Geological and Geochemical Evaluations of the Little Gem Cobalt, Nickel, Gold Deposit

Roxey Creek Area
Bridge River Mining Camp
Lillooet Mining Division
British Columbia

Mineral Titles Reference Map M092J086
Lat. 50°53.6' N, 122°57.46' W

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Summary

This report confirms the polymetallic composition of the Little Gem deposit and proposes a high temperature vein model for the ore body based on petrographic descriptions, chemical analyses and X-ray diffraction results. Also, for exploration and environmental purposes, background levels are established for the 41 major and minor elements in 16 silt and moss-mat samples from local streams.

The results show that cobaltian arsenopyrite, glaucodot and safflorite are the principal ore minerals in which native gold apparently occurs as submicroscopic intergrowths. Uranium resides in fine grained uraninite in irregular and sparcely distributed concentrations often associated with allanite, but not necessarily with the sulpharsenides.

The important metallic elements of the ore body provide a signature that is well reflected as a chemical dispersion aureole in the sediments immediately below the Little Gem mine site. However, sediments collected from Roxy Creek several kilometres downstream from the mine show little evidence of the mineralization. Apparently the mobility of pathfinder elements (esp. As and U) is limited by absorption of these elements in organic matter (humic soils) or the coprecipitation (esp. AsO_3^{+++}) of insoluble iron-rich compounds such as scorodite in limonite.

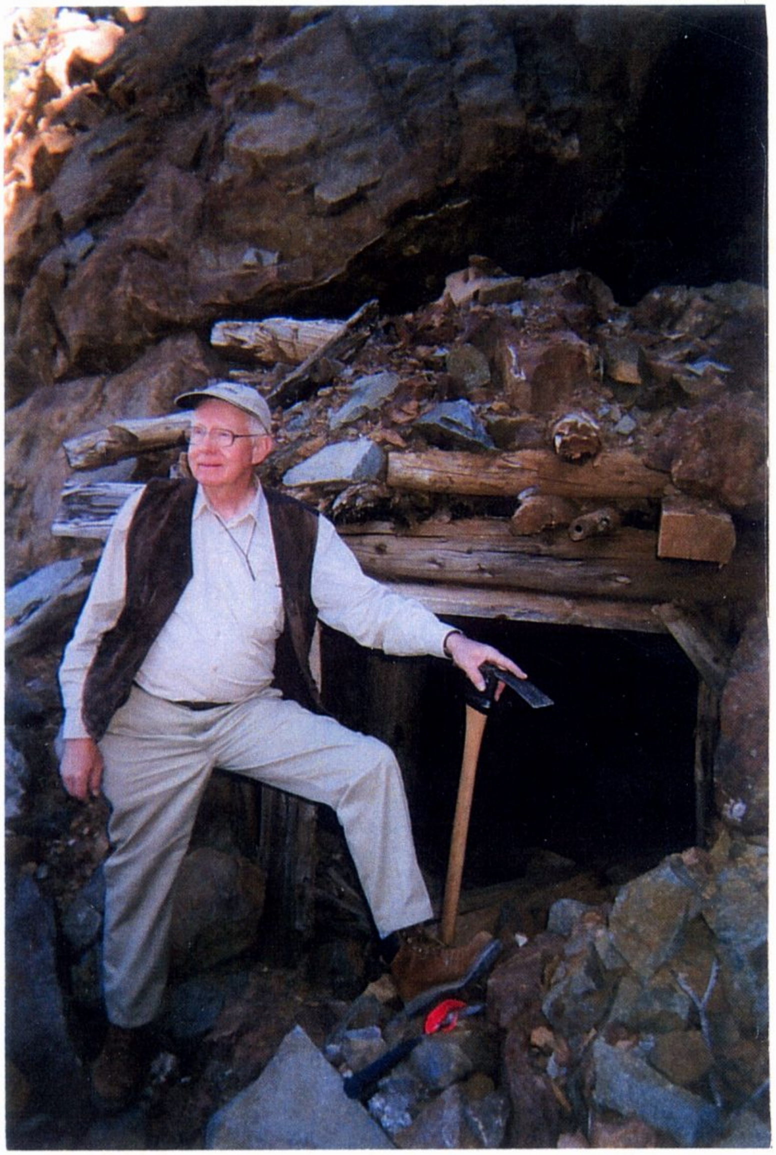


Photo 1 Little Gem Mine, Adit No.1

Introduction

The Little Gem deposit (MINFILE 092JNE068) is of interest because of the cobalt content of the ore and notable amount of gold, nickel, uranium, molybdenum and rare earth elements. Analyses of sulphide-rich samples average 4 to 7% cobalt and 0.5 to 1.5 ounces per ton gold. The most closely related deposits are those of the Bou Azzer district of Morocco and the arsenide-silver-uranium veins of Cobalt Ontario and the Eldorado mine, NWT.

Cobalt is widely used in metal alloys for the production of high-strength magnets, machine tools and high-temperature alloys for jet engines etc. Other uses include chemicals, catalysts in the petroleum industry, batteries, electrical equipment, semiconductors, and pigment for paints, ceramics and glass. Also, cobalt provides one of the most outstanding examples showing the importance of trace elements in agriculture - it is a proven essential element for the production of Vitamin B12 necessary for proper digestion in the rumen of grazing animals .

Cobalt occurs in varying amounts in many minerals, in particular the sulphides and sulpharsenides such as linnaeite, cobaltite, glaucodot, loellingite and safflorite. These minerals are found in mineable concentrations associated with mafic and ultramafic igneous intrusions, contact metamorphic lodes and stratabound deposits, hydrothermal veins and sea floor manganese nodules.

Cobalt production is often a by-product of processing copper, nickel, silver and iron ores. The Democratic Republic of the Congo is the foremost historical producer. In the USA cobalt has been produced from the Gap nickel mine in Pennsylvania, the lead district of southeastern Missouri and the Blackbird copper mine of Lemhi County, Idaho.

Only in Morocco is cobalt produced as a major product from veins. The Bou Azzer cobalt deposits are associated with serpentinites of a late Proterozoic ophiolite. They consist of cobalt (Ni-Fe) arsenides and sulpharsenides with associated copper sulphides, molybdenite and gold in quartz-carbonate gangue. Metamorphism has rendered these deposits in various sizes and shapes of complex shells and lenses. Silver is a minor constituent in these ores compared to the ores of the Cobalt and Eldorado mining districts. The serpentinites are the most likely origin of the cobalt at Bou Azzer, however, the source of the arsenic and the quartz-carbonate gangue remains controversial.

The Property

The Little Gem property consists of four 'core' mineral claims (12 cells) owned by B.N. Church and R.H. McMillan according to the schedule listed in Table 1 of this report, plus nine surrounding claims acquired October 31st, 2007 by option agreement with Goldbridge Mining Ltd. cba Goldbridge Holdings Ltd. The total claim area comprising 4000 hectares covers most of the summit, eastern part and southern slopes of Mount Penrose (Figure 1). The property overlaps the original eight Crown-granted Little Gem mineral claims Nos. 2,4,6, 11, 15, 18, 17, and 18 (Lots 7566, 7567, 7568, 7729, 7727, 7728, 7730 and 7731 respectively).

Location and Access

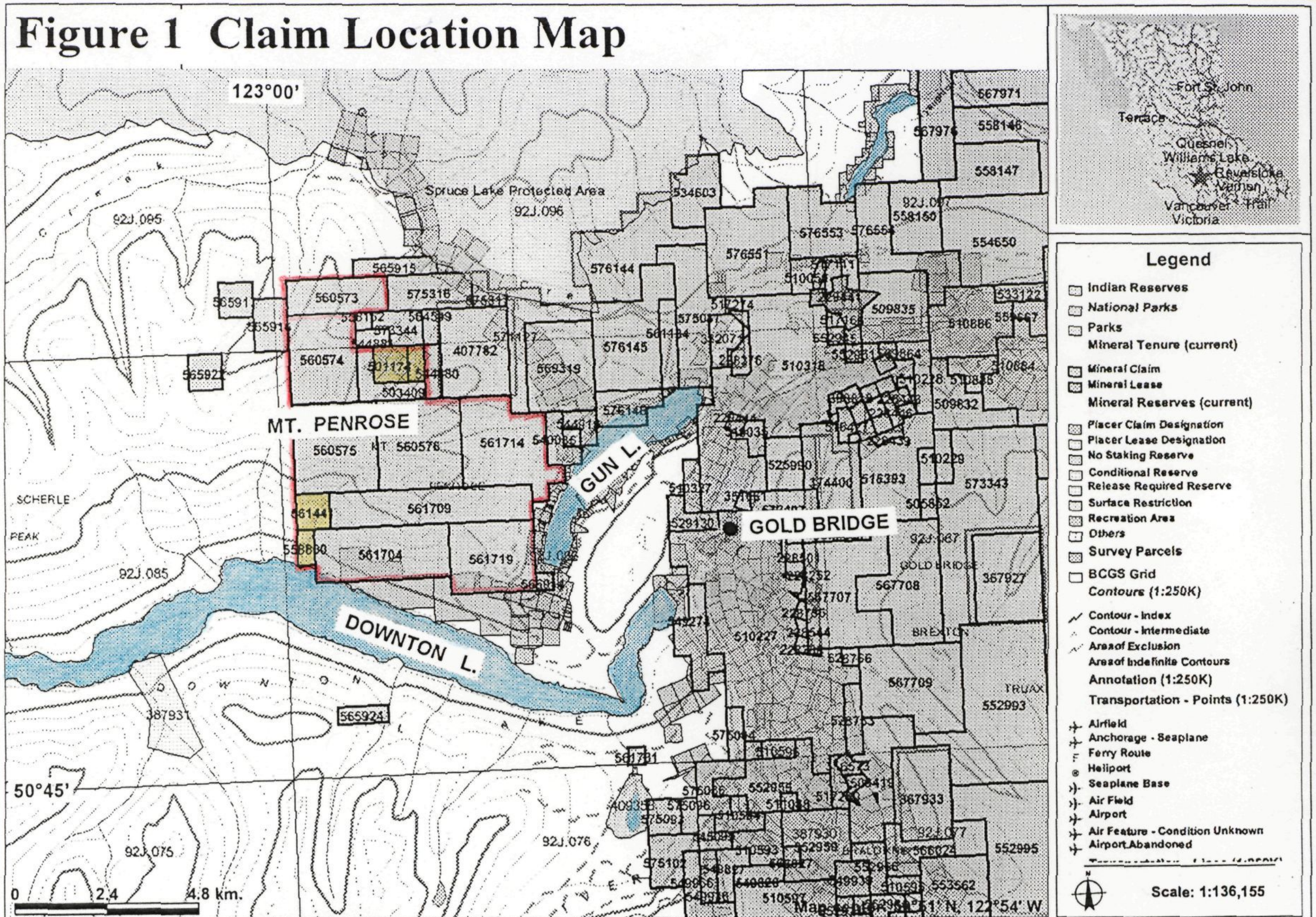
The Little Gem property is centred 9.5 km northwest of Gold Bridge on Mount Penrose in the Roxey Creek area. The mine workings lie between 1800 and 2000 m elevation at Lat. 50°53'36", Long. 122°57'28". Access to the mine is by a 4.5 km-long, steep mountain road from the Slim Creek logging road at Gun Creek. The Slim Creek road joins the main Gold Bridge - Carpenter Lake road 12 km to the east at a point 5.5 km northeast of the town of Gold Bridge. The southern part of the property is accessed from the forestry road that follows the north shore Downton Lake from the Lajoie - Gun Lake main road west of Gold Bridge.

Physiography and Climate

The Bridge River mining camp, in which the Little Gem property is situate, lies between the rugged Coast Mountains, west of the town of Gold Bridge, and the Shulaps and Chilcotin ranges to the northeast. Elevations vary from 650 m on Carpenter Lake to 2627 m at the summit of Mount Penrose. The area is markedly sculptured by Pleistocene and Recent glaciation which has resulted in the broad and deep valleys occupied by Downton Lake and Carpenter Lake and smaller 'U' shaped hanging tributary valleys such as the valley of Roxey Creek. The north facing slopes and low lands along Gun Creek are heavily forested with stands of spruce, pine and fir trees that support intermittent logging operations. Rock exposures occur on ridge tops and in the rugged areas above tree line and along gullies, road cuts, stream banks and lake shores at lower elevations. North of Carpenter Lake and Gun Creek the valley slopes are modulated and sparsely timbered with some open exposures.

The marked topographic variation is responsible for significant climatic differences in the region. Summer months are warm and dry - the winter months are moderately cold in the valleys but severe with heavy snow conditions in the mountains.

Figure 1 Claim Location Map



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.

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Table 1 Mineral Claims

Tenure No.	Due Date	Area	Registered Owner
501174	Jan. 12/09	81.537	R. H. McMillan 50% B.N. Church 50%
502808	Jan. 13/09	40.769	R. H. McMillan 50% B.N. Church 50%
558800	May 16/08	40.804	B.N. Church 100%
561441	June 27/08	81.594	B.N. Church 100%

Photo 2 Base Camp on Roxey Creek

History

Evidence of mineralization on the slopes near tree line led to the discovery in 1934 of the 'Little Gem' showings 500 m southeast of Roxey Creek by W.H. Ball and his partner W. Halymore. Their ownership interests were sold to J.M. Taylor and R.R. Taylor in 1937. In the same year the United States Vanadium Corporation optioned the property and began work on the Adit No.1 (elev. 6,250 feet). The company suspended operations in Canada in 1939. Later that year contractors began work on Adit No.2 (elev. 6,192 feet).

Bralorne Mines Ltd. optioned the Little Gem property briefly in 1940. Adit No.2 was extended and two raises were driven. The option was soon dropped due to market uncertainties because of war conditions and the lack of a plan for treatment of the ore.

From 1952 through 1953 Estella Mines Ltd. held an option on the property during which time a switchback road from the bridge on Gun Creek to the camp was constructed and a program of 12 drill holes (total 667 feet) was completed. Drilling from the Adit No. 2 encountered both disseminated and massive sulpharsenide mineralization in several horizontal of the holes with intersections ranging from 1.5 to 10.9 feet, grading 0.20 to 0.36 oz/ton gold, and 0.9 to 2.34 % cobalt. Estella Mines Ltd. was unable to meet payment obligations the option was dropped in November 1953.

Northern Gem Mining Corporation was formed in December 1955 to acquire and develop the property. This company completed a cable tramway, road rebuilding, camp improvements and work on the showings between June and October 1956. Four inclined holes (total 697 feet) drilled from Adit No.2 encountered several mineralized lenses grading 0.04 to 3.26 oz/ton gold, and 0.01 to 2.42 % cobalt. In 1957 the company added 363 feet of drifting and 50 feet of crosscutting to Adit No.1. The company also collared Adit No.3 (elev. 6,085 feet), 120 m southwest of Adit No.2, completing 435 feet of drifting, 70 feet of crosscutting and 2,600 feet of drilling. In February 1958 a sample of ore (500 lbs) was shipped to the Mines Branch in Ottawa for metallurgical tests to prove methods for the extraction of cobalt, uranium and gold.

There was little activity on the property from 1958 to 1978. The Canadian Mines Handbook 1974-75 reports an ore reserve for the Little Gem property of 18,140 tonnes averaging 22.64 g/t gold, 3.0 % cobalt and 0.2 % uranium.

Major Resources Ltd. optioned the property and completed a geological review in March 1979. A combined airborne magnetometer - radiometric survey was then carried out followed by various ground-based surveys that included a VLF-EM survey and a soil geochemistry program (Mark, 1979).

Anvil Resources Ltd. renewed exploration of the property in 1984 under an option agreement to purchase the property. A program of data compilation, geology and drilling was completed in 1986. Drilling to test offset faulting of the ore zone on Little Gem No. 4 amounted to a total of 373.8 m in two easterly inclined holes. Both holes intersected zones of disseminated sulphides but no important mineralization (Lammle, 1986).

