Elements by ICP-MS

This is the perfect addition to Group 4A. This package comprises two separate analyses. Rare earth and refractory elements are determined by ICP mass spectrometry following a Lithium metaborate / tetrabortate fusion and nitric acid digestion of a 0.1 g sample (same decomposition as Group 4A). In addition a separate 0.5 g split is digested in Aqua Regia and analysed by ICP Mass Spectrometry to report the precious and base metals (in highlight). This is the same method as Group 1DX.

Prices are for routine geological samples. Acme may refuse to analyse or charge extra for non-geological materials.

Group 4A and 4B each require 5 g for analysis, 10 g for combined package (Group 4A-4B).

Group 4B	Cdn
Any 1 element	$17.00
Full Suite (45 elements)	$36.40
Refractory and REEs only	$26.70
Group 4A – 4B	$53.30

	Group 4A Det. Lim.	Upper Limit
SiO_2	0.01 %	100 %
Al_2O_3	0.01 %	100 %
Fe_2O_3	0.04 %	100 %
CaO	0.01 %	100 %
MgO	0.01 %	100 %
Na_2O	0.01 %	100 %
K_2O	0.01 %	100 %
MnO	0.01 %	100 %
TiO_2	0.01 %	100 %
P_2O_5	0.01 %	100 %
Cr_2O_3	0.002 %	100 %
LOI	0.1 %	100 %
C	0.01 %	100 %
S	0.01 %	100 %

	Group 4A Det. Lim.	Group 4B Det. Lim.	Upper Limit
Au	–	0.5 ppb	100 ppm
Ag	–	0.1 ppm	100 ppm
As	–	1 ppm	10000 ppm
Ba	5 ppm	1 ppm	50000 ppm
Be	–	1 ppm	10000 ppm
Bi	–	0.1 ppm	2000 ppm
Cd	–	0.1 ppm	2000 ppm
Co	20 ppm*	0.2 ppm	10000 ppm
Cs	–	0.1 ppm	10000 ppm
Cu	5 ppm*	0.1 ppm	10000 ppm
Ga	–	0.5 ppm	10000 ppm
Hf	–	0.1 ppm	10000 ppm
Hg	–	0.1 ppm	100 ppm
Mo	–	0.1 ppm	2000 ppm
Nb	5 ppm	0.1 ppm	50000 ppm
Ni	20 ppm	0.1 ppm	10000 ppm
Pb	–	0.1 ppm	10000 ppm
Rb	–	0.1 ppm	10000 ppm
Sb	–	0.1 ppm	2000 ppm
Sc	1 ppm	–	10000 ppm
Se	–	0.5 ppm	100 ppm
Sn	–	1 ppm	10000 ppm
Sr	2 ppm	0.5 ppm	50000 ppm
Ta	20 ppm*	0.1 ppm	50000 ppm
Th	–	0.2 ppm	10000 ppm
Tl	–	0.1 ppm	1000 ppm
U	–	0.1 ppm	10000 ppm
V	–	8 ppm	10000 ppm
W	–	0.5 ppm	10000 ppm
Y	3 ppm	0.1 ppm	50000 ppm
Zn	5 ppm*	1 ppm	10000 ppm
Zr	5 ppm	0.1 ppm	50000 ppm
La	–	0.1 ppm	50000 ppm
Ce	30 ppm*	0.1 ppm	50000 ppm
Pr	–	0.02 ppm	10000 ppm
Nd	–	0.3 ppm	10000 ppm
Sm	–	0.05 ppm	10000 ppm
Eu	–	0.02 ppm	10000 ppm
Gd	–	0.05 ppm	10000 ppm
Tb	–	0.01 ppm	10000 ppm
Dy	–	0.05 ppm	10000 ppm
Ho	–	0.02 ppm	10000 ppm
Er	–	0.03 ppm	10000 ppm
Tm	–	0.01 ppm	10000 ppm
Yb	–	0.05 ppm	10000 ppm
Lu	–	0.01 ppm	10000 ppm

Note: Highlighted elements by Aqua Regia/ ICP-MS analysis in 4B package.

Appendix B-3 Mineralogy

teckcominco

J.A. McLeod
Manager, Global Discovery Labs

Neil Church
600 Parkridge Street
Victoria, B.C.
V8Z 6N7

4 September, 2007

Dear Neil: ***RE: XRD (T160,TW13,TL04-0) / G.D.L. Job V07-0848R***

Three samples were submitted for x-ray diffraction. They are labeled as follows:

LAB NO.	***FIELD NO.***
R07:56515	T-160
R07:56516	TW-13
R07:56517	TL-40-0

The results are as follows:

SAMPLE R07:56515 (T-160) contains:

1) Quartz .... Abundant
2) Albite .... Minor to moderate
3) Kaolinite .... Possible but minor
4) Calcite .... Possible but minor
5) Dolomite .... Possible but minor

Teck Cominco Ltd.
Global Discovery Labs. / 1486 East Pender Street / Vancouver, B.C. / Canada V5L 1V8 / Phone: (604) 685-3032 / Fax: (604) 844-2686

SAMPLE R07:56516 (TW-13) contains:

1) Quartz .... Abundant
2) Albite .... Moderate
3) Mica .... Minor (muscovite?)
4) Kaolinite .... Possible but trace based on a small peak at d = 7.16

SAMPLE R07:56517 (TL-40-0) contains:

1) Quartz .... Abundant
2) Albite .... Minor to moderate
3) Dolomite .... Moderate
4) Kaolinite .... Very minor
5) Montmorillonite .... Unlikely

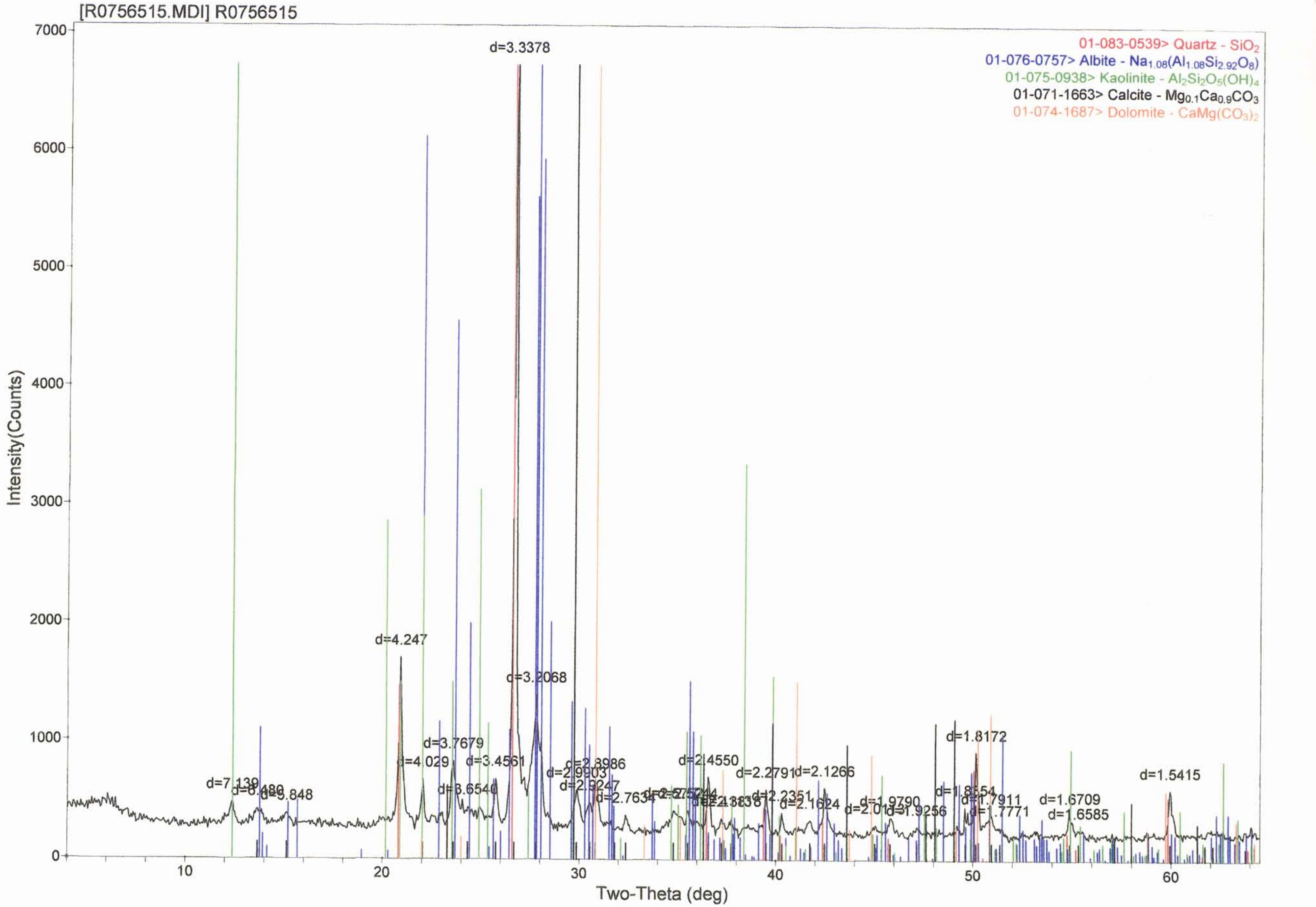
Attached are the x-ray traces and the mineral matches.