Ownership of the eight Little Gem claims reverted to the Crown in 2004. On November 14th, 2006 the mineral rights of the Crown grants were vested to the mineral cell claims registered over this land.

Geological Setting

Mineral occurrences in the Bridge River mining camp are principally gold-quartz veins. It is believed that emplacement of the Coast Plutonic Complex provided not only the thermal engine driving the circulation of mineralizing solutions but also the structural setting for development of the veins (Church, 1995). Stresses caused by the intrusion of granitic plutons resulted in shearing and the development of vein fissures, the country rocks being displaced laterally to accommodate these intrusions. An important part of this movement is manifest in reactivation of the Cadwallader fault zone, a pre-existing major break coincident with a southeasterly trending belt of ultramafic rocks.

Radiometric dating indicates that the major vein systems are Late Cretaceous between the age of the Bendor batholith (63.4 Ma) and the Coast Plutonic Complex (92 Ma).

The Little Gem property is underlain by the Penrose lobe of the Coast Plutonic Complex that projects easterly from Dickson Peak to Gun Lake (Figure 2). These rocks are mostly of biotite hornblende granodiorite that intrudes metasedimentary rocks and amphibolites (Cadwallader Group) and serpentinized ultramafic rocks that crop out along both the north and south flanks of Mount Penrose.

Heavily mineralized lenses and disseminations of sulphides are exposed in the Little Gem mine where they occur in a steeply dipping zone of bleached granodiorite. Open cuts and strippings trace the zone up the mountain side to just below the top of the ridge, between Roxey Creek and Jewel Creek, at a point 450 feet above and 600 feet easterly from the upper adit (Stevens, 1949). Near the showings and adjacent slopes the granodiorite is cut by a variety flat and steeply dipping shears from which carbonate alteration has spread producing prominent tan coloured bands. These alteration bands attained widths of 25 feet and often cut across the main zone of mineralization.

The mineralogy of the Little Gem ore is simple. It is made up of abundant arsenic and iron, some cobalt and sulphur, minor nickel and significant gold (Cairnes, 1943). Accordingly, this is equivalent to cobaltiferous lollingite with low sulphur. Alternatively, the ore has been described as a mixture of arsenopyrite, danaite, lollingite-safflorite and a little molybdenite in a gangue of quartz, feldspar and altered country rocks (Warren and Thompson, 1945). Where the ore is oxidized, limonite and pink erythrite are conspicuous.

The ore lenses are sub-alignments of pods each ranging from a few metres to more than 15 m long and 1.5 m wide as seen in the underground workings and on surface above the No.1 Adit. The disseminate ore, known mostly from drilling, covers broad but ill-defined areas within the alteration envelope and the wall rocks of the granodiorite. In places the ore minerals are intercrystallized with the comparatively fresh granodiorite suggesting a common magmatic origin (Cairnes, 1943).

Figure 2 Geology, Bridge River Area

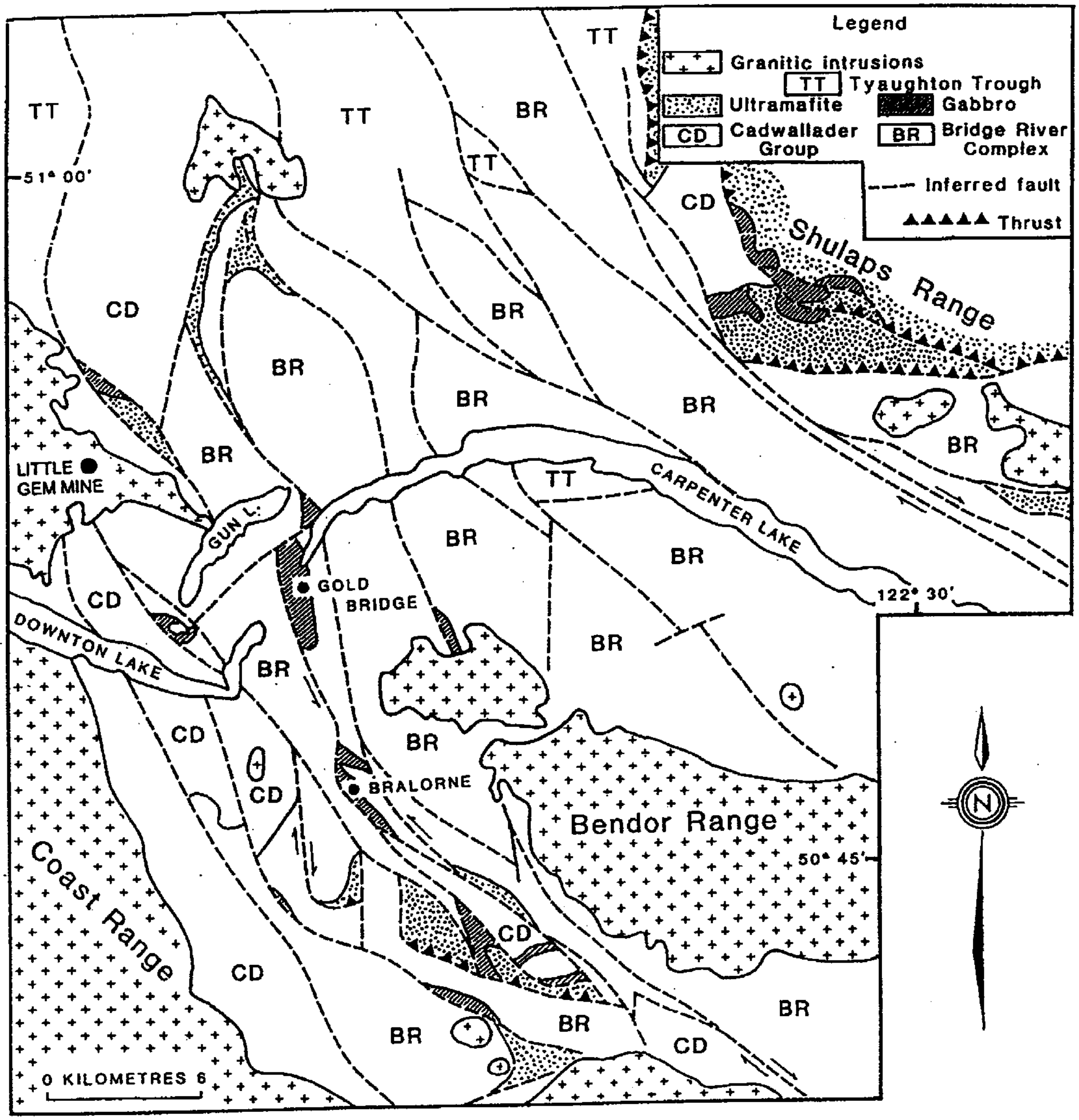
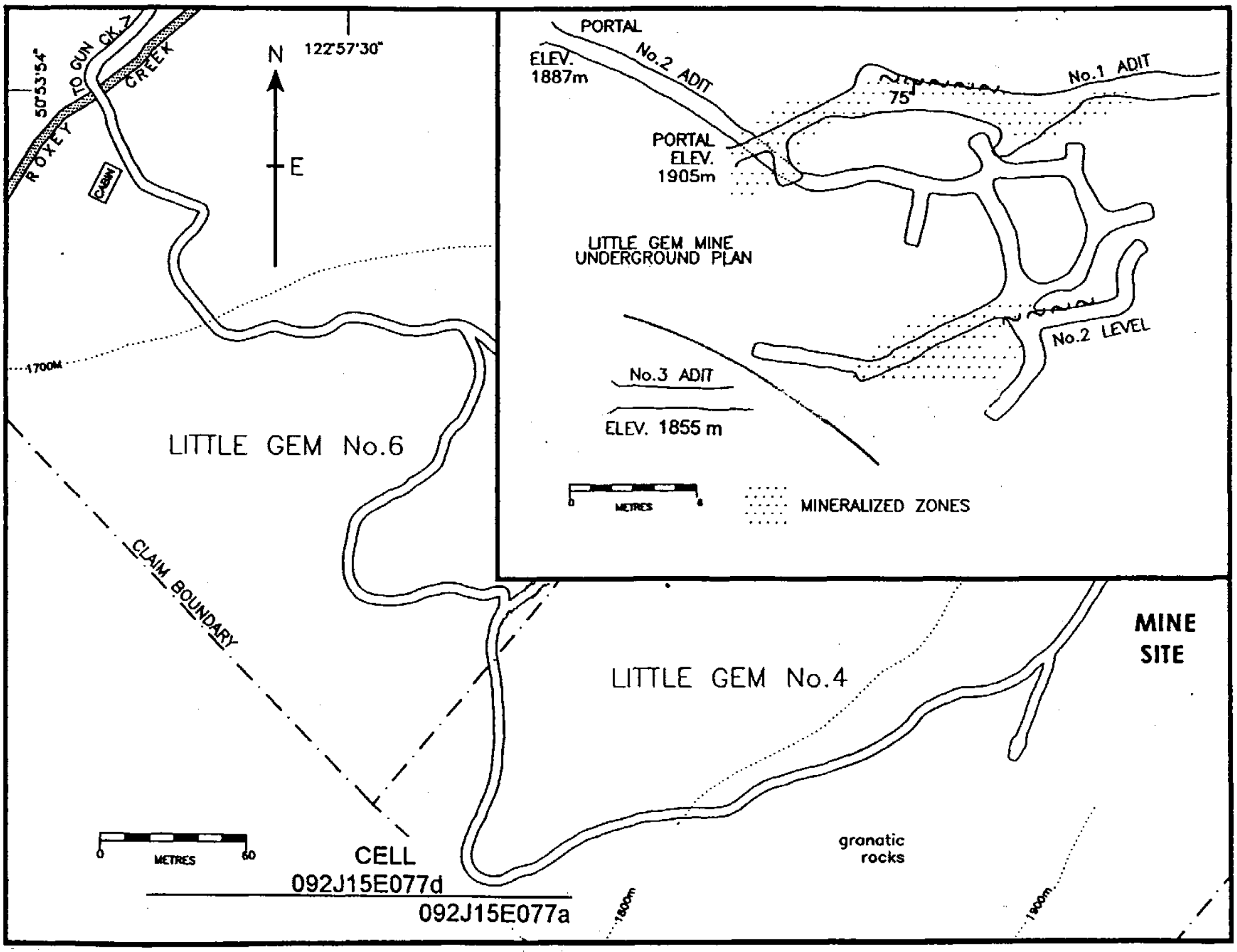


Figure 3 Little Gem Property



Review of the Data-Base

The most detailed previous study of the Little Gem ore is a Mines Branch investigation of a 500 pound composite sample from three levels of the underground workings submitted by Northern Gem Mining Corp. Ltd. (Appendix C). According to Hughson (1958) a light fraction (S.G. < 2.96), 20 per cent of the sample, is composed chiefly of feldspar, quartz, calcite, dolomite and minor siderite. Approximately one half of the sample (S.G. > 3.40) consists of metallic ore minerals, minor allanite, siderite, biotite and traces of uraninite, native gold and anatase. From this the principal minerals were concentrated into magnetic and electrostatic fractions which in turn were separated by heavy liquids to individual minerals for microscope and further examination.

The results shows that the combined carbonate content of the sample is 9 per cent.

Uraninite occurs as disseminated grains usually less than 1/10 mm associated with concentrations of allanite and the metallic ore minerals. The allanite contains a small amount of thorium but little or no uranium. There is no significant uranium associated with the carbonates, feldspar or quartz.

A dark phase of the ore is a mixture of biotite plus biotite altered to chlorite alteration and abundant ore minerals. Chlorite and biotite comprise about 15 per cent of the sample.

The metallic ore minerals consist largely of arsenopyrite (FeAsS) and safflorite ((Co, Fe)As_2). Partial chemical analyses shows the arsenopyrite contains Co, 5.50 %; Ni, 0.28 %; Fe, 25.8 %; S, 15.2 % and safflorite Co, 8.30 %; Ni, 0.38 %; Fe,19.9 %; S, 1.31 %.

Native gold is present as very fine grains preferentially associated with the sulpharsenides.

Metallurgical evaluations of the Little Gem ore, reported by Jenkins (1959), deal principally with the recovery of gold by various techniques. These methods include (separately and in combination) amalgamation, cyanidation, flotation and gravity concentration. The results show the recovery of gold by mercury amalgamation was only 10.68 per cent from the original sample that assayed 1.03 oz/ton gold. In contrast, the extraction of gold by cyanidation of the raw ore was 63.1 per cent. This improved slightly to 64.5 per cent by cyanidation of the roasted ore.

Current Project

A geological/geochemical investigation of the Little Gem property was completed in the period September 11th to 14th, 2007. This followed a reconnaissance survey of the mining camp reported by Church (1996). Altogether 4 samples of vein material and 16 sream sediment samples were collected and processed for this program. The object of this endeavour was (1) to establish the chemical and mineralogical signature of the Little Gem ore deposit and (2) to determine the geochemical background levels for stream sediments in the area for exploration purposes and environmental reference prior new mineral development. The sediment samples are silts from stream beds and moss-mats collected, in most cases, from the same locations (Fig. 4, Table 2).

The samples were gathered and processed by the author and then shipped to Acme Analytical Laboratories Ltd. in Vancouver, B.C. At Acme the samples were analysed for 9 major elements (Ti, Al, Fe, Mg, Ca, K, Na, P, S) and 32 minor elements (Ag, As, Au, Ba, Be, Bi, Cd, Ce, Co, Cr, Cu, Hf, La, Li, Mn, Mo, Nb, Ni, Pb, Rb, Sb, Sc, Sn, Sr, Ta, Th, U, V, W, Y, Zn, Zr). The analytical method followed a routine whereby the samples were subjected to acid dissolution ($HF/HNO_3/HClO_4$) and take up of the dried residue in HCl. The final determination was done by ICP-mass spectrometry.

The Acme Laboratories brochure entitled 'Service and Fees' (see Appendix B) provides details of the analytical methods. For Acme's 41 element, the ICP package 'Group 1EX' was used where the lower detection limits for the major elements range from 0.001 to 0.01 % and 0.1 to 1 ppm for the minor elements. (In a few instances where the Co and As levels in vein samples exceed upper detection limits of 4,000 and 10,000 ppm, respectively. In these cases the samples were re-run using the 'Group 7DX package'). The quality of the results is gauged by replicate analyses and the use of standard samples.