Regards,

J.A. McLeod, M.A.Sc., P.Eng.
Manager, G.D.L.

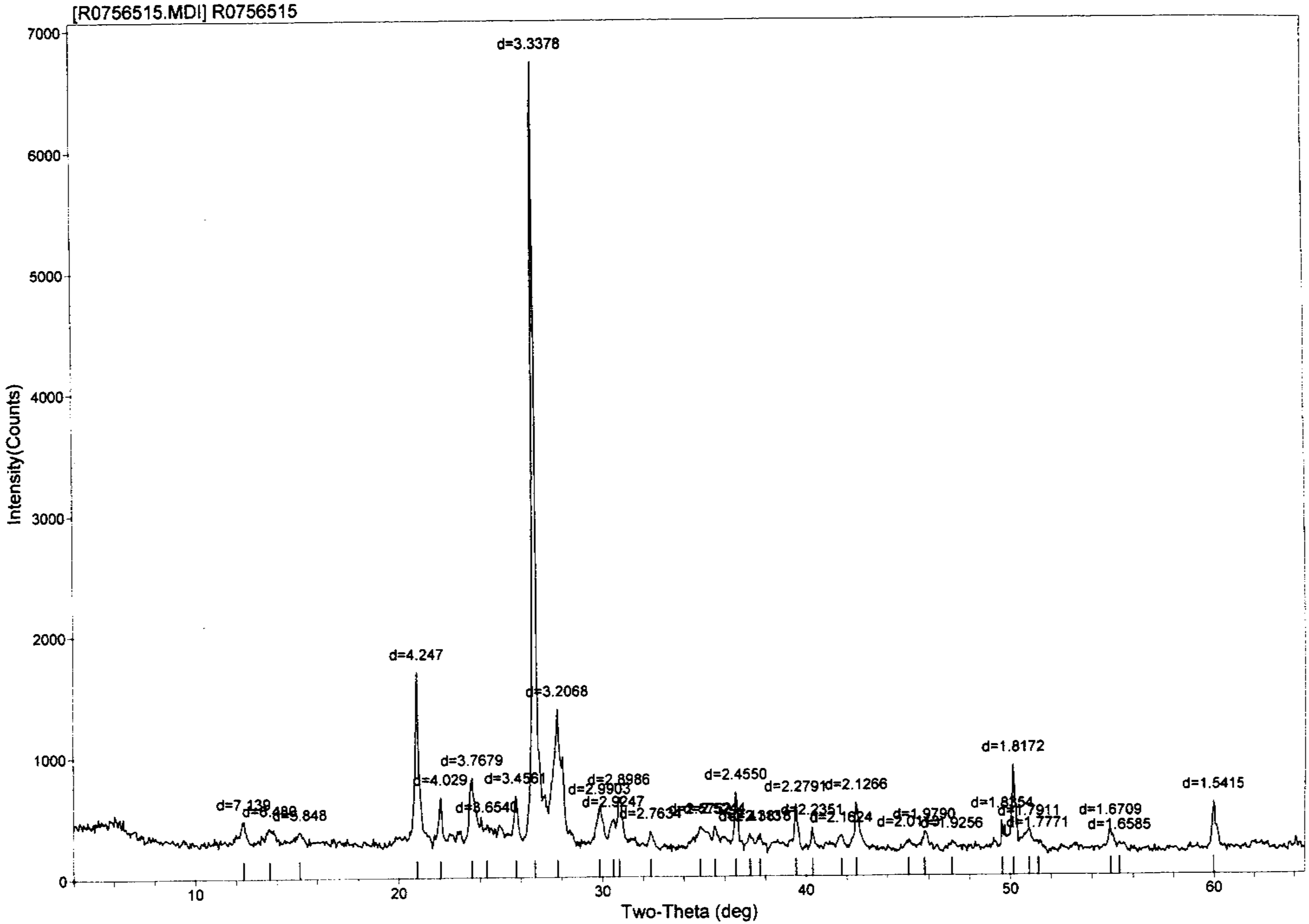
JAM/skw

App. (x-ray diffractograms)



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Thursday, August 30, 2007 03:34p (MDI/JADE8)



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Thursday, August 30, 2007 03:21p (MDI/JADE8)

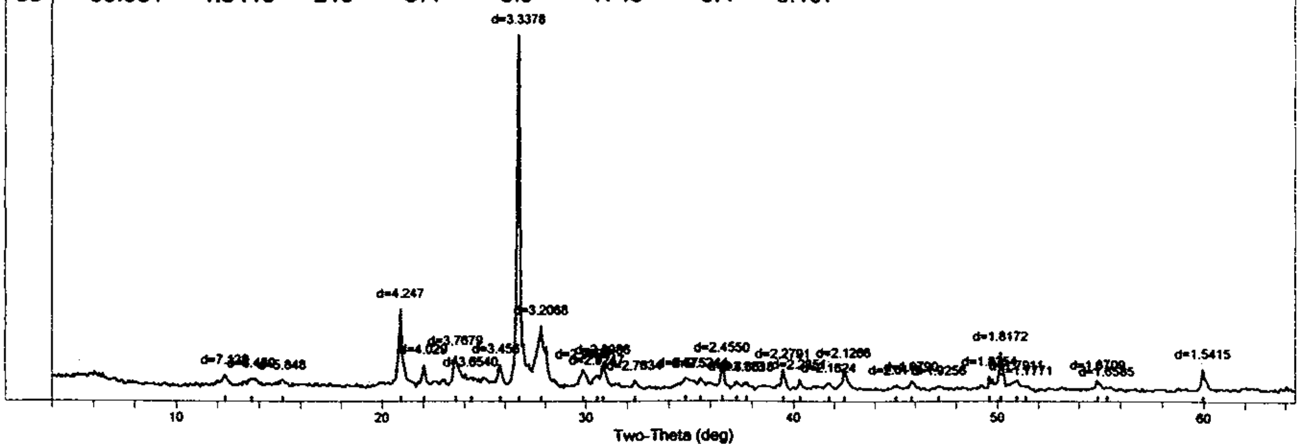
[R0756515.MDI] R0756515	Peak Search Report

SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=6730, 08/30/07 01:23p

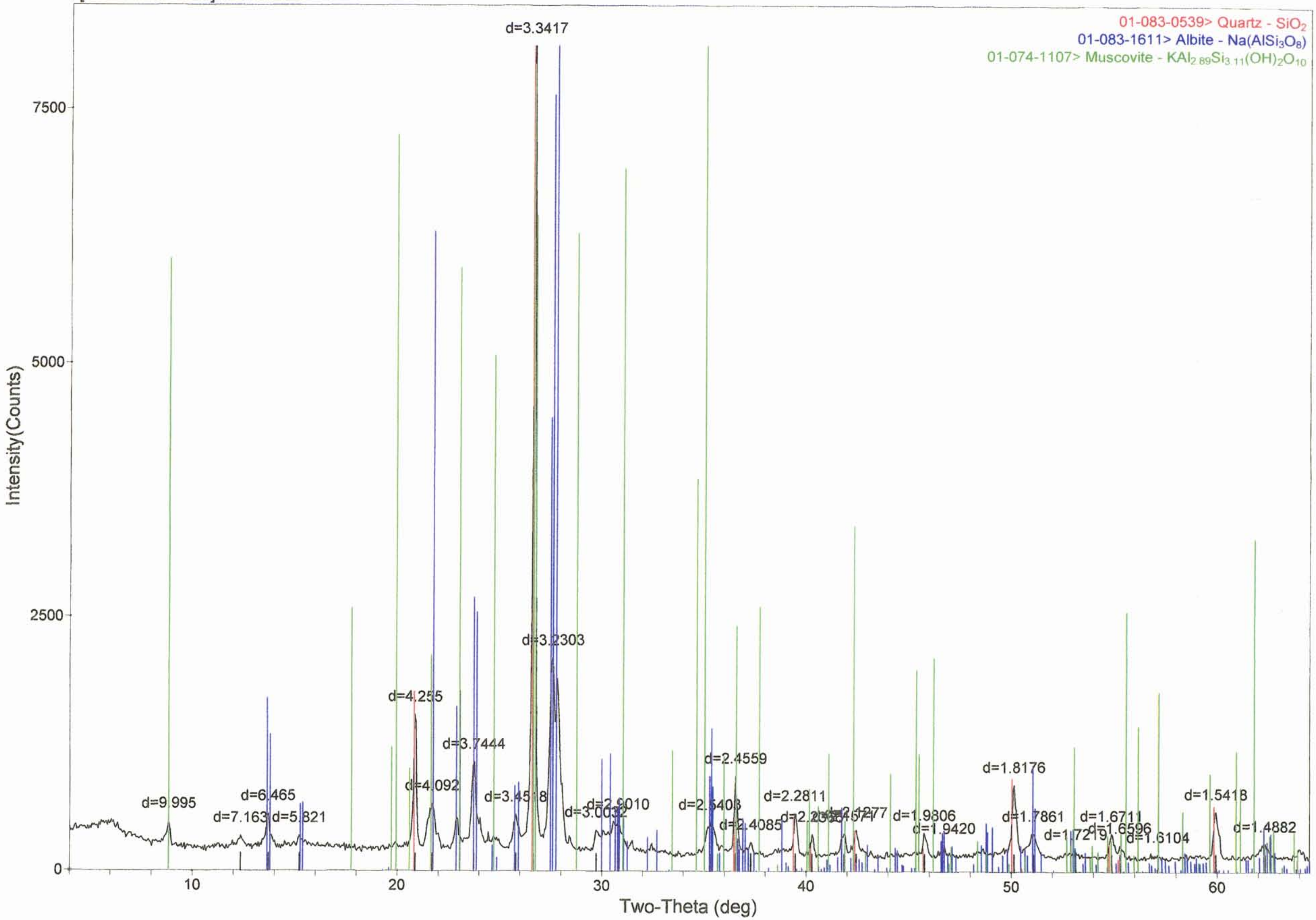
PEAK: 11(pts)/Parabolic Filter, Threshold=3.0, Cutoff=0.1%, BG=3/1.0, Peak-Top=Summit

NOTE: Intensity = Counts, 2T(0)=0.0(deg), Wavelength to Compute d-Spacing = 1.54059Å (Cu/K-alpha1)

#	2-Theta	d(Å)	BG	Height	H%	Area	A%	FWHM
1	12.388	7.1391	295	181	2.8	1224	4.5	0.287
2	13.653	6.4805	301	118	1.8	1141	4.2	0.412
3	15.138	5.8478	307	77	1.2	429	1.6	0.237
4	20.898	4.2473	328	1371	21.4	5986	21.8	0.186
5	22.042	4.0294	325	341	5.3	1013	3.7	0.126
6	23.593	3.7679	344	481	7.5	3390	12.3	0.299
7	24.339	3.6540	361	78	1.2	1049	3.8	0.574
8	25.757	3.4561	346	329	5.1	1169	4.3	0.151
9	26.686	3.3378	333	6397	100.0	27469	100.0	0.182
10	27.797	3.2068	290	1095	17.1	11119	40.5	0.432
11	29.855	2.9903	332	249	3.9	1119	4.1	0.191
12	30.541	2.9247	329	146	2.3	1239	4.5	0.361
13	30.823	2.8986	323	336	5.2	2446	8.9	0.310
14	32.371	2.7634	265	110	1.7	200	0.7	0.077
15	34.809	2.5752	274	140	2.2	1549	5.6	0.470
16	35.534	2.5244	306	108	1.7	839	3.1	0.329
17	36.573	2.4550	283	413	6.5	1383	5.0	0.142
18	37.259	2.4113	256	93	1.4	749	2.7	0.343
19	37.738	2.3818	246	104	1.6	749	2.7	0.305
20	39.508	2.2791	248	344	5.4	1215	4.4	0.150
21	40.319	2.2351	241	158	2.5	329	1.2	0.088
22	41.736	2.1624	253	82	1.3	425	1.5	0.221
23	42.474	2.1266	247	360	5.6	1869	6.8	0.221
24	45.036	2.0113	228	67	1.0	359	1.3	0.229
25	45.813	1.9790	220	138	2.2	1340	4.9	0.413
26	47.160	1.9256	215	66	1.0	396	1.4	0.257
27	49.629	1.8354	225	225	3.5	1479	5.4	0.279
28	50.161	1.8172	251	660	10.3	3190	11.6	0.205
29	50.943	1.7911	195	186	2.9	2604	9.5	0.595
30	51.375	1.7771	195	87	1.4	491	1.8	0.240
31	54.905	1.6709	211	174	2.7	1272	4.6	0.310
32	55.349	1.6585	205	56	0.9	595	2.2	0.450
33	59.961	1.5415	219	377	5.9	1748	6.4	0.197



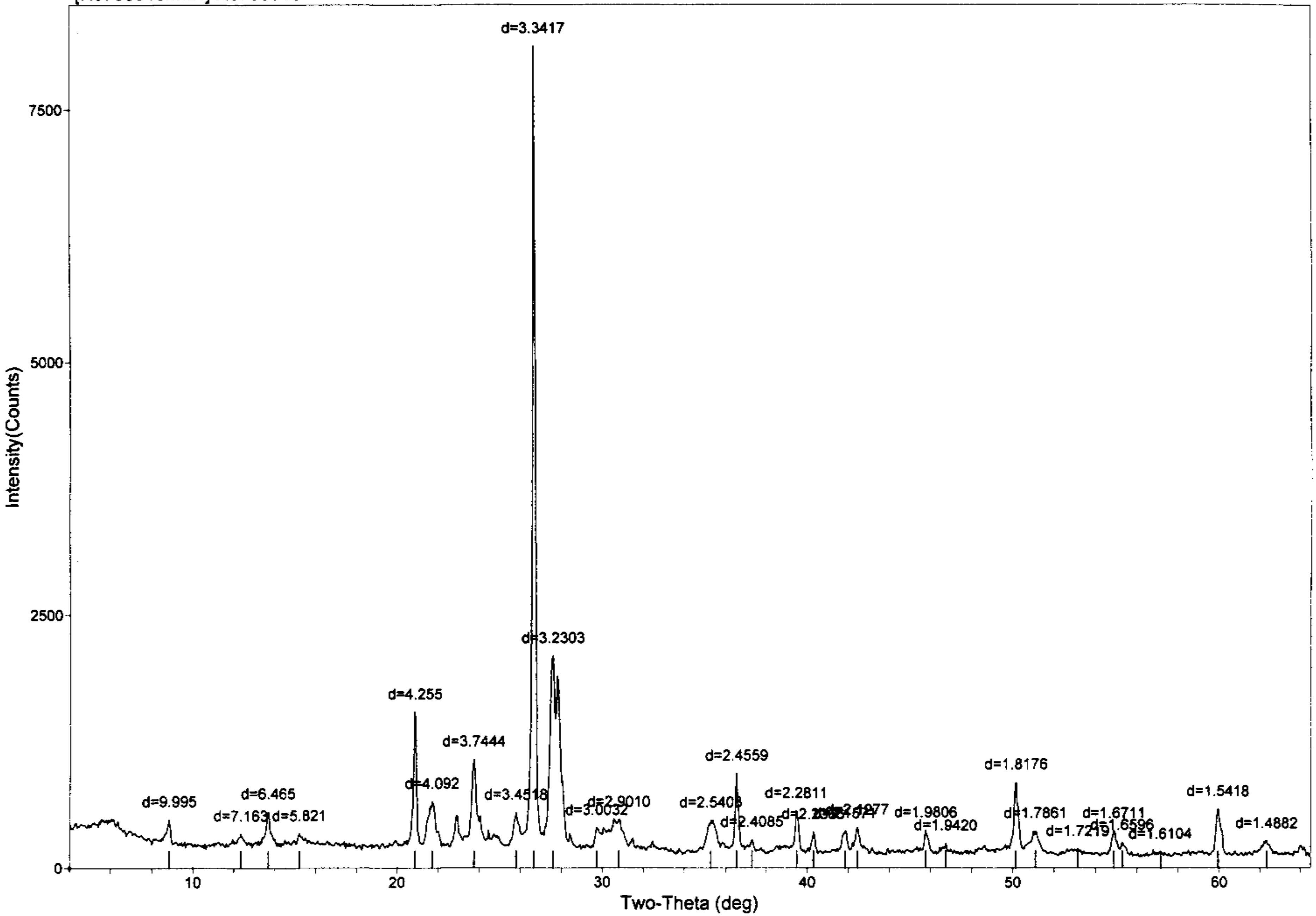
[R0756516.MDI] R0756516



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Thursday, August 30, 2007 04:20p (MDI/JADE8)

[R0756516.MDI] R0756516



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Thursday, August 30, 2007 03:37p (MDI/JADE8)