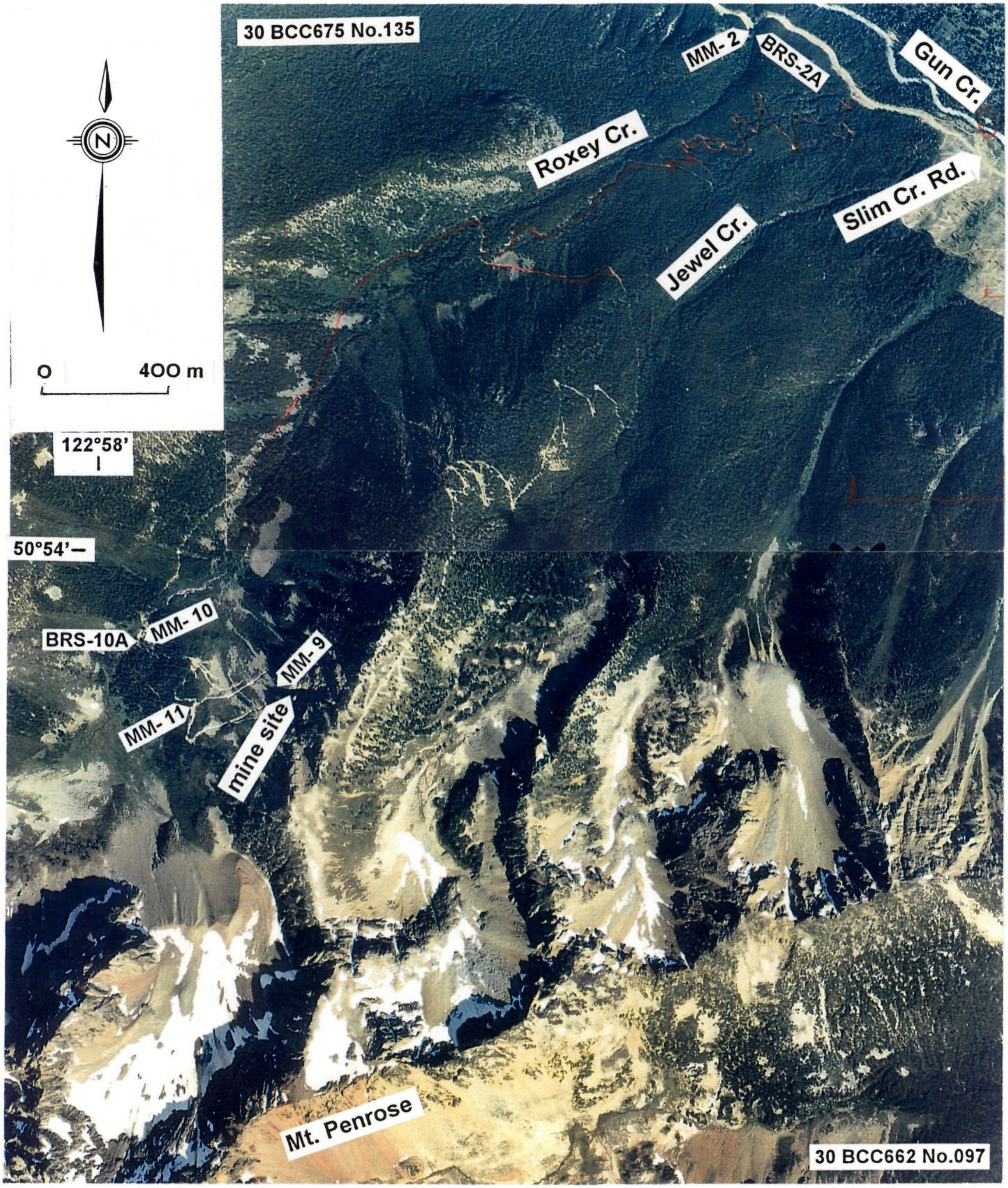
Geochemical Results

Analyses of Vein Samples are presented in Appendix 'B'. These are BRORE, BROAT and BRU from the Little Gem mine, and for comparison BREX from the Gloria-Kitty vein system in the Brexton area, 11.5 km southeast of Little Gem.

BRORE is an example of massive sulphide mineralization from the portal of No.1 Adit, the Little Gem mine. The major elements of this sample are Fe, 18.18 %; Co, 11.43 %, As, 11.24 % and S, >10 % plus notable amounts of Ni (4363 ppm) and Mo (938 ppm). Calculated in terms of molecular proportions this is essentially 2 parts Fe, 2 parts S, 1 part Co and 1 part As that combined is equivalent to a mixture of pyrite ½(FeS_2), with some Co replacing Fe^{++}, and glaucodot (CoAsS), containing minor Fe^{++} and Ni in substitution for Co, plus residual Fe assumed to reside in the carbonate and/or chlorite gangue.

Figure 6 compares the original assay data (MB) for the Little Gem deposit, using classical analytical methods (Hughson, 1958), with new sampling (BRORE) using ICP/MS methods (this study). The resulting patterns are strikingly similar. Although Zn is missing

Figure 4 Sampling Stations



from the original MD data base, the relative abundance of the other important elements (Au, Ag, Cu, Pb, Mo, Ni, Co, U and As) provides a chemical signature for the deposit.

BROAT is an example disseminated sulphide mineralization at the Little Gem mine. The host is a dark green, chloritic rock containing an estimated 50 % SiO_2 (calculated by difference) and 15% scattered sulphides comprised of Fe, 5.62 %; As, 5.01 %; S, 4.3 % and Co, 0.949 %. In terms of molecular proportions the sulphides consist of 2 parts sulphur, 1½ parts (iron + cobalt), and 1 part arsenic, giving a mixed mineral normative composition of pyrite ½(FeS_2) + arsenopyrite (FeAsS) where there is Co substitution of some of the Fe^{++}. The overall pattern of the important metallic elements is similar to BRORE except Co, Ni and Mo values are higher and Zn lower in the latter.

BRU is an example of a banded vein composed mainly of light coloured K-spar - quartz - carbonate segregations and dark layers enriched in allanite. The sulphides, occurring similarly in both bands, amount to 20 % of the whole sample and consist of As, 14.47 %, Co, 4.0 %; Fe, 3.4 %; S, 2.1 % and Ni, 0.28 %. In terms of molecular proportions this is 3 parts arsenic, 1 part cobalt, 1 part sulphur and 1 part (iron + nickel) that gives a mixed normative composition of safflorite 2($CoAs_2$) + loellingite ($FeAs_2$) + pyrite (FeS_2) where there is nickel substitution for some Fe^{++}. The remaining iron, calculated as FeO (14.54 %), and many other elements such as magnesium, manganese and aluminum occur in silicate minerals of which chlorite + allanite combined are most important comprising 33.75 % of the sample. Characteristically allanite carries the rare earth elements La (>2000 ppm), Ce (>2000 ppm), Y (172.4 ppm) and a small amount of Th (7.2 ppm) but no uranium. Uranium occurs as uraninite (UO_2) comprising 0.25 % of the sample by weight. The frequency pattern of the metallic elements is similar to BRORE, except for uranium which has a relative high value compared to the latter.

There is no apparent correlation between uranium and thorium. Thorium values are consistently low (< 8 ppm). Uranium at 8.8 ppm and 23.4 ppm in BRORE and BROAT are somewhat higher but well below ore grade values. Sample BRU is exceptional reporting U at 2297 ppm which correlates with relatively high values obtained for Mo (340.4 ppm) and K (1.57 %).

In general there is a positive (but non-linear) correlation comparing cobalt and per cent sulphides in these samples, although the relationship relating cobalt to specific minerals is complex. Considering gold tenor and the amount of sulphides, there appears to be an inverse relationship. For example, BROAT reports the highest gold assay at 24.9 ppm but only 15 % total sulphides; BRORE has the lowest gold at 13.7 ppm but most sulphide at an estimated 50 %; BRU is intermediate with 18.0 ppm gold and 20 % sulphides.

Stream Sediment Sampling is a valid prospecting tool providing a ready method of obtaining geochemical data for drainage basins. Silt from stream beds and moss-mats are effective collectors and concentrators of metals which can be used to establish background element levels for environmental purposes or to trace the source of anomalous gold and base metals.

The principal constituents of the stream sediments are clastic rocks and mineral fragments (mostly feldspar, quartz, biotite, pyroxene, magnetite, apatite and zircon) and very small amounts of chemical precipitates (such as calcium carbonate and oxides of iron, manganese, uranium and molybdenum). The chemistry of the clastic fraction, after screening and removal of the organic matter, is mostly equivalent to the sum of the major elements (minus residual moisture and organic carbon resulting from drying the samples) except for silica which is obtained by difference. For this study the elements are converted to oxides, then silica is calculated as $SiO_2 = 100 - (TiO_2 + Al_2O_3 + Fe_2O_3 + MnO + MgO + CaO + Na_2O + K_2O + P_2O_5)$. The results of 16 analysed sediment samples show silica (SiO_2) averaging 65%, which is also typical for granodiorite.

In many cases there is not much difference comparing the chemistry of the silt and moss-mat sediment from the same locations. For example the results are very similar for the sample pairs MM-1 and BRS-1A, MM-5 and BRS-5, MM-12 and BRS-12. Sediments from the main channel of Roxey Creek, MM-2, BRC-2A, MM-10 and BRS-10A, are also similar to and consistent with the diorite - granodiorite composition of the Coast Plutonic Complex in the headwater area (Table 2).

The Bridge River mining camp is known mainly for gold in quartz veins. In the Mount Penrose area anomalous gold (1.1 ppm) was obtained from a stream sediment sample near the present south boundary of the Little Gem property (Church, 1996). In the present study the highest gold value (1.7 ppm) was obtained from sample MM-09, near the Little Gem mine, and on samples MM-5 and BRS-5 (0.3 and 0.4 ppm Au) from Cadwallader Creek near the Bralorne mine site.

Sample MM-09 is exceptional. Anomalous gold together with high levels Co and As and above average U and Mo obtained on this sample is the signature of the Little Gem deposit.

Cobalt is a siderophile and, to a lesser degree, a chalcophile element that correlates with Mg and Ni in ultramafic and mafic rocks and with Fe, As, Sb, Cu, Ni, Ag and U in sulphide deposits. The mobility of cobalt at surface is limited in the early stages of weathering and dispersion by co-precipitation with limonite and manganese oxide.

Arsenic is chalcophile pathfinder element associated with epigenetic gold ore. The mobility of As is limited by the co-precipitation of $FeAsO_4.2H_20$ (scorodite) and AsO_3 with limonite. In iron-poor environments arsenic becomes more mobile in the weathering - dispersion cycle.

Uranium and the other minor elements Th, Nb, Ta, Zr, Hf and Sr are 'incompatible' oxyphile elements that tend to partition into residual fluid phases during magmatic evolution. In fresh sediments these elements are often much diminished. It is speculated that some of these elements were brought into solution during weathering of the source rocks and others were selectively removed from the aqueous medium in heavy mineral accumulations. Uranium is extremely mobile under alkaline, oxidizing conditions and limited mainly by Eh of reduction of the UO_2^{++} complex.

A variety of elements follow U in many deposits. Notable examples are the enrichment of Mo in 'young uranium' deposits and with Ni, Co, As in veins (Ruzicka and Thorpe, 1995) and the 'unconformity-type' Athabasca deposits (Hendry et al., 2005). For young uranium deposits, U appears to be closely bound to Mo in carbonaceous trash and Be, Pb, Zn, Cd in humic soils.

Mineralogy and Petrology

X-ray diffraction analyses of the ore samples are given in Appendix 'B' as received from Global Discovery Labs of Teck Cominco Ltd. These data include diffractogram charts and d(A) / intensity tabulations for BRORE, BROAT and BRU and three separate phases of the BRU sample.

The results for BRORE shows mostly a mixture of quartz, alloclasite or glaucodot and possibly a minor amount of kaolinite. Glaucodot is part of a group of similar sulpharsenide minerals, that includes alloclasite and danaite (FeS_2-rich variety), that are difficult to differentiate either optically or by X-ray diffraction methods. Although the presence of pyrite is suggested by the chemical data there is no evidence of this mineral on the diffractogram. Consequently calculated pyrite (FeS_2) is assumed to reside in the alloclasite or danaite $(Fe,Co)S_2.(Fe,Co)As_2$ (Warren and Thompson, 1945).

The results for BROAT shows a preponderance of clinochlore and a modest amount of quartz, muscovite and arsenopyrite. This coincides with the calculated normative composition, except for the presence of muscovite and the absence of pyrite. It is suspected that the variety of muscovite present maybe 'sericite' or 'phengite' thus explaining the low potassium (0.54 %) content of the sample. Accessory minerals at <5% levels, such as pyrite in this case, usually cannot be easily detected by X-ray diffraction methods.

The results for BRU mostly confirm the chemical analyses. The minerals identified by X-ray diffraction are quartz, clinochlorite, safflorite, muscovite, K-spar, allanite and calcite. A pick from the metallic mineral fraction BRUAS provides a good diffractogram patter indicating safflorite $(Co,Fe)As_2$ - a cobalt-rich member of the diarsenide and disulphide family of minerals of which lollingite $FeAs_2$ and pyrite FeS_2 are end-members Similarly, BRUPK and BRUBK are mineral picks from light coloured and dark coloured fractions, respectively, that confirm the identification of K-spar and allanite. Uraninite, usually metamict, is not seen in the diffractogram patterns.

Petrography of the ore samples, based on examination of polished thin section and cut-offs, is generally confirmed by Vancouver Petrographics Ltd., Appendix 'B'. However, there are differences comparing the chemical and X-ray results and evaluations based on microscope examinations. These differences are no doubt due in part to sub-sampling and the inherent limitations of the various analytical methods. In particular, X-ray analyses are not always effective for identifying accessory minerals because of screening out of weak diffraction peaks by background radiation. Also, mineral norms calculated from chemical analyses, based on ideal compositions, may be unrealistic in the natural setting because of diadochy that allows entry of the elements, particularly at low levels, into the structure of a variety of mineral species.

Under the microscope BRORE consists of about equal parts sulphides and quartz-carbonate gangue. The sulphide fraction is uniformly hard, silver-white, highly reflectant alloclasite-glaucodot that forms broken wedges or solitary diamond shapes <1 - 4 mm and cockscomb structures fringing thin grey seams of semi-translucent quartz. The carbonate minerals occur as small patches within the quartz and, more generally, as light brownish stained matrix within the mass of fine grained sulphides. The carbonates and quartz (to lesser extent) also occur as secondary filling in the fractured and brecciate sulphides. Some of this filling is charged with, what appears to be, very fine grained reddish brown hydrobiotite and vermiculite. Other accessories include chlorite and a few small, high-relief, strongly birefringent grains of monazite.

BROAT is an example of disseminated mineralization that is interpreted to be a highly chloritized intermediate or basic igneous rock (either microdiorite or diabase) charged with scattered grains of cobaltian arsenopyrite. In polished section the rock consists of an intergrowth of quartz 5-8 %, sulphides 15-20 % and a mixture of chlorite-carbonates speudomorphic after a combination of amphibole, biotite (books of mica), and feldspar (retangular plates and laths) suspended in a fine-grained chlorite-carbonate matrix. Accessory minerals include sparse apatite euhedra (~0.1 mm) and opaque rods and plates (0.5-2 mm) of TiO_2 (anatase, brookite). Arsenopyrite formed intercrystalline with the chlorite and the other silicate minerals. It occurs as silver-white, highly reflective wedges, solitary diamond shapes (~1 mm) and coalescing composite grains (~0.5-2 cm).

BRU is an unusual mixture of minerals of apparent pyrogenic and hydrogenic origin where safflorite is the common metallic mineral phase. The pyrogenic ore consists of closely packed allanite, safflorite and calcite. Allanite, the dominant mineral, occurs as crowded dark pleochroic red-brown, twinned, oscillatory zoned euhedra (1-3 mm). The angular interstices between the allanite prisms are filled with sparry calcite, safflorite, minor quartz and inclusions of more sulphides and small uraninite grains in the calcite. The hydrogenic ore phase consists of coarse K-spar (to 1 cm), safflorite, calcite, quartz, minor apatite and monazite (?) in a fine grained hydrobiotite-chlorite-quartz matrix. Clinochlore occurs as fracture fillings and thin alteration fringes in and around the sulphides.

Discussion and Recommendations

The Little Gem deposit fits the intragranitic vein model, or perhaps a better fit, the polymetallic cobalt-nickel sulpharsenide - precious metal vein sub-type model typical of the Cobalt - Gowganda region of Northern Ontario (Ruzicka and Thorpe, 1995). In accordance with this latter model mineral concentrations occur in short, steeply dipping veins associated with diabase dykes and sills. Carbonates are often the main gangue component and typically occupy the central part of the vein structure. Quartz is ubiquitous but tends to concentrate adjacent vein walls; other vein silicates such as chlorite, epidote (allanite) and K-spar have sporadic occurrence. Apatite, monazite, anatase and uranium minerals are minor accessories. The mineral succession in the veins indicates that the mineralizing fluids changed with time from lower to higher pH values and in chemical composition from silicic to carbonate-rich. The ore minerals, when present, are usually found between the carbonates and silicates. Variations occur where repeated dilatancies have produced ribboned veins with screens of wall rock (Fig. 5A, C, and D).