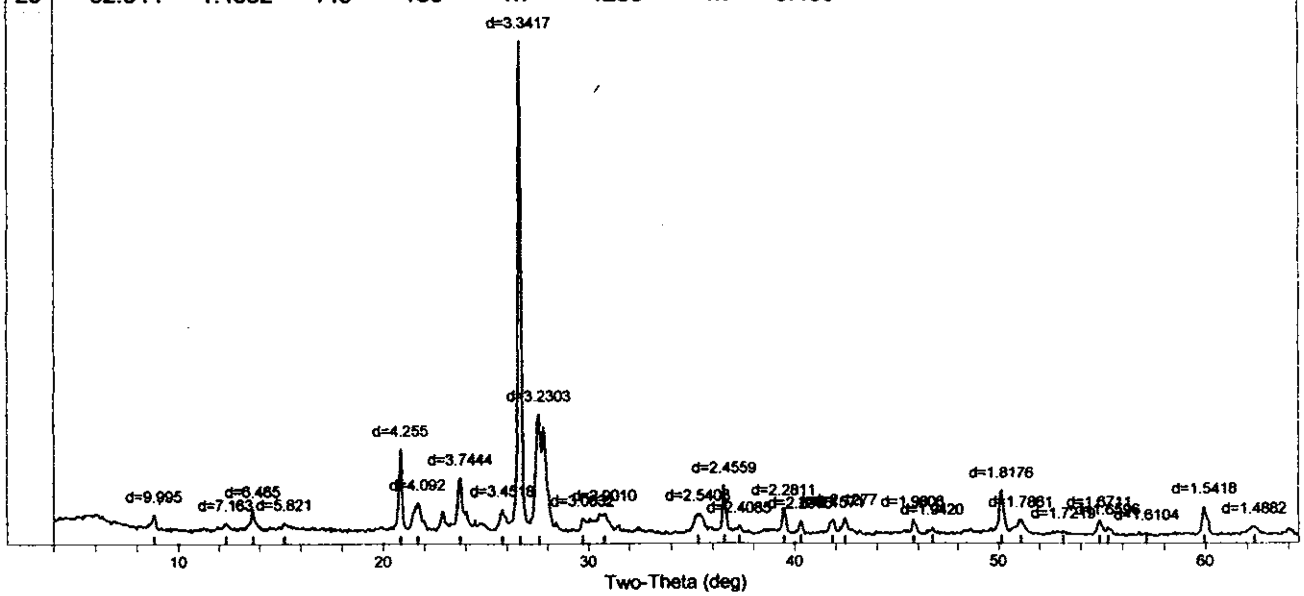
[R0756516.MDI] R0756516 | **Peak Search Report**

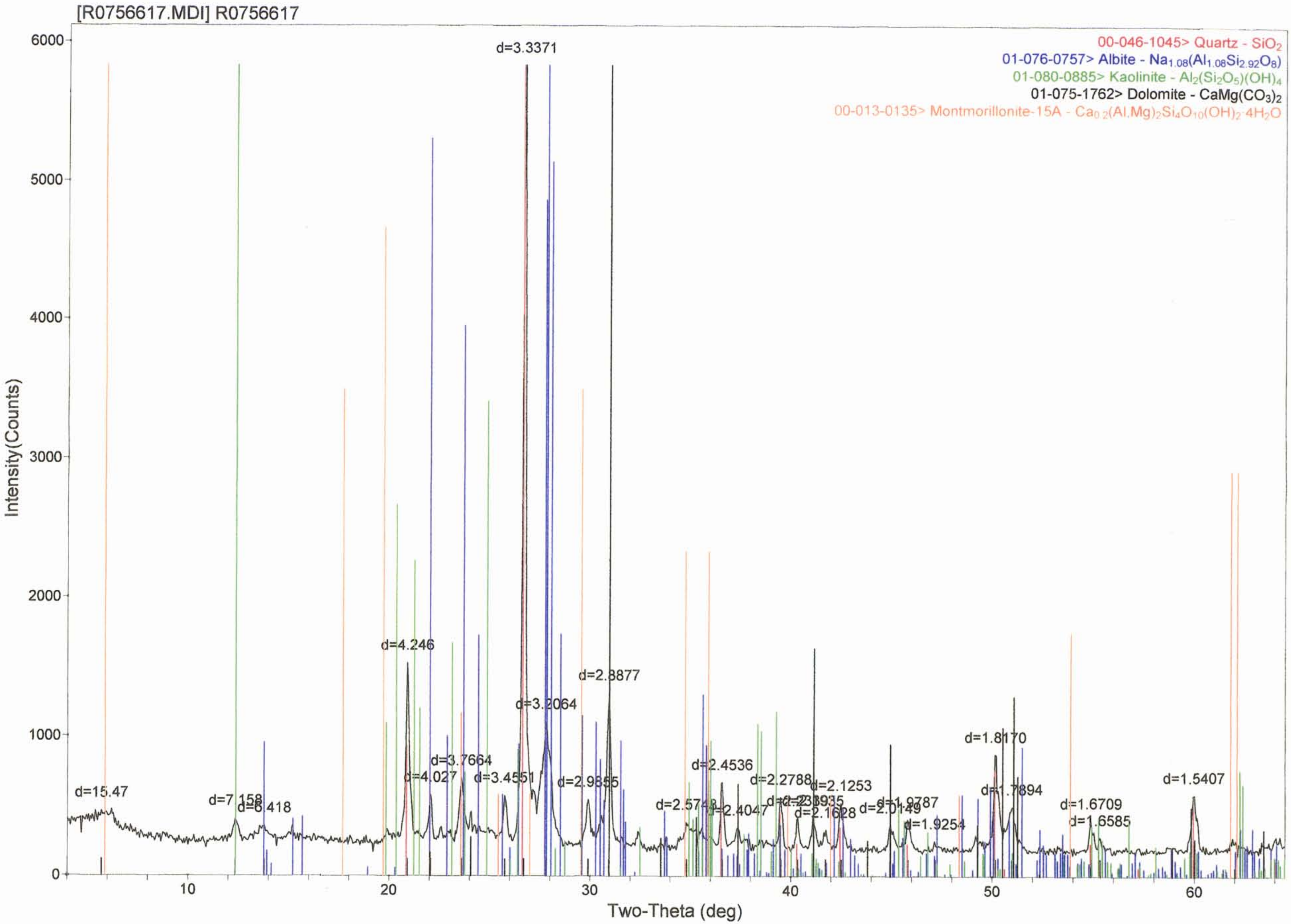
SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=8124, 08/30/07 02:15p

PEAK: 13(pts)/Parabolic Filter, Threshold=3.0, Cutoff=0.1%, BG=3/1.0, Peak-Top=Summit

NOTE: Intensity = Counts, 2T(0)=0.0(deg), Wavelength to Compute d-Spacing = 1.54059Å (Cu/K-alpha1)

#	2-Theta	d(Å)	BG	Height	H%	Area	A%	FWHM
1	8.840	9.9952	258	227	2.9	1000	3.8	0.187
2	12.348	7.1625	236	109	1.4	703	2.7	0.274
3	13.687	6.4647	240	322	4.2	1732	6.5	0.228
4	15.208	5.8211	242	106	1.4	887	3.3	0.357
5	20.861	4.2547	262	1279	16.5	4466	16.9	0.148
6	21.700	4.0921	263	399	5.1	3065	11.6	0.327
7	23.743	3.7444	309	764	9.9	4303	16.2	0.240
8	25.789	3.4518	323	230	3.0	972	3.7	0.180
9	26.654	3.3417	374	7750	100.0	26500	100.0	0.145
10	27.592	3.2303	231	1863	24.0	24354	91.9	0.556
11	29.724	3.0032	211	192	2.5	1088	4.1	0.241
12	30.797	2.9010	206	276	3.6	4955	18.7	0.764
13	35.303	2.5403	187	291	3.7	3046	11.5	0.446
14	36.559	2.4559	204	731	9.4	2636	9.9	0.153
15	37.305	2.4085	193	91	1.2	281	1.1	0.131
16	39.472	2.2811	192	377	4.9	1629	6.1	0.184
17	40.291	2.2366	187	176	2.3	450	1.7	0.109
18	41.844	2.1571	159	212	2.7	1420	5.4	0.284
19	42.449	2.1277	163	244	3.1	1815	6.9	0.316
20	45.775	1.9806	159	220	2.8	1135	4.3	0.219
21	46.739	1.9420	154	97	1.2	462	1.7	0.203
22	50.150	1.8176	215	638	8.2	2946	11.1	0.196
23	51.096	1.7861	139	234	3.0	2657	10.0	0.482
24	53.147	1.7219	139	57	0.7	734	2.8	0.546
25	54.899	1.6711	139	236	3.0	1927	7.3	0.347
26	55.309	1.6596	133	125	1.6	1302	4.9	0.442
27	57.151	1.6104	126	44	0.6	366	1.4	0.353
28	59.949	1.5418	145	446	5.8	2468	9.3	0.235
29	62.344	1.4882	145	130	1.7	1238	4.7	0.403





Materials Data, Inc.