The solutions that deposited the arsenide ores are interpreted to have been initially at high temperature. Indeed it has been noted at Little Gem that the ore minerals are partly intercrystallized with the granodiorite wall rocks suggesting a common magmatic origin (Cairnes, 1943). Elsewhere, such as the altered dyke rock BROAT, disseminated ore minerals are found in direct contact with chlorite (clinochlore) suggesting that the growth of chlorite and the mineralizing event were broadly coeval (Fig. 5B). Metals originally derived from magmatic sources or from country rocks were probably transported as chloride-rich brines or possibly sulphates from which the ore minerals were precipitated in response to a decrease in temperature, a decrease in pressure associated with boiling, reaction with wall rocks or mixing with other fluids.

It is speculated that uranium was release at the interface where ascending reducing formation fluids met metal saturated brines of low pH and high Eh at an early stage of hydrothermal activity.

The origin of cobalt, arsenic and uranium is unresolved. Cobalt is siderophile, and to a lesser degree chalcophile, and correlates with magnesium and nickel in ultramafic and mafic rocks. Arsenic is strongly chalcophile and commonly associated with epigenetic gold ore. Granitic or felsic rocks may be the mostly likely source in the case of U-bearing arsenide vein systems.

The rare-earth elements are sensitive indicators of different igneous processes. For example elevated content of lanthanum and cerium are characteristic of felsic igneous rocks whereas elevated yttrium indicates relationship to mafic igneous rocks. In the case of the Little Gem ore, elevated lanthanum, cerium and yttrium (esp. BRU) indicates affiliation with both felsic and mafic magmatism.

Exploration Guides: Geochemical surveys can be useful to locate anomalous levels of elements and dispersion haloes indicative of polymetallic assemblages (Ruzicka and Thorpe, 1996). In the case of the Little Gem deposit, assays of both massive and disseminated ores for the important elements provides a distinctive chemical profile showing particular enrichment of Au, Co, As *and U, to lesser extent* (Fig. 6). This profile is closely matched by the chemistry of the stream sediments found immediately below the mine site (sample MM-09, Appendix 'B') where the metals reached the sampling site by erosion and transport of gossaniferous soils and other weathering products from the ore deposit. Conspicuous pink erythrite $3CoO.As_2O_5.8H_2O$ commonly marks weathered surfaces of the ore deposit.

It is interesting to note that stream sediments (both silt and moss mat samples) collected from Roxey Creek, several kilometres down stream from the mine, show little evidence of the Little Gem mineralization.

Gold as solid particles of varying size may have been transferred directly from weathering of the ore to the soil where it remains more or less unchanged. Since the specific gravity of gold is much higher than ordinary soil minerals (by a factor of 6-8 times) gold will tend to collect in the lowest soil horizons, often immediately above bed rock.

Arsenic is used as a pathfinder in geochemical prospecting for gold although the soluble compounds of arsenic tend to be absorbed in soil humus thereby limiting further dispersion of this element. Also, in the case of the Little Gem deposit, where the soils and ore are iron-rich (13-23 %), arsenic mobility is effectively limited by coprecipitation of AsO_3^{+++} together with limonite yielding the very insoluble scorodite $FeAsO_4,2H_2O$.

Cobalt does not form hydrosilicates during weathering and generally remains in solution as a bicarbonate or colloidal hydroxide, although it may eventually be deposited in manganese wad. The deficiency of cobalt in soil and herbage is the established cause of disease (lack of Vitamin B12) related to the digestive process of grazing animals.

Uranium is extremely mobile in waters of intermediate Eh and neutral to alkaline pH; it is brought into solution forming very strong inorganic complexes with calcium and carbonate anions during the weathering of source rocks. Limited mainly by the Eh of reduction of the UO_2^{++} complex, uranium will tend to precipitate preferentially with the organ matter (esp. peat bogs), but in fresh sediments uranium is often much diminished and not detected by geochemical prospecting.

Further work on the property is recommended by way of the following projects:

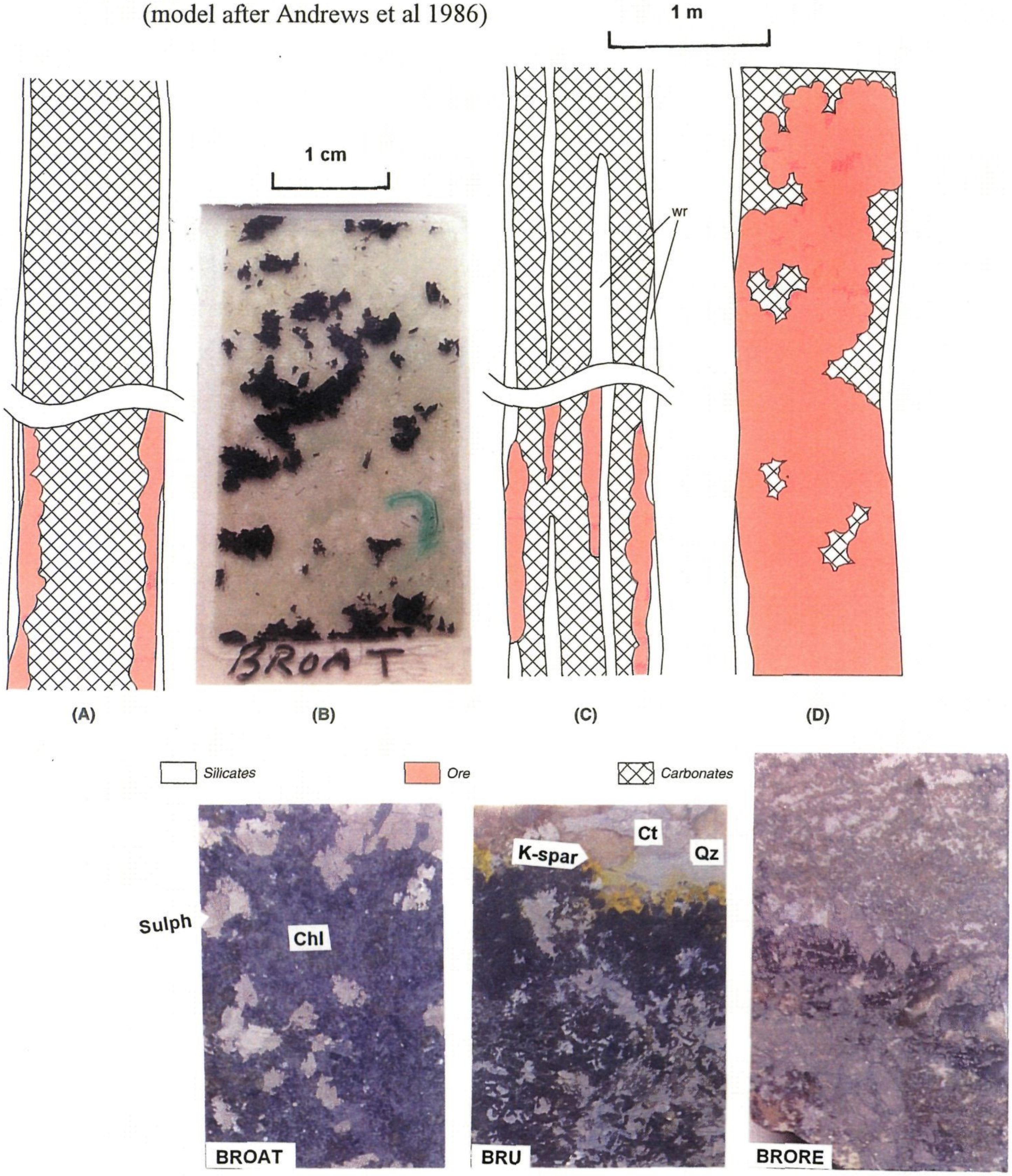
1 - repair of trails at the mine site and the main access road to the mine (4.2 km).

2 - geological mapping and stream water sampling at 1:5,000 scale.

3 - a diamond drill program to sample the vein ore and disseminations below No.1 Adit.

Figure 5 Vein Mineralization

(A) Typical distribution of minerals in ore veins with B, C, D variations
(model after Andrews et al 1986)



(B) Sample 'BROAT' showing disseminated sulpharsenides (opaque) in chloritic alteration (thin section)

(C) Sample 'BRU' showing mixed sulpharsenides-allanite-uraninite ore and quartz-carbonate-K-spar segregations within slivers of wall rock

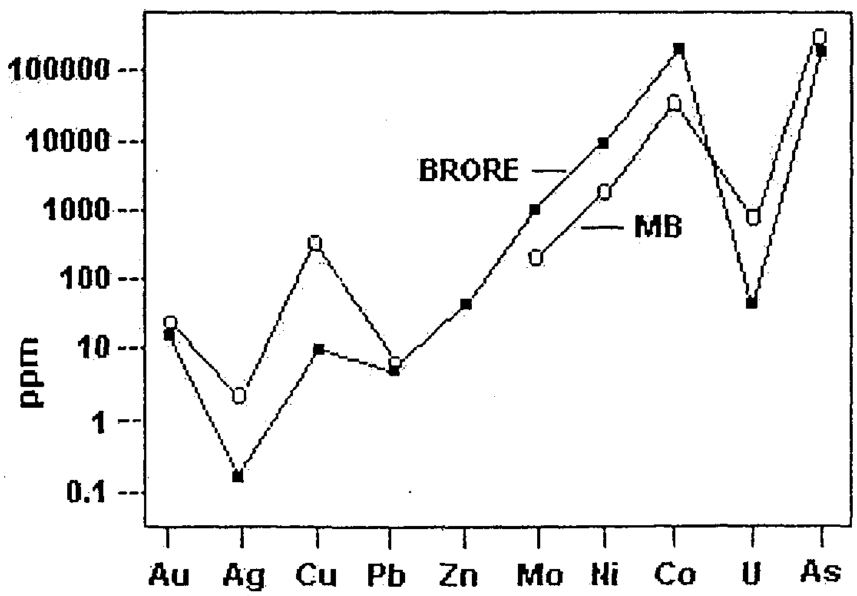
(D) Sample 'BRORE' showing massive Co-Ni sulpharsenide ore with submicroscopic Au

Table 2 Description of Samples

Samples Silt	Moss	Vein	Co-ordinates Lat	Long	
BRS-1A	MM- 1		50^50.52'	122^26.45'	Jones Cr at Carpenter L Road
BRS-2A	MM- 2		50^54.97'	122^56.13'	Roxey Creek at Slim Creek Road
BRS-3	MM- 3		50^51.25'	122^41.37'	Truax Cr trib by Mary Mac Mine
BRS-4	MM- 4		50^46.75'	122^50.77'	Carl Creek by Ogden Road
BRS-5	MM- 5		50^46.60'	122^49.25'	Cadwallader Cr at Bralorne Mine
	MM- 9		50^53.92'	122^57.48'	Seep in gully, Little Gem Mine
BRS-10A	MM-10		50^53.90'	122^57.65'	Roxey Cr by Little Gem cabin
	MM-11		50^53.80'	122^57.50'	Seep on track, Little Gem area
BRS-12	MM-12		50^54.57'	122^50.07'	Lick Creek at Gun Creek Road
		BREX	50^49.97'	122^49.50'	Vein in road cut, Brexton area
		BROAT	50^53.80'	122^57.48'	Vein material, Little Gem Mine
		BRU	50^53.60'	122^57.46'	Vein material, Little Gem Mine
		BRORE	50^53.60'	122^57.45'	Little Gem vein, No.1 Portal

Figure 6 Comparison of Little Gem Ore Samples

'BRORE', this study, and 'MB' Mines Branch Report IR 58-89



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Appendix A

Statement of Costs (Estimate)

Labour: geological engineer, Neil Church, P.Eng.		
September 11-14th, 2007; 4 days @ $500/day =	$2,000	
geological assistant, David Haughton, P.Eng.		
September 11-14th, 2007; 4 days @ $500/day =	$2,000	
		$ 4,000.00
Accomodation: (3 nights, 2 persons)		$ 239.23
Meals: (2 persons, 4 days) 2 x 4 x $50		$ 400.00
Equipment Rental: GPS unit 2 days @ $12/day		$ 24.00
Vehicle costs: 4x4 truck – 4 days @ $85/day + $0.30/km		$ 580.00
Fuel ($73.42 + $104.03)		$ 177.45
Ferry costs: vehicle + passengers ($66.05 + $39.60)		$ 105.65
TRIM topographic maps (3 x 8)		$ 24.00
Geological map		$ 20.00
Assay costs: 20 + 3 samples ($358.00 + $75.90)		$ 433.90
Petrographic analyses: 3 samples		$ 697.00
X-ray analyses: 3 samples		$ 252.00
Report preparation costs: geologist, N. Church 5 days @ $ 500/day		$ 2,500.00
Drafting		$ 100.00
Typing		$ 200.00
Photography		$ 12.03
Copying costs		$ 100.00
Total		**$ 9,865.26**

Vancouver Petrographics Ltd.

8080 GLOVER ROAD, LANGLEY, B.C. V1M 3S3
PHONE: 604-888-1323 - FAX: 604-888-3642
email: vanpetro@vanpetro.com
Website: www.vanpetro.com

DATE	31/12/2007

INVOICE NO.	071113

BILL TO

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

SHIP TO

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

GST#0548 4687 RT0001

P.O. NO.	TERMS	SHIP DATE	SHIP VIA	PROJECT	FOR
	Net 30	04/01/2008	purolator		

DESCRIPTION	QTY	RATE	AMOUNT
Polished Thin Sections	3	35.00	105.00T
Offcuts	3	1.00	3.00T
Kspar Staining	3	3.00	9.00T
Report by C.Leitch		465.00	465.00T
Photos		60.00	60.00T
Shipping		15.55	15.55T
Business Number: 105484687			

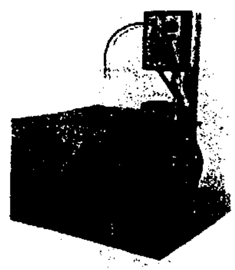
We appreciate your prompt payment.

GST	39.45
PST	0.00
TOTAL	Can$697.00

Rock saws

Diamond Blades

Rock Grinding



Sample Preparation

24

teckcominco

Global Discovery Labs

INVOICE

Number: GDL08-0104

Date: 5-Feb-08

GST # R101063576

Payable To:

TECK COMINCO LTD.
Global Discovery Labs
Attention: Susie Woo
1486 East Pender Street
Vancouver, B.C.
V5L 1V8

Bill To:

CHURCH, NEIL
600 Parkridge Street
Victoria, B.C.
V8Z 6N7

G.D.L. JOB NO.	CLIENT REFERENCE/I.D.	JOB COST $	G.S.T. (5%)	NET COST $
V07-1420R	Little Gem Mine	240.00	12.00	252.00
		SUBTOTAL	TOTAL G.S.T.	AMT PAYABLE (CAD)
	Please Pay Upon Receipt	$240.00	$12.00	$252.00

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

AcmeLabs

Acme Analytical Laboratories (Vancouver) Ltd.
852 East Hastings St.
Vancouver, BC Canada V6A 1R6
Phone 604 253 3158 Fax 604 253 1716
GST # 100035377 RT

Invoice Date:	January 10, 2008
Invoice Number:	**VANI003643**
Submitted by:	B. Neil Church
Job Number:	VAN07002397
Order Number:	
Project Code:	None Given
Shipment ID:	
Quote Number:	

Bill To: B.N. Church Geological Services
600 Parkridge St.
Victoria, BC V8Z 6N7
Canada

Item	Package	Description	Sample No.	Unit Price	Amount
1	SP100	Pulverize 100g soil samples	20	$2.30	$46.00
2	G1EX	0.25g 4 Acid Digestion ICP-MS	20	$15.60	$312.00
			Net Total		$358.00
			Grand Total	**CAD**	**$358.00**

Invoice Stated In Canadian Dollars

Payment Terms:

This is a professional service. Payment due upon receipt. Please pay the last amount shown on the invoice.