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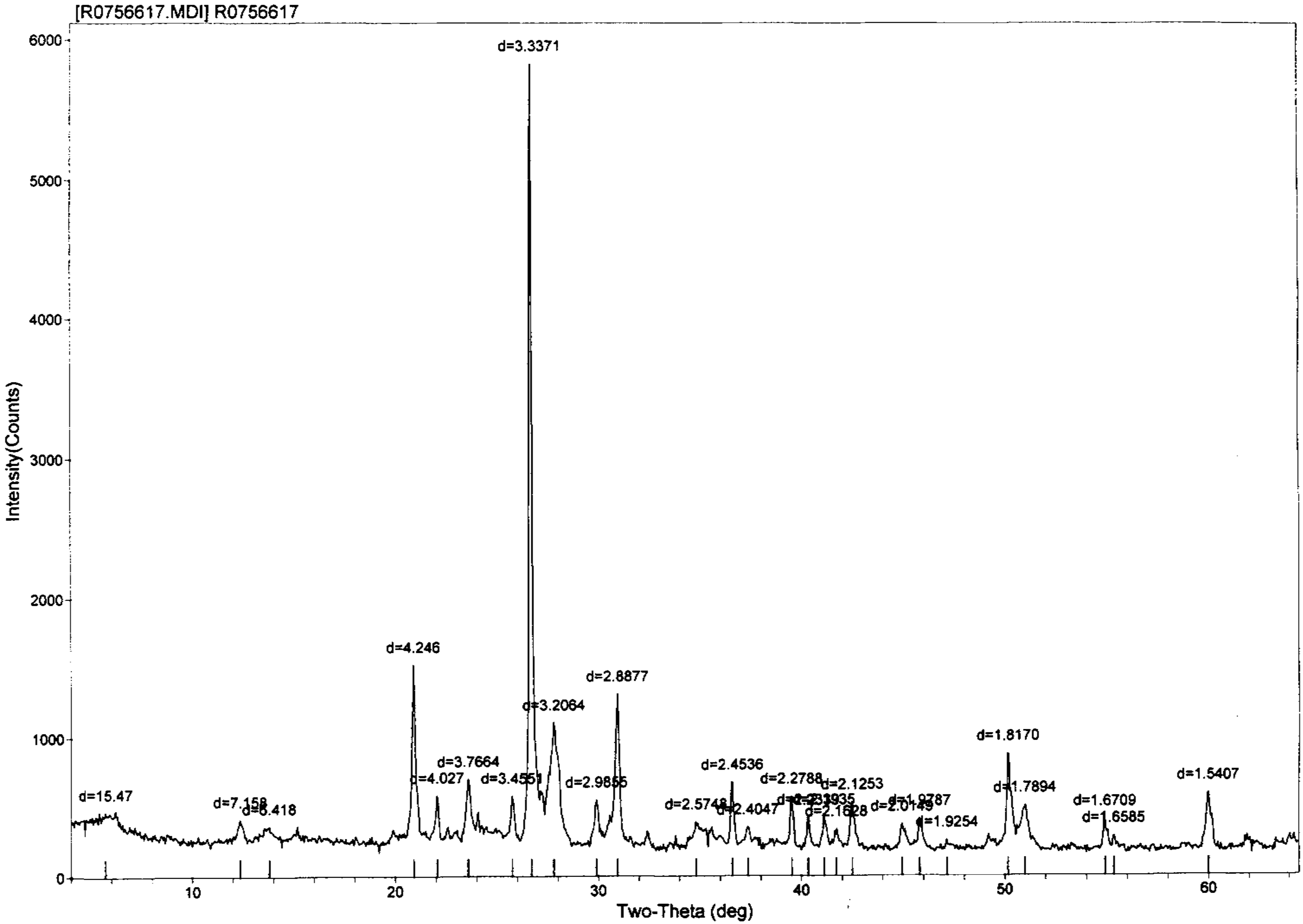
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Intensity(Counts)
Two-Theta (deg)
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5000
4000
3000
2000
1000
0
10
20
30
40
50
60
d=3.3371
d=4.246
d=2.8877
d=3.2064
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d=3.7664
d=4.027
d=3.4551
d=2.9855
d=2.4536
d=2.2788
d=2.1253
d=1.5407
d=1.7894
d=15.47
d=7.158
d=6.418
d=2.5748
d=2.4047
d=2.1628
d=1.9787
d=2.0149
d=1.9254
d=1.6709
d=1.6585

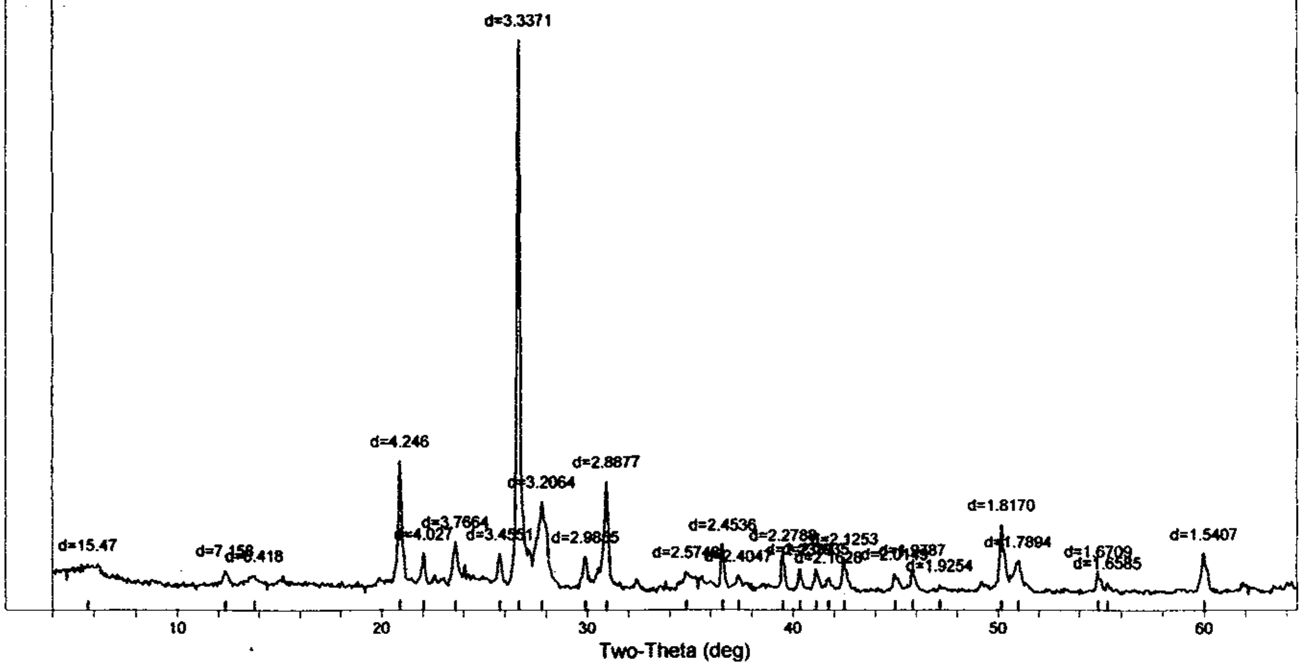
[R0756617.MDI] R0756617	Peak Search Report

SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=5828, 08/30/07 05:05p

PEAK: 11(pts)/Parabolic Filter, Threshold=3.0, Cutoff=0.1%, BG=3/1.0, Peak-Top=Summit

NOTE: Intensity = Counts, 2T(0)=0.0(deg), Wavelength to Compute d-Spacing = 1.54059Å (Cu/K-alpha1)

#	2-Theta	d(Å)	BG	Height	H%	Area	A%	FWHM
1	5.709	15.4665	397	69	1.3	537	2.2	0.329
2	12.355	7.1583	273	138	2.5	695	2.9	0.215
3	13.787	6.4180	269	92	1.7	936	3.9	0.434
4	20.906	4.2456	290	1236	22.3	5500	22.9	0.189
5	22.055	4.0270	285	295	5.3	996	4.1	0.144
6	23.602	3.7664	309	389	7.0	2025	8.4	0.221
7	25.764	3.4551	289	286	5.2	1076	4.5	0.160
8	26.691	3.3371	282	5546	100.0	24018	100.0	0.184
9	27.801	3.2064	249	857	15.5	9621	40.1	0.477
10	29.904	2.9855	279	267	4.8	1088	4.5	0.173
11	30.942	2.8877	276	1037	18.7	5536	23.0	0.227
12	34.816	2.5748	263	124	2.2	735	3.1	0.252
13	36.594	2.4536	259	412	7.4	1313	5.5	0.135
14	37.366	2.4047	247	101	1.8	426	1.8	0.179
15	39.513	2.2788	220	347	6.3	1251	5.2	0.153
16	40.342	2.2339	216	200	3.6	624	2.6	0.133
17	41.117	2.1935	220	198	3.6	1119	4.7	0.240
18	41.728	2.1628	227	106	1.9	460	1.9	0.184
19	42.500	2.1253	212	314	5.7	1570	6.5	0.213
20	44.952	2.0149	212	155	2.8	762	3.2	0.209
21	45.821	1.9787	212	197	3.6	898	3.7	0.194
22	47.166	1.9254	188	66	1.2	318	1.3	0.206
23	50.166	1.8170	230	643	11.6	3493	14.5	0.231
24	50.995	1.7894	186	312	5.6	3332	13.9	0.454
25	54.904	1.6709	182	219	4.0	1573	6.5	0.305
26	55.351	1.6585	183	98	1.8	718	3.0	0.310
27	59.995	1.5407	189	394	7.1	2524	10.5	0.272



Appendix B-4 XRD & CEC Analyses

Miles Industrial Mineral Research
1244 Columbine Street
Denver, CO 80206
Tel: (303) 355-5568   Fax: (303) 355-0422
w_miles@hotmail.com

February 14, 2007

Liz Butler-Henderson
Princeton Energy Resources Inc.
Box 53
Parson, B.C.
Canada   V0A 1L0
Tel: 250-348-2132
rockhound@xplornet.com

Re: Zeolite XRD analysis – 2 samples

Liz:

I received two rock samples, Manual Creek and Twin Lakes, for x-ray diffraction analysis and determination of mineral composition. Both samples have been evaluated and the results are summarized in this letter. Based on the mineral composition, an approximate CEC is provided. However, CEC analysis will give a more reliable value.