For cheque payments, please remit payment to the above address, made payable to: Acme Analytical Laboratories (Vancouver) Ltd.
Please specify Acme invoice number on cheque remittance.

For electronic payments, please wire funds to one of the following accounts:

For payment in Canadian Funds:
Acme Analytical Laboratories (Vancouver) Ltd.
The Royal Bank of Canada
400 Main Street
Vancouver, BC Canada V6A 2T5
Account # 1034123
Bank Transit # 07120-003
Swift Code: ROYCCAT2

For payment in US Funds:
Acme Analytical Laboratories (Vancouver) Ltd.
The Royal Bank of Canada
400 Main Street
Vancouver, BC Canada V6A 2T5
Account # 4001533
Bank Transit # 07120-003
Swift Code: ROYCCAT2

Please specify Acme invoice number for reference on transfer forms when making payment.

25A

AcmeLabs

Acme Analytical Laboratories (Vancouver) Ltd.
852 East Hastings St.
Vancouver, BC Canada V6A 1R6
Phone 604 253 3158 Fax 604 253 1716
GST # 100035377 RT

Invoice Date: February 6, 2008
Invoice Number: **VANI004826**
Submitted by: B. Neil Church
Job Number: VAN07002397
Order Number:
Project Code: None Given
Shipment ID:
Quote Number:

Bill To: B.N. Church Geological Services
600 Parkridge St.
Victoria, BC V8Z 6N7
Canada

Item	Package	Description	Sample No.	Unit Price	Amount
1	G7TD	0.5g 4 Acid Digestion ICP-ES	3	$15.30	$45.90
2	BATCH	Batch Surcharge for <20 samples	1	$30.00	$30.00
			Net Total		$75.90
			Grand Total	**CAD**	**$75.90**

Invoice Stated In Canadian Dollars

Payment Terms:

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Please specify Acme invoice number on cheque remittance.

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400 Main Street
Vancouver, BC Canada V6A 2T5
Account # 1034123
Bank Transit # 07120-003
Swift Code: ROYCCAT2

For payment in US Funds:
Acme Analytical Laboratories (Vancouver) Ltd.
The Royal Bank of Canada
400 Main Street
Vancouver, BC Canada V6A 2T5
Account # 4001533
Bank Transit # 07120-003
Swift Code: ROYCCAT2

Please specify Acme invoice number for reference on transfer forms when making payment.

25 B

AcmeLabs

Acme Analytical Laboratories (Vancouver) Ltd.
852 East Hastings St.
Vancouver, BC Canada V6A 1R6
Phone 604 253 3158 Fax 604 253 1716
GST # 100035377 RT

Bill To: B.N. Church Geological Services
600 Parkridge St.
Victoria, BC V8Z 6N7
Canada

Invoice Date: January 10, 2008
Invoice Number: **VANI003643**
Submitted by: B. Neil Church
Job Number: VAN07002397
Order Number:
Project Code: None Given
Shipment ID:
Quote Number:

Item	Package	Description	Sample No.	Unit Price	Amount
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2	G1EX	0.25g 4 Acid Digestion ICP-MS	20	$15.60	$312.00
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Vancouver, BC Canada V6A 2T5
Account # 1034123
Bank Transit # 07120-003
Swift Code: ROYCCAT2

For payment in US Funds:
Acme Analytical Laboratories (Vancouver) Ltd.
The Royal Bank of Canada
400 Main Street
Vancouver, BC Canada V6A 2T5
Account # 4001533
Bank Transit # 07120-003
Swift Code: ROYCCAT2

Please specify Acme invoice number for reference on transfer forms when making payment.

Appendix B

Analytical Results

Vancouver Petrographics Ltd.
8080 GLOVER ROAD, LANGLEY, B.C. V1M 3S3
PHONE: 604-888-1323 • FAX: 604-888-3642
email: vanpetro@vanpetro.com
Website: www.vanpetro.com

PETROGRAPHIC REPORT ON 3 SAMPLES FROM LITTLE GEM MINE, GOLD BRIDGE, B.C.

Report for: Neil Church
600 Parkridge St.
Victoria, B.C. V8Z 6N7

Invoice 071113

January 2, 2007.

SUMMARY:

Samples are described as vein material from the Little Gem Mine near Gold Bridge, B.C., representing different phases of Au- and Co-bearing sulfarsenide mineralization with local U enrichment, associated with quartz, carbonate and chlorite (?) gangue minerals and clay alteration (other minerals previously named include "danaite", loellingite, safflorite, arsenopyrite, pyrite, scheelite, molybdenite, uraninite, allanite, monazite, Kspar, apatite and native gold. Petrographic analysis (supported by X-ray results) confirm the presence of the following minerals: arsenopyrite (cobaltian, <9% Co, formerly known as "danaite"), grading to glaucodot (with >9% Co) and to safflorite, $(Co,Fe,Ni)As_2$; minor molybdenite, rutile?, uraninite?, in a matrix of carbonate (likely both calcite/dolomite and Fe-bearing varieties such as ankerite/siderite?), chlorite, muscovite/sericite, quartz, locally abundant apatite, allanite?, monazite? (or locally scheelite?), possible clay?/chlorite. No native gold was seen in any of the samples in spite of levels as high as 25 g/t, and detailed examination of the sulfide phases; it is possible that SEM scanning in back-scattered electron mode would locate minute grains of Au (or Au_2Bi, maldonite?). Capsule descriptions are as follows:

BRORE: vein sample of highly fractured glaucodot (Co-rich arsenopyrite) cut by quartz-carbonate (dolomite/ankerite?)-clay/chlorite?, and with minor molybdenite-limonite/rutile?-monazite or scheelite?-allanite?

BROAT: coarse euhedral arsenopyrite (likely cobaltian, i.e. "danaite") in a strongly chlorite-carbonate (dolomite and ankerite/siderite?)-quartz-muscovite-rutile?-apatite altered gangue matrix, possibly after a former mafic igneous rock (?).

BRU: unusual assemblage of dark greenish brown allanite?-safflorite?-carbonate (calcite/dolomite, ankerite/siderite?)-monazite?-euhedral apatite-quartz-Kspar-clay/chlorite?-sericite-uraninite?-rutile?

Detailed petrographic descriptions and photomicrographs are appended (on CD). If you have any questions regarding the petrography, please do not hesitate to contact me.

C.H.B. Leitch, P.Eng.

Craig H.B. Leitch, Ph.D., P. Eng. (250) 653-9158 craig.leitch@gmail.com
492 Isabella Point Road, Salt Spring Island, B.C. Canada V8K 1V4

BRORE: SEMI-MASSIVE GLAUCODOT CUT BY QUARTZ-CARBONATE-CLAY/CHLORITE; WITH MINOR MOLYBDENITE, LIMONITE?, MONAZITE/SCHEELITE?, TRACE ALLANITE?

Hand specimen shows medium grey, fine- to medium-grained, semi-massive sulfides (likely mainly arsenopyrite?) with buff- or tan-coloured carbonate gangue. The rock is locally very weakly magnetic, the carbonate shows slow reaction to cold dilute HCl, and there is no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Glaucodot (Co-rich arsenopyrite)	55%
Quartz (secondary, vein)	20%
Carbonate (dolomite, ankerite/siderite?)	15%
Clay-chlorite (?)	8-10%
Molybdenite	<1%
Unidentified (Fe hydroxides or rutile?)	<1%
Monazite (or possibly scheelite?)	<1%
Allanite (?)	trace

This sample consists mainly of highly fractured sulfide in a gangue of quartz and carbonate, or in places Fe-carbonate and a clay-chlorite mineral. Accessory molybdenite, opaque oxides and possible monazite (or scheelite?) are relatively rare.

The sulfide appears optically to be arsenopyrite, but with relatively weak anisotropism under crossed polars (typical of glaucodot). It is confirmed by XRD analysis to be glaucodot (i.e. to have a significant, >9 wt%, Co content). This is supported by significant (>4000 ppm) whole-rock Co content for this sample; anomalous Ni (4300 ppm) is also likely here. Glaucodot forms sub- to euhedral crystals up to 3.5 mm long, but commonly is strongly to locally intensely fractured, mainly by veinlets of quartz (up to 2 mm thick), or microveinlets of carbonate (mainly <0.1 mm thick).

Locally, minor molybdenite is present within the glaucodot as clumps ~2 mm across composed of randomly oriented, sub/euhedral, somewhat crumpled flakes <0.4 mm in diameter.

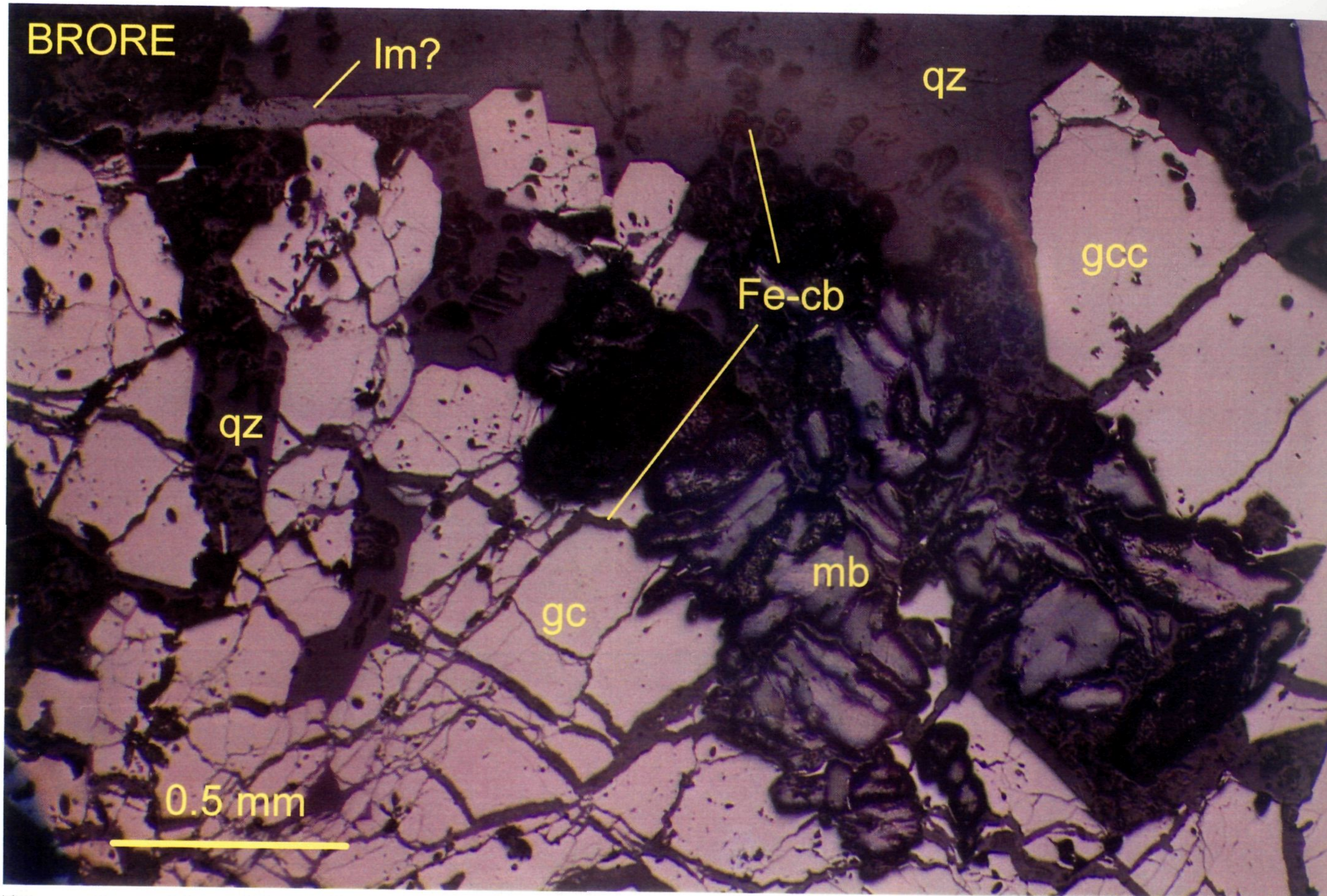
In places (loosely associated with the molybdenite), an opaque mineral with lower reflectance (~15-20%?) and grey colour forms bladed euhedral, somewhat ragged crystals up to 1 mm long. In detail, under high magnification and intense transmitted light, it is dark brown at thin edges, and consists of an aggregate of at least two phases, one with higher reflectance and strong anisotropism, and a lesser dark bluish grey phase with lower reflectance and indistinct anisotropism. These characteristics best fit Fe-hydroxides ("limonite" such as lepidocrocite and goethite respectively) or possibly rutile, but SEM analysis would be required to identify these phases properly.

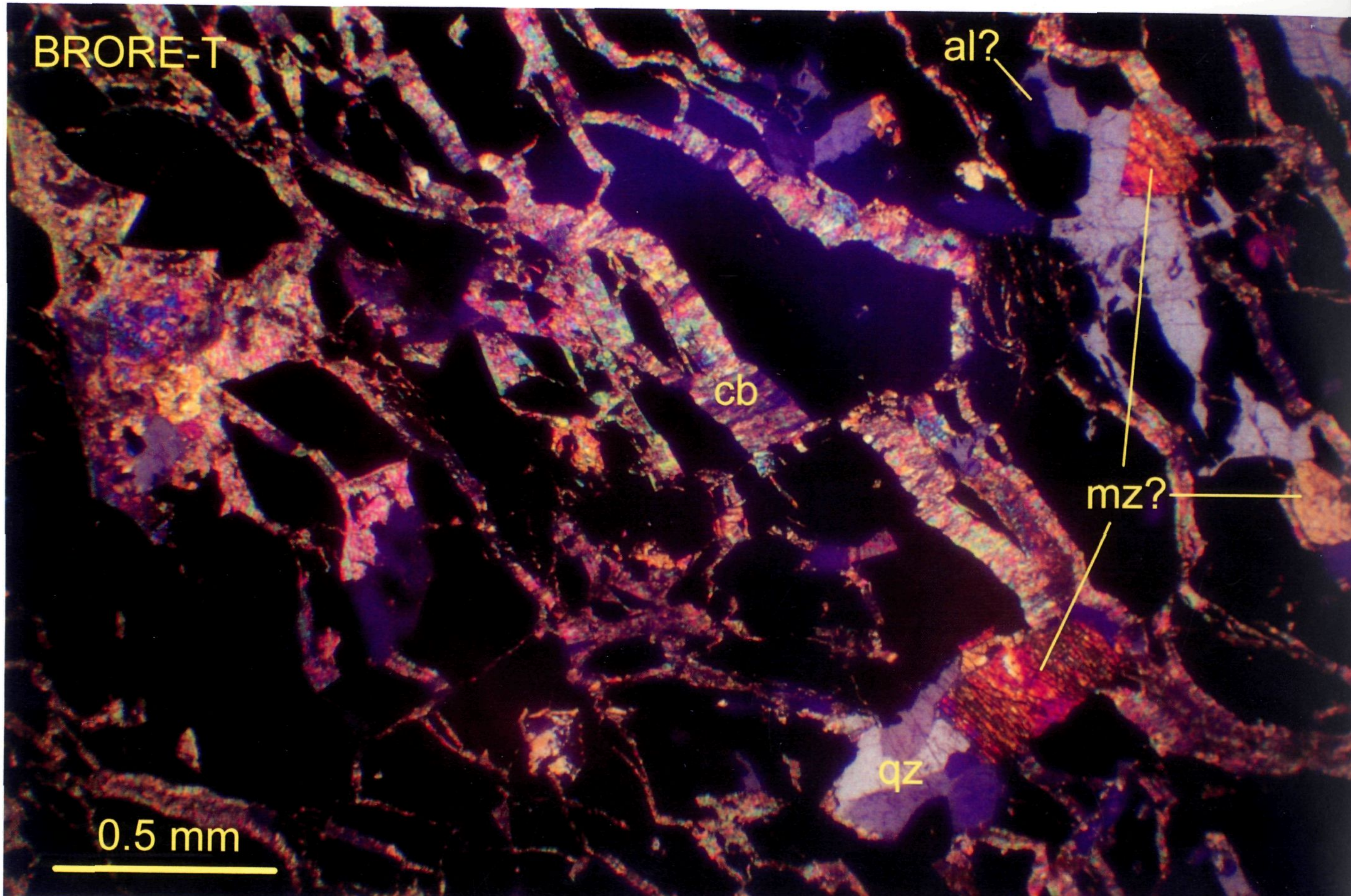
Quartz forms relatively coarse, irregular to subhedral crystals up to at least 3 mm long, in veins that appear to partly cut but also be partly intergrown with the sulfides. Carbonate more or less intergrown with quartz is relatively clear (possibly dolomite?) and forms ragged subhedral crystals of similar size to the quartz, up to 3 mm long. This carbonate contains inclusions, mostly <0.1 mm in size, of both sulfides and brownish Fe-carbonate, and has the appearance of having been recrystallized adjacent to (possibly by) the quartz.

Elsewhere in the section, brownish (commonly Fe-stained) carbonate forming small rosettes mostly <0.1 mm in size, likely ankerite or even siderite, is intergrown with or included within a clay-chlorite (?) mineral forming colourless, sub/euhedral flakes mostly <50 microns in diameter, with very low (first-order grey), length-slow birefringence suggestive of a clay mineral such as kaolinite (also suggested by XRD analysis), but it could be a clay-chlorite (mixed-layer) mineral (?).

The mineral tentatively identified as monazite or scheelite (strong positive relief, moderate birefringence up to first-order blue, nearly parallel, length-slow extinction; small positive 2V) forms mainly euhedral, stubby prismatic crystals up to 0.5 mm long that are highly fractured parallel to the carbonate veining (and are altered to carbonate and brownish "hydrobiotite" along the fractures). Rarely, loosely associated smaller, euhedral tabular crystals <0.1 mm long that appear to be metamict (lack birefringence; cloudy in transmitted light) could be allanite (?).

In summary, this vein sample consists of highly fractured glaucodot (Co-rich arsenopyrite) cut by quartz-carbonate (dolomite/ankerite?)-clay?, and minor molybdenite-Fe oxides-monazite?-allanite?


BRORE
Im?
qz
qz
gcc
Fe-cb
mb
gc
0.5 mm


BRORE-T
al?
cb
mz?
qz
0.5 mm

BROAT: ARSENOPYRITE IN MATRIX OF CHLORITE-CARBONATE-QUARTZ-MUSCOVITE WITH ACCESSORY LATH-LIKE RUTILE?, MINOR APATITE

Hand specimen consists of coarsely disseminated euhedral arsenopyrite crystals in a dark green, fine-grained, likely chloritic matrix. The rock is weakly magnetic, shows only minor reaction to cold dilute HCl (in buff-coloured carbonate only; brownish carbonate does not react), and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Chlorite	50%
Arsenopyrite	20%
Carbonate (dolomite, ankerite/siderite?)	20%
Quartz (secondary)	5%
Muscovite/sericite	3-5%
Unidentified (rutile, limonite?)	1%
Apatite	<1%

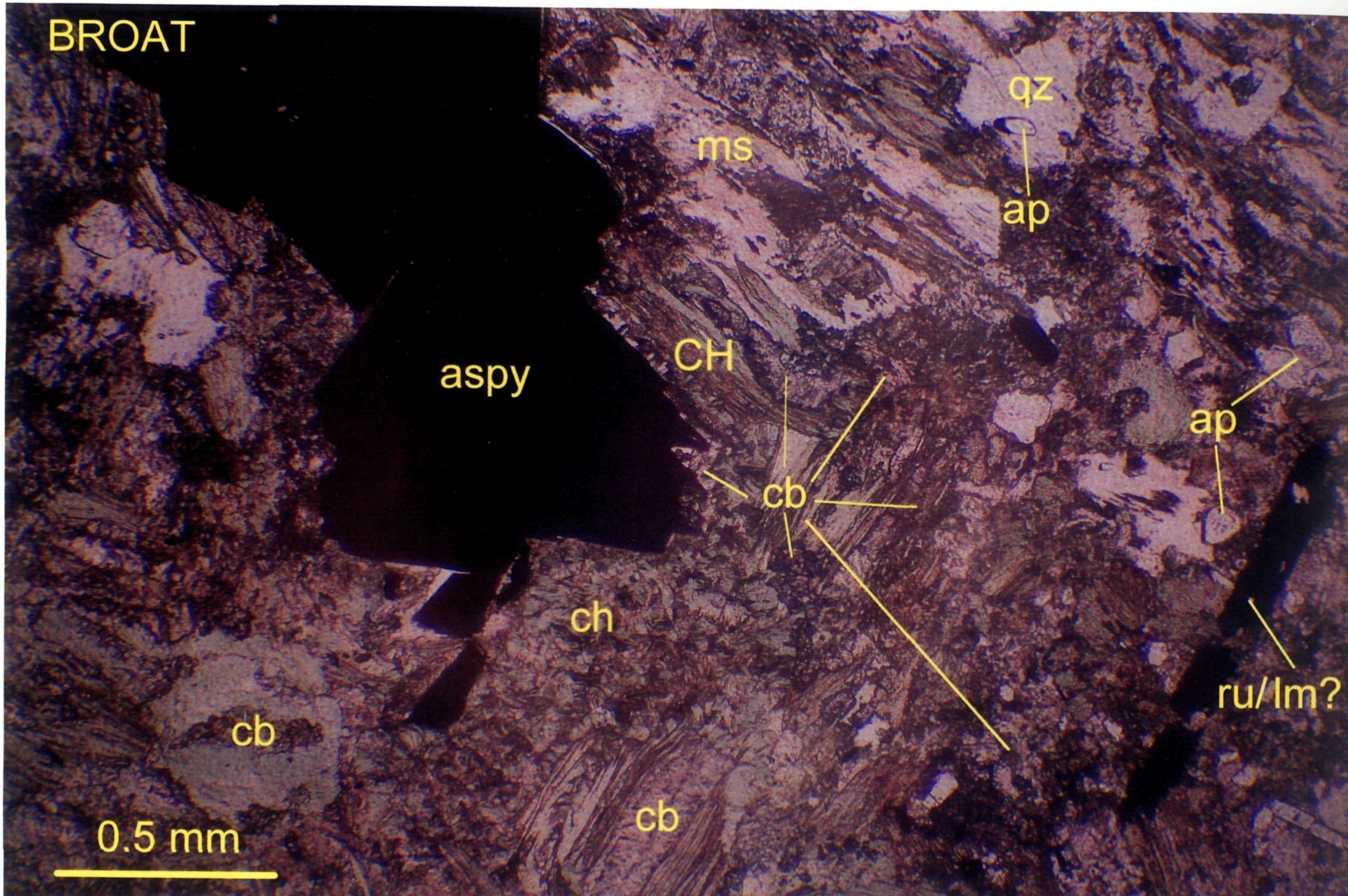
This sample consists mainly of coarse euhedral arsenopyrite crystals in a gangue matrix of chlorite (commonly interleaved by muscovite, possibly after former biotite?), carbonate, and quartz. Scattered small bladed crystals of tabular opaque (rutile?), and apatite, are present in the matrix.

Chlorite forms ragged, subhedral (commonly rounded) booklets either about 0.75 mm in diameter, or as finer-grained, somewhat radiating, rosette-like aggregates or flakes mostly <0.1 mm in diameter. Both have similar optical properties (moderate green pleochroism, pale anomalous blue-grey, length-slow birefringence, indicative of a somewhat Fe-rich chlorite with Fe:Fe+Mg, or F:M, ratio possibly around 0.6). However, X-ray diffraction analysis indicates clinochlore, a Mg-rich chlorite with F:M defined as <0.2. The coarser flakes of chlorite are commonly partly interleaved by ragged, subhedral flakes of muscovite up to about 0.5 mm in diameter, or contain carbonate as fine sub/euhedral crystals mostly <0.15 mm in diameter. This carbonate is generally relatively clear, and may be dolomite (?). It is possible that these large chlorite-muscovite ±carbonate aggregates could represent former biotite booklets (?). In places, finer-grained muscovite (sericite) of similar size to the fine-grained chlorite occurs in irregular-shaped patches up to 1.5 mm across. The finer-grained chlorite is also commonly intergrown with carbonate as sub/euhedral crystals rarely over 75 microns long, commonly with a brownish cast and higher relief, suggestive of Fe-carbonate (ankerite or siderite?). In places, coarser-grained aggregates of this brownish carbonate up to about 1 mm across are composed of ragged interlocking subhedra up to 0.3 mm in size. Quartz forms somewhat ragged, irregular subhedral crystals up to about 1 mm in size (locally in crudely sector-twinned aggregates up to 1.5 mm across), with inclusions of chlorite, muscovite and carbonate, suggesting blastic growth.

Arsenopyrite occurs as irregular-shaped aggregates up to 1.5 cm long, composed of generally euhedral, rhomb-shaped crystals up to about 2 mm in diameter, likely cobaltian (the former name for cobaltian arsenopyrite with <9% Co, "danaite", has been dropped). It seems likely the anomalous Ni (and possibly Bi) in this sample are also hosted by arsenopyrite. The crystals are only locally fractured, and have a somewhat blastic texture emphasized by minor inclusions of quartz and carbonate but not chlorite or muscovite. In places the arsenopyrite is rimmed by carbonate.

An opaque phase partly similar to that tentatively listed as "limonite" in the previous sample, occurs as randomly oriented, ragged lath-shaped crystals up to 1.25 mm long in the chloritic matrix. These lath-shaped aggregates are composed of minutely crystalline sub-domains mostly <20 microns in size with strong anisotropism, locally brown at thin edges (could be rutile or lepidocrocite?) Separate crystals of almost certain rutile (pale to medium brown) are euhedral and up to 30 microns long. If the lath-like aggregates are mainly rutile (whole-rock TiO_2 values would be high), it argues for derivation of this rock by intense alteration of a mafic rock (also suggested by the presence of minor apatite as euhedra <0.1 mm in size).

In summary, this sample consists of coarse euhedral arsenopyrite (likely cobaltian, i.e. "danaite") in a strongly chlorite-carbonate (dolomite and ankerite/siderite?)-quartz-muscovite-rutile?-apatite altered gangue matrix, possibly after a former mafic igneous rock (?).


BROAT
qz
ms
ap
aspy
CH
ap
cb
ch
ru/Im?
cb
cb
0.5 mm

BRU: ALLANITE?-SAFFLORITE?-CARBONATE-MONAZITE?-APATITE-QUARTZ-KSPAR-CLAY/CHLORITE?-SERICITE-URANINITE-RUTILE

Hand specimen shows abundant euhedral arsenopyrite-like mineral, in either dark green (chloritic?) or buff-coloured (?quartz-carbonate-rich) matrix, with quartz (?) forming euhedral bladed crystals up to 1.5 cm long, and the carbonate surrounding arsenopyrite commonly being brown (Fe-rich). The rock is locally slightly magnetic, shows minor slow reaction to cold dilute HCl, and minor stain for K-feldspar in the etched offcut (at the boundary between "chloritic" and "quartz-carbonate" zones). Modal mineralogy in polished thin section is approximately:

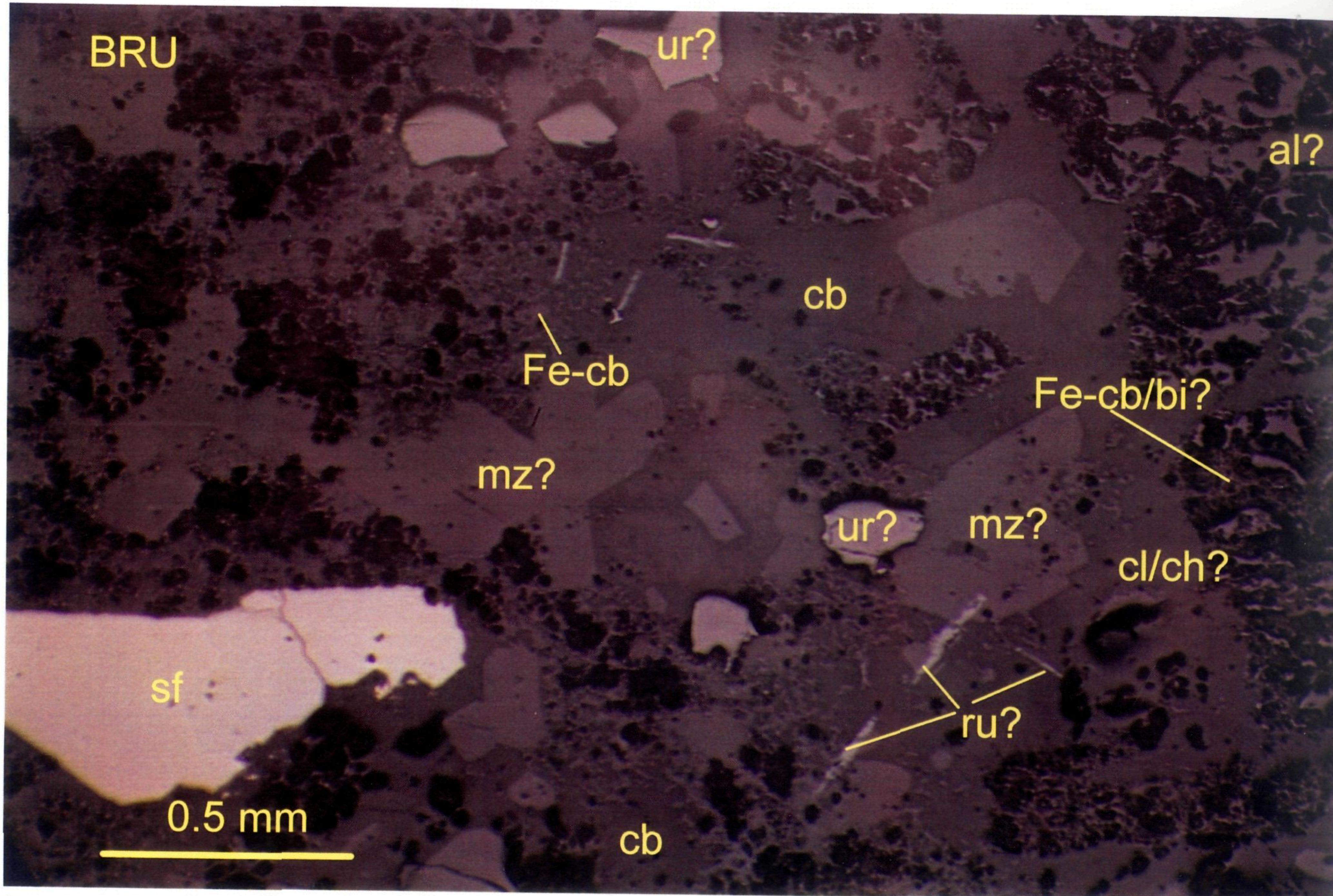
Allanite (?)	35%
Safflorite (?)	25%
Carbonate (dolomite, ankerite/siderite?)	20%
Monazite (?)	5%
Apatite	5%
Quartz (secondary)	3%
K-feldspar	2%
Clay/chlorite (?)	2%
Sericite, trace biotite (?)	1%
Uraninite (?)	1%
Rutile	1%