X-ray Diffraction Analysis:

Each rock sample was ground to less than 200 mesh with a ceramic mortar and pestle. Each was mounted as a randomly oriented powder for x-ray diffraction analysis. A portion of each sample was then sifted into the back of a sample holder to provide a randomly oriented sample for analysis. This randomly oriented sample was used for identification and quantification of the crystalline mineral components. External standards for quartz, feldspar and illite/mica were used for quantification.

Because clay minerals may be present in each rock sample, another portion of each sample was slurried in water and coated on a glass slide. As a slurry dries, any dispersed layer silicate clay minerals orient parallel to the glass slide increasing the layer spacing for identification of the clay minerals by x-ray diffraction analysis. In order to identify expandable clay minerals, the oriented slide was then exposed to ethylene glycol vapor at 50°C. X-ray diffraction analysis shows expansion of the layer spacing of smectite clay minerals (including montmorillonite) to 17 Angstroms. Each sample XRD pattern has an overlay of the oriented film before and after exposure to ethylene glycol to demonstrate the presence of montmorillonite or other expandable clay minerals. The x-ray diffraction analysis results are listed in Table 1. X-ray diffraction patterns are included for reference.

The Manual Creek sample is composed of zeolite, and smectite clay, with minor concentrations of feldspar, and quartz. The zeolite is heulandite/clinoptilolite. Calcium montmorillonite (smectite) in the Manual Creek sample shows the (0,0,1) layer spacing at 14.5Å and the (0,6,0) peak at 1.50Å. The plagioclase feldspar has its major peak at 3.18Å.

The Twin Lakes rock sample is composed of clinoptilolite, quartz and feldspar in similar concentrations. It does not contain any montmorillonite (smectite).

Table 2 contains an approximation of the cation exchange cation concentration, based on the mineral composition. In high purity, clinoptilolite has a CEC value of about 200 meq/100g, while montmorillonite has a CEC value of about 100 meq/100g.

Thank you for your business.

William Miles, Ph.D.

Table 1
Semi-quantitative XRD Mineral Composition of Two rock Samples

Sample	%Clinoptilolite	%Smectite	%Feldspar	%Quartz	% Kaolin
Manual Creek	~30%	~45%	~20%	<5%	0%
Twin Lakes	~20%	0%	~35%	35%	10%

Table 2
Approximate Cation Exchange Capacity Calculated From Mineral Composition

Manual Creek	~105 meq/100g
Twin Lakes	~40 meq/100g

Payment should be made to:

Miles Industrial Mineral Research
1244 Columbine Street
Denver, Colorado 80206
Tel: (303) 355-5568
Fax: (303) 355-0422

Persons or entity liable for payment of this Invoice:

February 14, 2007

Liz Butler-Henderson
Princeton Energy Resources Inc.
Box 53
Parson, B.C.
Canada V0A 1L0
Tel: 250-348-2132

Invoice # 7235

Persons or Entity Ordering Service: Liz Butler-Henderson

Service/Cost Description		**Balance Due**
XRD evaluation of Manual Creek ands Twin Lakes rock samples:		
1. XRD Analysis, 2 at $100		$200.00
	USA	$200.00
Net 15 days, 1.5% interest per month	**Total Due:**	**prepaid**

Appendix B-5 Petrography

Report 070105 for
Liz Butler-Henderson,
P.O. Box 53,
Parsons, B.C., V0A 1L0

February 2007

Sample: **Volcanic Glass**

Summary:

Sample Volcanic Glass

Scattered phenocrysts and clusters of phenocrysts of plagioclase, and lesser rounded ones of quartz and subhedral ones of biotite (altered slightly towards muscovite) are enclosed in volcanic glass that shows two textural varieties, one encompassing the phenocrysts (Glass A) and containing abundant small feldspar crystals, and a more abundant variety away from the phenocrysts (Glass B) that contains only minor tiny feldspar crystals. Perlitic fractures and irregular patches in Glass B consist of Glass A. An irregular veinlet is of quartz (cryptocrystalline to very fine grained) and minor cryptocrystalline sericite.

Some of the cryptocrystalline quartz could be deleterious to the use of this material in concrete. Field studies should be done to make certain that the abundance of this type of veinlet is small.

Photographic Notes:

The scanned section shows gross textural features; these features are seen much better on the digital image than on the printed image. Sample numbers are shown in or near the top left of the photos and photo numbers at or near the lower left. The letter in the lower right-hand corner indicates the lighting conditions: P = plane light, X = plane light in crossed nicols, R = reflected light, RP = reflected light and plane light, RX = reflected light (partly crossed nicols) and transmitted light in crossed nicols. Locations of digital photographs (by photo number) are shown on the scanned section. Descriptions of individual photographs are given at the end of the report.

John G. Payne, Ph.D., P.Geol.
Tel: (604)-597-1080
Fax: (604)-597-1080 (call first)
email: jgpayne@telus.net

Sample Volcanic Glass

Scattered phenocrysts and clusters of phenocrysts of plagioclase, and lesser rounded ones of quartz and subhedral ones of biotite (altered slightly towards muscovite) are enclosed in volcanic glass that shows two textural varieties, one encompassing the phenocrysts (Glass A) and containing abundant small feldspar crystals, and a more abundant variety away from the phenocrysts (Glass B) that contains only minor tiny feldspar crystals. Perlitic fractures and irregular patches in Glass B consist of Glass A. An irregular veinlet is of quartz (cryptocrystalline to very fine grained) and minor cryptocrystalline sericite. Some of the cryptocrystalline quartz could be deleterious to the use of this material in concrete. Field studies should be done to make certain that the abundance of this type of veinlet is small.

mineral	percentage	main grain size range (mm)	
phenocrysts			
plagioclase	5- 7%	0.2-1	(a few up to 1.2 mm long)
quartz	2- 3	0.5-1.5	
biotite	1- 2	0.3-0.81	
opaque	minor	0.07-0.1	
groundmass			
Glass A	17-20	amorphous	
Glass B	65-70	amorphous	
crystallites	1- 2	0.01-0.02	(mainly in Glass A)

Plagioclase forms euhedral phenocrysts and clusters up to 2 mm across of a few to several phenocrysts. Some phenocrysts were fractured coarsely and fractures were filled with Glass A.

Quartz forms equant phenocrysts and clusters of equant grains and one pear-shaped phenocryst.

Biotite forms disseminated phenocrysts and clusters of up to a few phenocrysts, in part adjacent to plagioclase phenocrysts or clusters thereof. Pleochroism is from light/medium brown to dark brown to semi-opaque. Some phenocrysts were altered slightly to thin plates of muscovite along cleavage planes.

Opaque forms small disseminated euhedral to subhedral equant phenocrysts commonly associated with biotite.

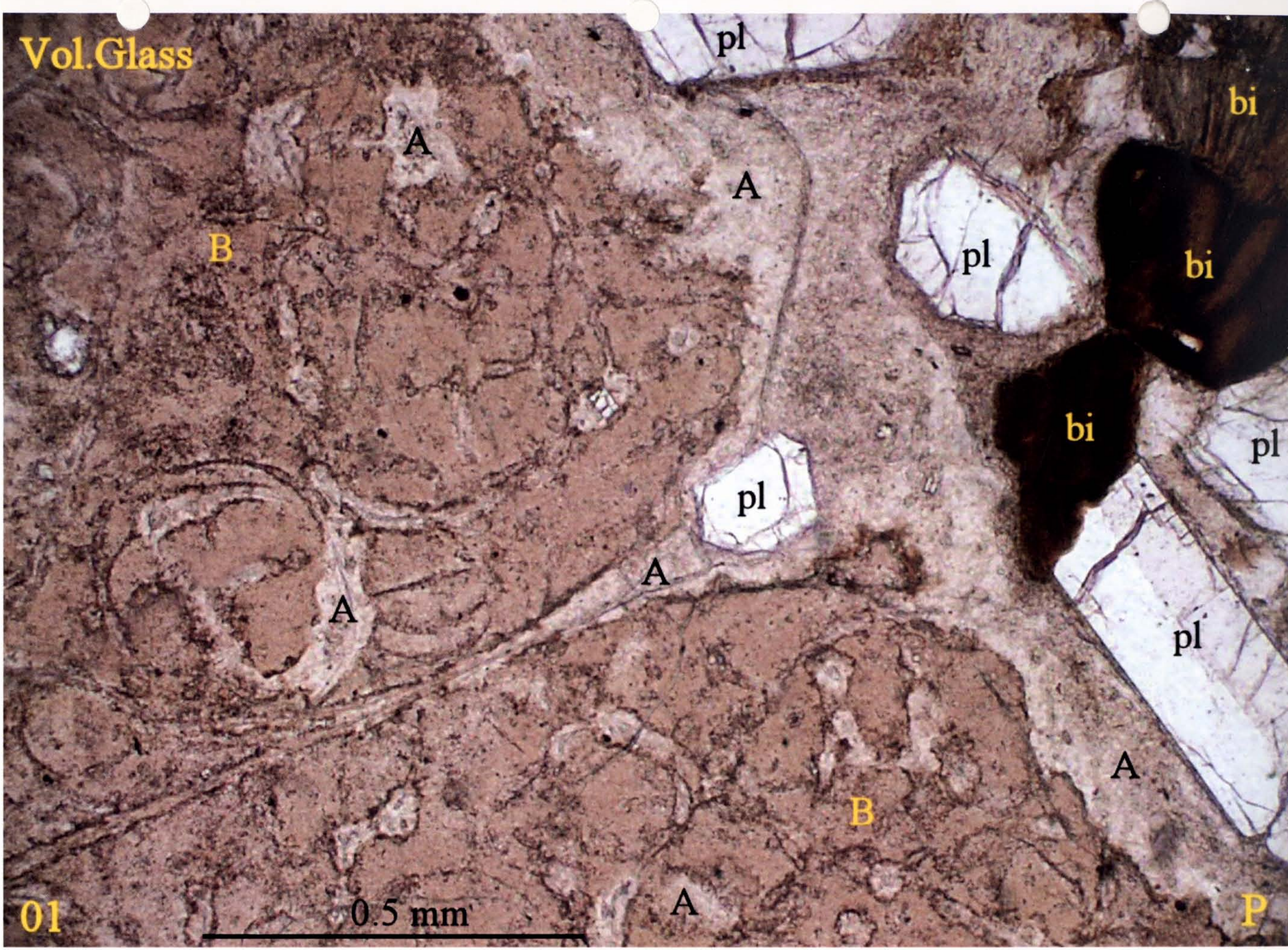
Most phenocrysts and clusters are rimmed by one type of volcanic glass (Glass A) that is paler in colour than Glass B and contains 5-10% ragged crystallites of feldspar, probably including K-feldspar. Glass A has a moderate yellow stain on the offcut block, indicating the presence of moderately abundant K-feldspar.

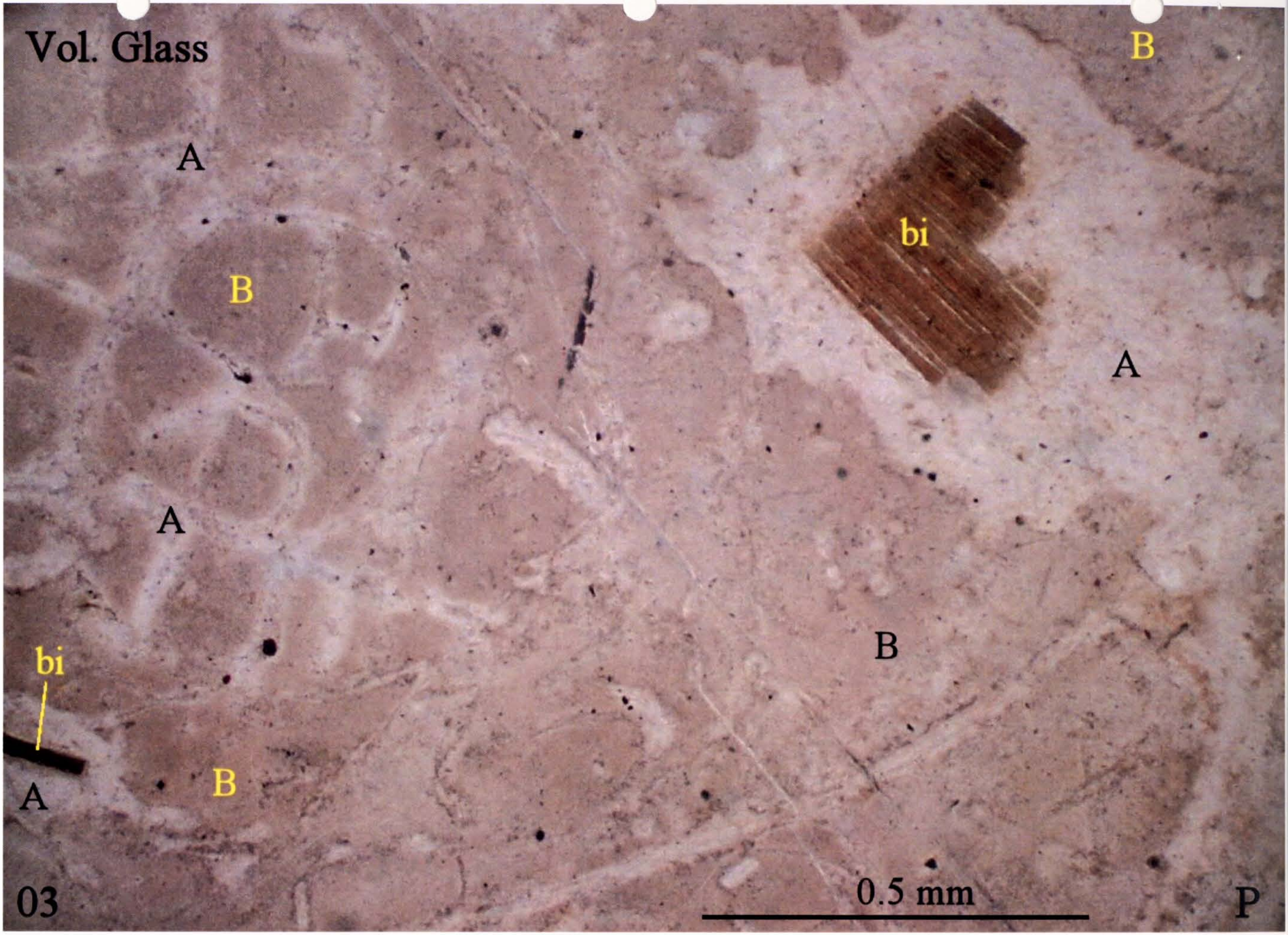
Glass B is slightly darker grey in colour than Glass A. It contains perlitic fractures and irregular lensy patches of Glass A (with crystallite inclusions as in the main patches of Glass A adjacent to the phenocrysts). Glass B has a pale yellow stain on the offcut block, indicating the presence of minor K-feldspar.

An irregular, partly vuggy vein up to 1 mm wide and offshooting veinlet up to 0.06 mm wide are of quartz with minor patches of sericite.

List of Photographs

Photo	Sample	Description
01	Vol. Glass	cluster of phenocrysts of plagioclase and biotite and a small plagioclase phenocryst enclosed in Glass A; adjacent to Glass B that contains perlitic and other fractures that are filled with Glass B.
02	Vol. Glass	nearly same view as Photo 1 with crossed nicols. Note the crystallites (possibly some of K-feldspar) in Glass A, both bordering the phenocrysts and in perlitic and other fractures in Glass B.
03	Vol. Glass	small biotite phenocrysts enclosed in Glass A; remainder of section is Glass B with perlitic and other cracks filled with Glass A.
04	Vol. Glass	same view as Photo 1 with crossed nicols. Note the crystallites (possibly some of K-feldspar) in Glass A, both bordering the phenocrysts and in perlitic and other fractures in Glass B.
05	Vol. Glass	plagioclase phenocryst (with minor overgrowth and fracture-filling of sericite) surrounded by Glass A; Glass B with patches and seams of Glass A; late vuggy vein and veinlet of quartz with minor sericite. In places the contact between Glass A and Glass B is diffuse.


Vol.Glass
pl
bi
A
A
B
pl
bi
bi
pl
pl
A
A
pl
A
B
01
0.5 mm
A
P



Vol. Glass
B
A
bi
B
A
A
bi
B
A
B
03
0.5 mm
P

Appendix B-6 Pozzolan Testing

TECHNICAL REPORT
CERTIFIED CONCRETE TESTING LABORATORY
IN ACCORDANCE WITH CSA STD. A283

amec

TO: Elizabeth Butler Henderson
P.O. Box 53
Parson, BC V0A 1L0

FILE NO: CA17177
DATE: 28 March 2007

PROJECT: Pozzolan Sample Testing
SUBJECT: Fineness, Amount Retained When Wet – Sieved on a 45 µm (No.325) Sieve

Following is the result for a sample of Pozzolan received at our Calgary laboratory for testing March 6, 2007.