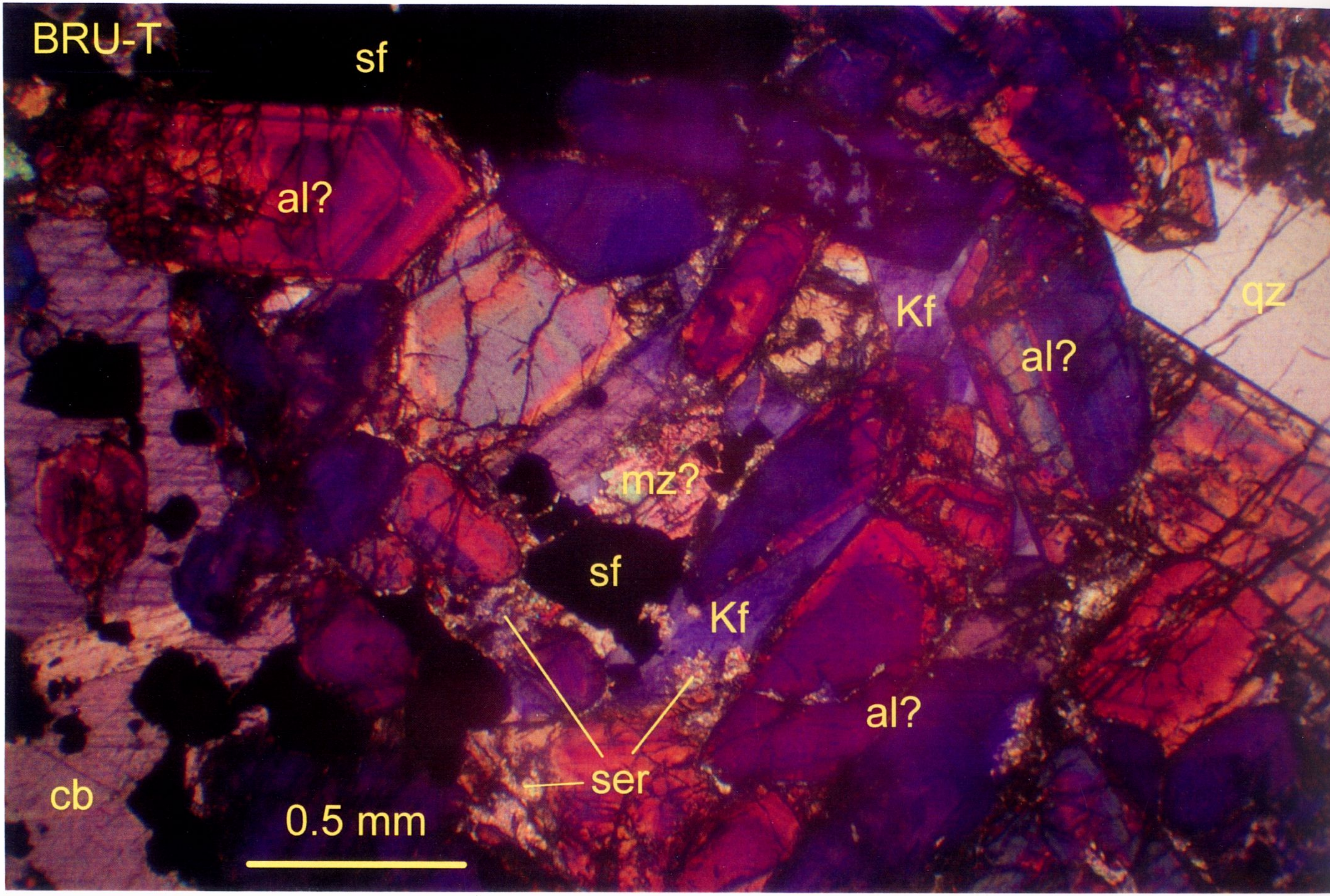
This is an unusual sample. Sulfide (mainly safflorite) is abundant in both the dark green zone, composed mainly of allanite, not chlorite (not sure why XRD analysis reports significant chlorite) and lesser, relatively clear, carbonate (dolomite?), and in the buff-coloured zone, which is composed mainly of apatite (not quartz!), carbonate (clear dolomite and red-brown ankerite/siderite?), monazite (?), and only minor quartz and K-feldspar. Minor uraninite (?) and rutile (?) are found in both zones.

Safflorite forms aggregates to 0.5 cm of mainly sub/euhedral crystals up to 2 mm in size, in part fractured or rimmed by Fe-carbonate. Scattered sub/euhedral crystals of opaque oxides (very high polishing relief, almost isotropic, sub-cubic, <0.5 mm) with reflectance slightly less than the lath-like, <1 mm long aggregates of rutile (?) are likely uraninite (?), locus of significant U/trace Th.

In the dark green rock, the mineral tentatively identified as allanite forms euhedral, bladed to tabular crystals up to 3 mm long with intense, greenish-brown to bright red-brown pleochroism with sharply defined, fine oscillatory compositional zoning. It is only rarely metamict (where altered to carbonate, trace sericite along microfractures). Carbonate forms mainly either coarse-grained, semi-massive material of sub/euhedral, clear crystals optically continuous for up to 6 mm (these contain most of the sulfide), or locally (in narrow, late veinlets <0.1 mm thick, or replacing rims of allanite) much finer-grained, finely granular, bright brownish crystals mostly <35 microns (ankerite/siderite?). In places, bright brown carbonate as rosettes mostly <0.1 mm across, composed of minute crystals <25 microns in size (locally mixed with biotite?), are hosted in a colourless to very pale greenish, flaky silicate with first-order grey, length-slow birefringence, similar to the clay?/chlorite mineral identified in BRORE (the patches of these two minerals fill interstices up to 1.5 mm across, between allanite). Only minor quartz occurs as similar interstitial sub/euhedral crystals up to 1.4 mm long.

In the buff-coloured zones, coarse euhedral prismatic crystals of apatite are up to 1.3 cm long. They are intergrown with carbonate as both relatively coarse, sub/euhedral clear crystals up to 3 mm in size (dolomite?) and bright brown, rosette-like aggregates mostly <0.1 mm in size (siderite?). As in the dark green rock, this Fe-carbonate is also hosted by a flaky silicate that may be clay?/chlorite. Quartz occurs as relatively rare, corroded-looking subhedra up to 2 mm long that are intimately intergrown with the flaky silicate and the brown carbonate (in places possibly intermixed with biotite?) around their margins. The mineral tentatively identified as monazite forms mainly euhedral, stubby prismatic to tabular crystals up to about 1 mm in diameter, with strong positive relief, moderate to high (up to third-order pink) birefringence, and length-slow, with very small, positive biaxial figure. It is unusually coarse-grained and abundant, and is likely the locus of the anomalous La and Ce. Kspar forms subhedra to 3 mm across that poikilitically enclose carbonate and monazite.


BRU
ur?
al?
cb
Fe-cb
Fe-cb/bi?
mz?
ur?
mz?
cl/ch?
sf
ru?
0.5 mm
cb



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PHOTOMICROGRAPH CAPTIONS

BRORE: Highly fractured, sub/euhedral glaucodot (gc) cut by microveinlets of Fe-carbonate (cb), with included patches of molybdenite (mb) and bladed Fe-hydroxides? (lm?); gangue matrix is mostly quartz (qz) containing rosette-like inclusions of Fe-carbonate. Reflected light, uncrossed polars, field of view 2.75 mm wide.

BRORE-T: As above, fractured glaucodot (opaque) cut by microveinlets of carbonate and Fe-carbonate (cb) or locally quartz (qz), containing euhedral crystals of monazite or possibly scheelite? (mz?), or rare (metamict) allanite? (al?). Transmitted light, crossed polars, field of view 3 mm wide.

BROAT: Euhedral arsenopyrite (aspy) locally rimmed by carbonate, plus bladed laths of rutile or Fe-hydroxides? (ru/lm?) in matrix of chlorite, either coarse-grained (CH) or fine-grained (ch), muscovite (ms) and carbonate (cb), with somewhat blastic quartz (qz) crystals. Transmitted plane light, field of view 3 mm wide.

BRU-T: Safflorite (opaque, sf) hosted by zoned euhedral allanite? (al?) crystals poikilitically enclosed in carbonate (cb), minor monazite? (mz?), quartz (qz), Kspar (Kf) and trace interstitial sericite (ser). Transmitted light, crossed polars, field of view 3 mm wide.

BRU: Safflorite (sf), minor uraninite? (ur?) and rutile? (ru?), euhedral monazite? (mz?) all hosted by carbonate (cb) and fine-grained Fe-carbonate locally as rosettes (with biotite?) in clay?/chlorite matrix, especially where replacing margins of allanite? (al?) crystals. Reflected light, uncrossed polars, field of view 2.75 mm wide.

Overview of thin sections and offcuts (green semi-circles mark photomicrograph locations).

teckcominco

J.A. McLeod
Manager, Global Discovery Labs

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

13 December, 2007

Dear Neil: ***RE: Little Gem Mine XRD samples / G.D.L. Job V07-1420R***

Three samples were submitted for x-ray diffraction analysis.
Two samples were very fine rock pulp and the third was fine gravel sized material.
Following are the results of x-ray diffraction:

SAMPLE R07:86985 (BRORE) contains:

1. Quartz .... Moderate abundance.
2. Alloclasite or Glaucodot ...... Moderate abundance. They are both (Co, Fe) AsS.
3. Kaolinite (?) .... Minor abundance.

SAMPLE R07:86986 (BROAT) contains:

1. Clinochlore .... Significant abundance.
2. Quartz .... Minor abundance.
3. Muscovite .... Minor abundance.
4. Arsenopyrite .... Moderate to minor abundance.

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 R07:86987 (BRU) contains:

1. Quartz .... Moderate abundance.
2. Clinochlore.......................... Moderate abundance.
3. Safflorite .... Moderate abundance.
4. Muscovite .... Minor abundance.
5. Orthoclase .... Minor abundance.
6. Allanite .... Very minor abundance.
7. Calcite .... Possible.

The BRU sample was picked and three different phases were analyzed by XRD.

The traces are referred to as BRUAS, to confirm safflorite, BRUPK to confirm orthoclase and BRUBK to confirm allanite.

All x-ray traces and mineral matches are attached.

To further confirm or eliminate the numerous phases supplied as possibilities it is recommended that samples such as BRU (which was submitted as grains) be prepared as polished thin section grain mounts and studied microscopically. This would allow for much better discrimination of minor constituent phases.

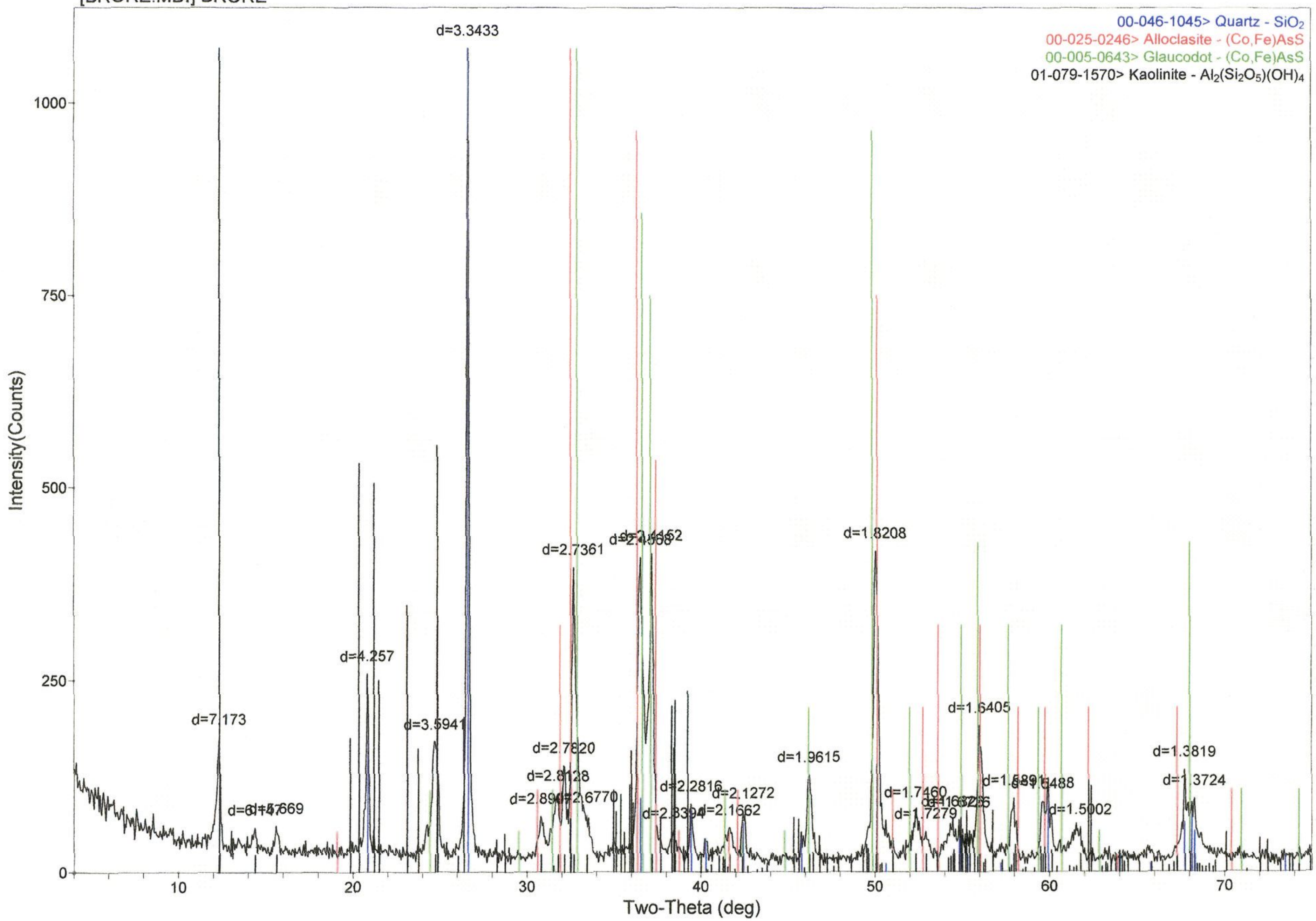
Sincerely,

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

JAM/skw

App. (diffractograms)