Sample Identification	No. 325 Sieve Fineness % Retained
# TW-12 Twin Lake Obsidian Dome "Glass Hill"	12.0

Note
- Test sample submitted by client, crushed and screened through #325 screen prior to test.
- Test performed in accordance with ASTM Standard C311, Part 20.

Yours truly,
AMEC Earth & Environmental
a Division of AMEC Americas Limited

K.W. (Kent) Gillingwater, C.E.T.
Senior Technical Supervisor

AMEC Earth & Environmental,
A Division of AMEC Americas Limited
221 – 18th Street S.E.
Calgary, Alberta
CANADA T2E 6J5
Tel + 1 (403) 248-4331
Fax + 1 (403) 248-2188
www.amec.com

TECHNICAL REPORT
CERTIFIED CONCRETE TESTING LABORATORY
IN ACCORDANCE WITH CSA STD. A283

amec

TO: Elizabeth Butler Henderson
P.O. Box 53
Parson, BC V0A 1L0

FILE NO: CA17177
DATE: 03 May 2007

PROJECT: Pozzolan Sample Testing
SUBJECT: Strength Activity Index with Portland Cement

Following is a summary of test results for a sample of Pozzolan, received at our Calgary laboratory for testing March 6, 2007.

SAMPLE IDENTIFICATION	TEST NO.	STRENGTH ACTIVITY INDEX – COMP.STR. (MPa) CONTROL MIXTURE			TEST MIXTURE		
		7 Day	28 Day	56 Day	7 Day	28 Day	56 Day
# TW-12	1	32.3	41.8	45.9	26.6	34.1	40.9
Twin Lake		33.1	41.7	46.0	25.8	34.5	41.4
Obsidian Dome							
"Glass Hill"							
Compressive Strength Averages:		32.7	41.8	46.0	26.2	34.3	41.2
Strength Activity Index-% of Control:		-	-	-	80.1	82.1	89.6

Notes:
- Tests performed in accordance with the ASTM Standard C311-05 (27).
- Cement Replacement=20% Pozzolan in test mix.
- Referenced Standard / ASTM C618-05 (Table 2 – Type N Pozzolan)=75% (Min.)
- Physical Requirements:
  Water Requirement (% control) = 98.3 (Max.115%)
  Flows (%) = 98 (Control mix) 97 (Test mix)

(FINAL REPORT)

AMEC Earth & Environmental
a Division of AMEC Americas Limited

K.W. (Kent) Gillingwater, C.E.T.
Senior Technical Supervisor
Materials Testing Division

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amec

TECHNICAL REPORT

CERTIFIED CONCRETE TESTING LABORATORY
IN ACCORDANCE WITH CSA STD. A283

TO: Elizabeth Butler Henderson
P.O. Box 53
Parson, BC V0A 1L0

FILE NO: CA17177
DATE: 18 May 2007

PROJECT: Pozzolan Sample Testing
SUBJECT: Fineness, Amount Retained When Wet – Sieved on a 45 µm (No.325) Sieve

Following is the result for a sample of Pozzolan received at our Calgary laboratory for testing April 16, 2007.

Sample Identification	**No. 325 Sieve Fineness % Retained**
TWIN 49-18-47 119-94-44	NIL (100% Passing)

Note

- Test sample submitted by client, crushed and screened through #325 screen prior to test.
- Test performed in accordance with ASTM Standard C311, Part 20.

Yours truly,
AMEC Earth & Environmental
a Division of AMEC Americas Limited

K.W. (Kent) Gillingwater, C.E.T.
Senior Technical Supervisor
Materials Engineering Division

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TECHNICAL REPORT
CERTIFIED CONCRETE TESTING LABORATORY
IN ACCORDANCE WITH CSA STD. A283

TO: Elizabeth Butler Henderson
P.O. Box 53
Parson, BC V0A 1L0

FILE NO: CA17177
DATE: 13 June 2007

PROJECT: Pozzolan Sample Testing
SUBJECT: Strength Activity Index with Portland Cement

Following is a summary of test results for a sample of Pozzolan, received at our Calgary laboratory for testing April 16, 2007.

SAMPLE IDENTIFICATION	TEST NO.	STRENGTH ACTIVITY INDEX – COMP.STR. (MPa) CONTROL MIXTURE			TEST MIXTURE		
		7 Day	28 Day	56 Day	7 Day	28 Day	56 Day
TWIN	2	33.7	41.2	45.1	30.2	38.2	38.7
49-18-47		33.4	40.8	44.9	30.4	37.9	38.5
119-94-44							
Compressive Strength Averages:		33.6	41.0	45.0	30.3	38.1	38.6
Strength Activity Index-% of Control:		-	-	-	90.2	92.9	85.8

Notes:
- Tests performed in accordance with the ASTM Standard C311-05 (27).
- Cement Replacement=20% Pozzolan in test mix.
- Referenced Standard / ASTM C618-05 (Table 2 – Type N Pozzolan)=75% (Min.)
- Physical Requirements:
  Water Requirement (% control) = 98.8 (Max.115%)
  Flows (%) = 100 (Control mix) 96 (Test mix)

(FINAL REPORT)

AMEC Earth & Environmental
a Division of AMEC Americas Limited

K.W. (Kent) Gillingwater, C.E.T.
Senior Technical Supervisor
Materials Testing Division

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Appendix C
Statement of Qualifications

I, Barry Neil Church, do hereby certify that:

1. I am a member of the Association of Professional Engineers and Geoscientists of British Columbia (membership number #8172) with offices at 600 Parkridge St., Victoria, B.C.
2. I am a graduate of the University of British Columbia (1967) with a Ph.D. in geology. I have practiced my profession continuously since graduation.
3. I am familiar with the district and this report is based on my personal examination of the property intermittently from October 6th 2006 to July 31st, 2008. I am the author of this report and verify the costs as reported to be true.
4. D.R. Haughton (Brentwood Bay, B.C.) and myself are the co-owners of the property.

Dated at Victoria, B.C., the 31st day of December, 2008.

Submitted by:

Neil Church

B. Neil Church, P. Eng.
December 31st, 2008

N. Church

From: <MT.Online@gov.bc.ca>
To: <drhaughton@shaw.ca>; <bnchurch@shaw.ca>
Sent: Wednesday, December 31, 2008 9:38 PM
Subject: SOW-M (4253803) 2008/DEC/31 21:38:34 Mineral Titles Online, Transaction event, Email confirmation

Event Number: 4253803
Event Type: Exploration and Development Work / Expiry Date Change

Work Type Code: T

Required Work Amount: 8690.23

Total Work Amount: 9351.00

Total Amount Paid: 434.99

PAC Name: 141786

PAC Debit: 0.00

Tenure Number: 396924
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN 1
Old Good To Date: 2014/oct/06
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 333.33
Tenure Submission Fee: 16.68

Tenure Number: 405910
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-2
Old Good To Date: 2014/oct/15
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 328.42
Tenure Submission Fee: 16.44

Tenure Number: 411169
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-3
Old Good To Date: 2010/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 1202.74
Tenure Submission Fee: 60.19

Tenure Number: 411170

Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-4
Old Good To Date: 2014/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.74
Tenure Submission Fee: 20.16

Tenure Number: 411171
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-5
Old Good To Date: 2014/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.74
Tenure Submission Fee: 20.16

Tenure Number: 411172
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-6
Old Good To Date: 2014/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.74
Tenure Submission Fee: 20.16

Tenure Number: 411173
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-7
Old Good To Date: 2014/jun/02
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.19
Tenure Submission Fee: 20.14

Tenure Number: 411174
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-8
Old Good To Date: 2014/jun/02
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.19
Tenure Submission Fee: 20.14

Tenure Number: 411175
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-9
Old Good To Date: 2010/jun/02
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 1202.19

Tenure Submission Fee: 60.16

Tenure Number: 411176
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-10
Old Good To Date: 2010/jun/02
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 1202.19
Tenure Submission Fee: 60.16

Tenure Number: 411177
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-11
Old Good To Date: 2014/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.74
Tenure Submission Fee: 20.16

Tenure Number: 411178
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-12
Old Good To Date: 2014/jun/01
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 402.74
Tenure Submission Fee: 20.16

Tenure Number: 411179
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-13
Old Good To Date: 2014/jun/03
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 401.64
Tenure Submission Fee: 20.11

Tenure Number: 411180
Tenure Type: M
Tenure Subtype: C
Claim Name: TWIN-14
Old Good To Date: 2010/jun/03
New Good To Date: 2016/jun/06
Tenure Required Work Amount: 1201.64
Tenure Submission Fee: 60.14

Your technical work report is due in 90 days as per Section 33 of the Mineral Tenure Act and Section 16 and Schedule A of the Mineral Tenure Act Regulation. Please attach a copy of your confirmation page to the front of your report.

If you have questions concerning the registration of exploration and development work/expiry date change or the filing of physical/technical reports, please make inquires to MT.Online@gov.bc.ca or call 1-866-616-4999 (toll free).

Server Name: PRODUCTION