[BRORE.MDI] BRORE



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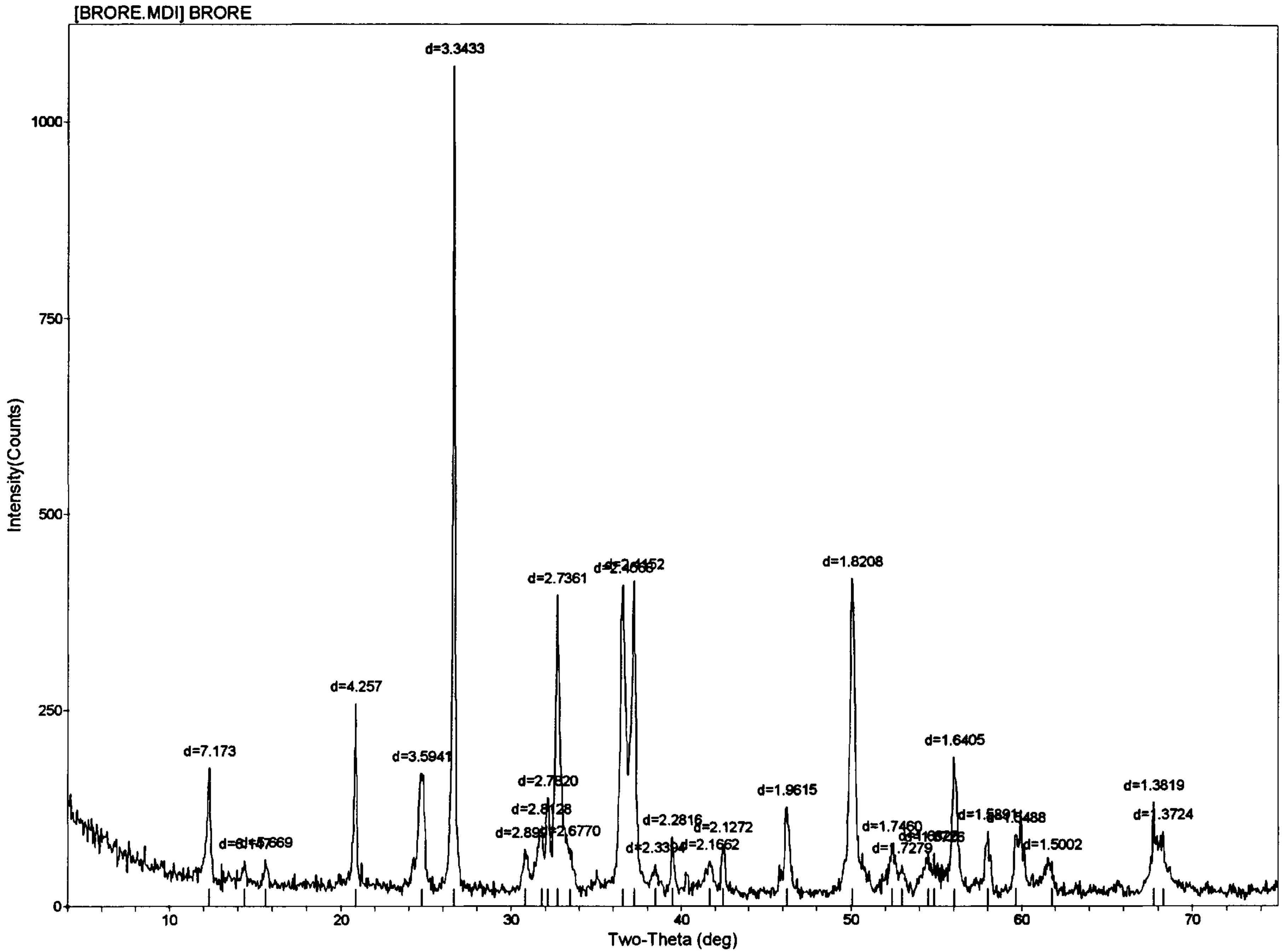
Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Tuesday, December 11, 2007 04:38p (MDI/JADE8)



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Wednesday, December 12, 2007 04:40p (MDI/JADE8

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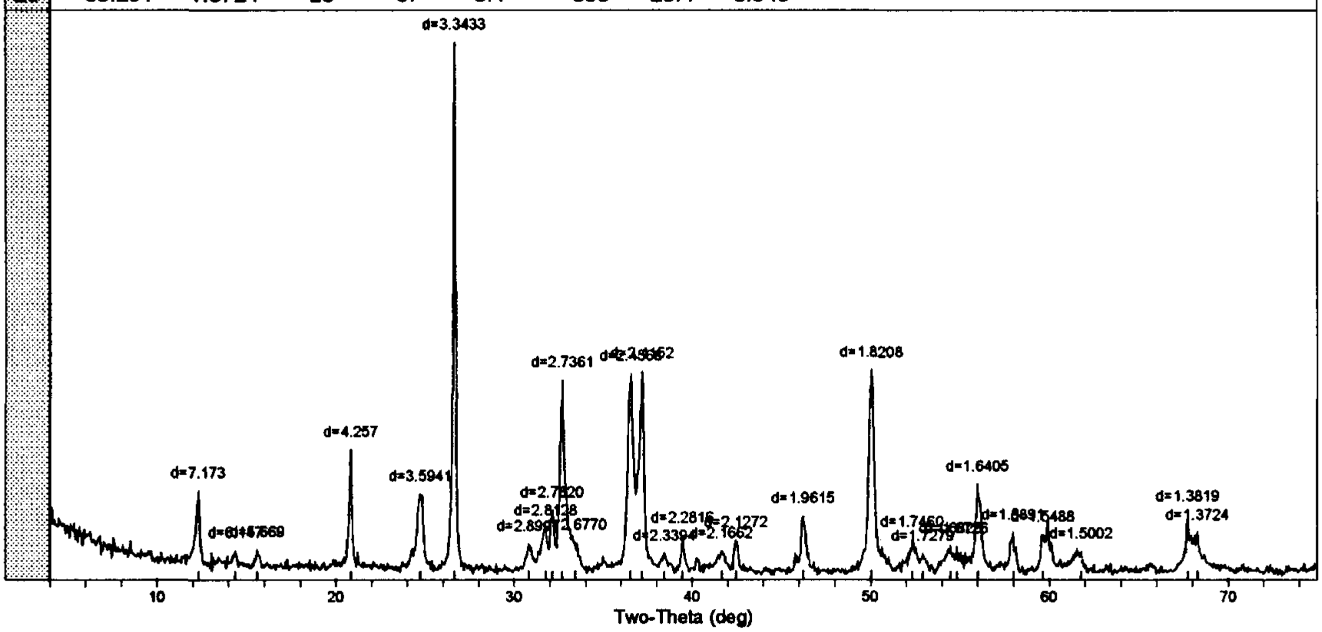
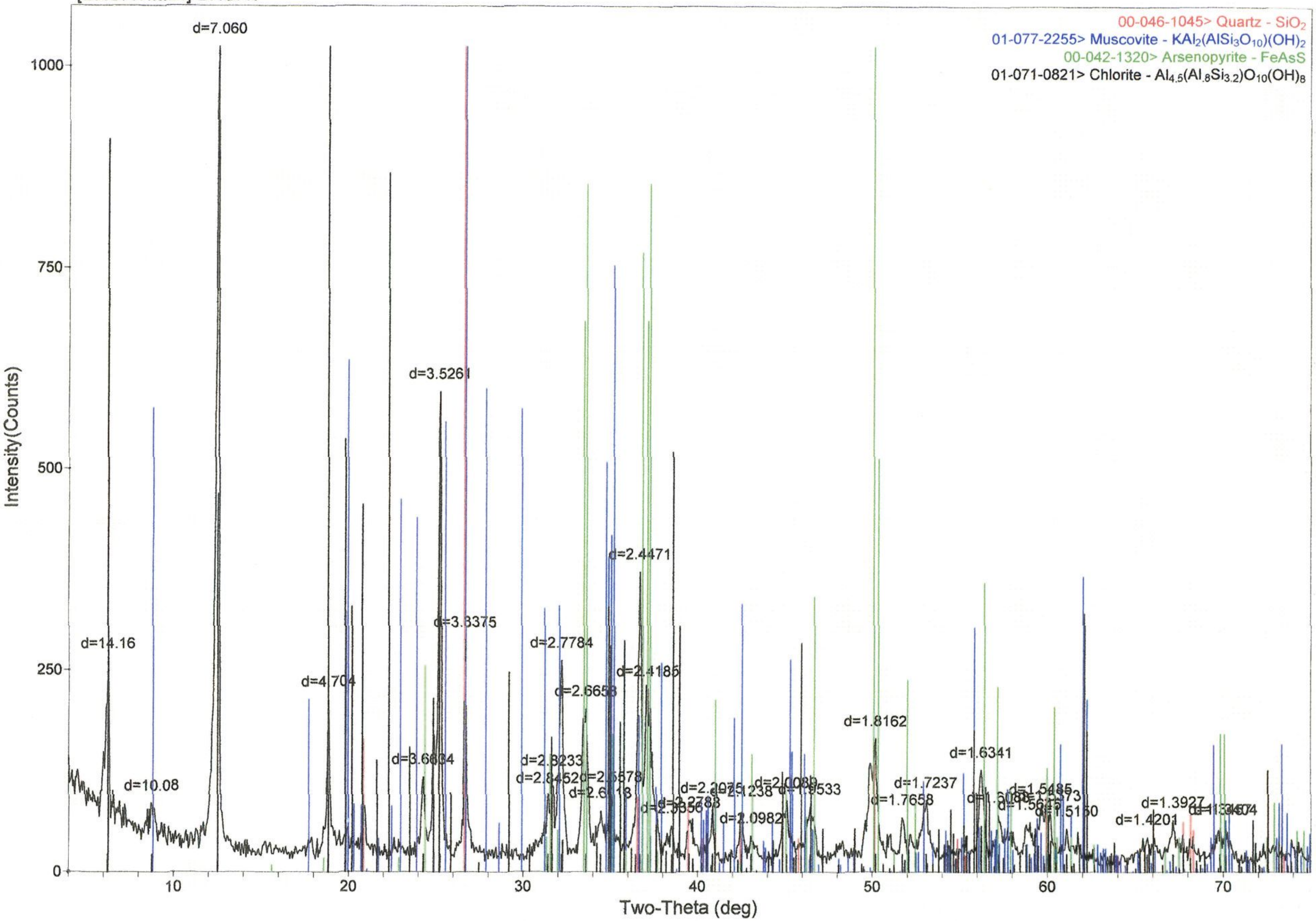
NOTE: Intensity = Counts, 2T(0)=0.0(deg), Wavelength to Compute d-Spacing = 1.54059Å (Cu/K-alpha1)	

#	2-Theta	d(Å)	BG	Height	H%	Area	A%	FWHM
1	12.330	7.1729	39	137	13.1	636	15.2	0.197
2	14.398	6.1468	34	24	2.3	50	1.2	0.086
3	15.618	5.6693	27	33	3.1	142	3.4	0.185
4	20.848	4.2575	31	227	21.6	885	21.1	0.166
5	24.751	3.5941	27	142	13.6	1338	31.9	0.399
6	26.641	3.3433	22	1049	100.0	4198	100.0	0.170
7	30.810	2.8997	18	54	5.1	464	11.1	0.365
8	31.787	2.8128	18	84	8.0	782	18.6	0.396
9	32.148	2.7820	18	120	11.4	1506	35.9	0.533
10	32.703	2.7361	18	378	36.0	3843	91.5	0.432
11	33.446	2.6770	21	53	5.1	1123	26.7	0.898
12	36.545	2.4568	28	381	36.3	3737	89.0	0.417
13	37.197	2.4152	30	384	36.6	3391	80.8	0.376
14	38.449	2.3394	20	33	3.2	263	6.3	0.337
15	39.464	2.2816	23	65	6.2	188	4.5	0.122
16	41.659	2.1662	25	32	3.1	298	7.1	0.391
17	42.460	2.1272	15	64	6.1	441	10.5	0.294
18	46.246	1.9615	18	108	10.3	883	21.0	0.346
19	50.056	1.8208	20	397	37.8	3319	79.1	0.356
20	52.358	1.7460	28	52	5.0	530	12.6	0.429
21	52.950	1.7279	20	32	3.0	410	9.8	0.552
22	54.492	1.6826	20	48	4.5	692	16.5	0.619
23	54.845	1.6726	26	41	3.9	551	13.1	0.565
24	56.009	1.6405	22	168	16.0	1412	33.6	0.358
25	57.990	1.5891	19	76	7.2	578	13.8	0.323
26	59.651	1.5488	17	74	7.1	1149	27.4	0.656
27	61.790	1.5002	18	39	3.8	588	14.0	0.634
28	67.753	1.3819	18	114	10.9	1468	35.0	0.546
29	68.291	1.3724	28	67	6.4	855	20.4	0.545



[BROAT.MDI] BROAT



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Thursday, December 06, 2007 04:50p (MDI/JADE8)

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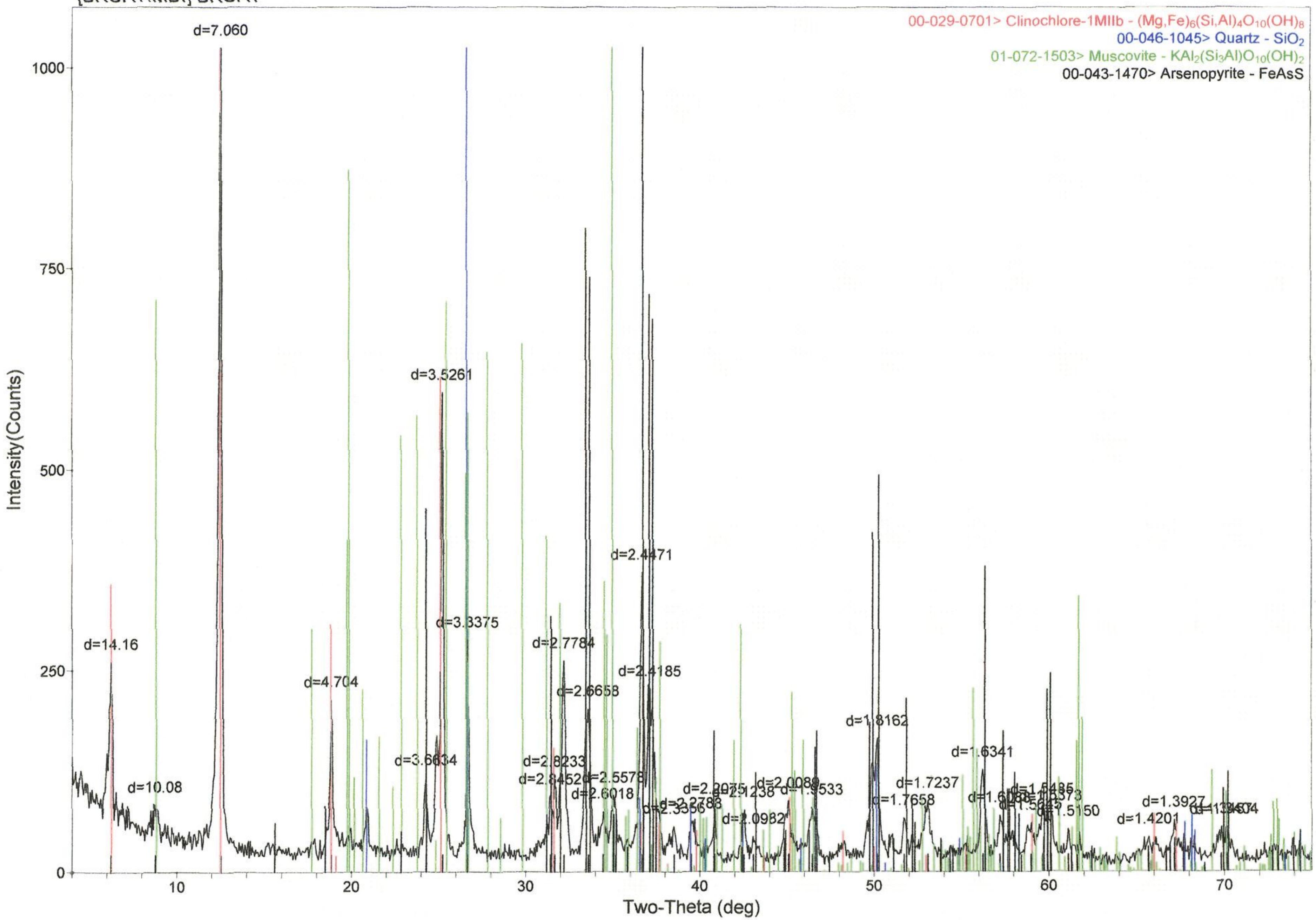
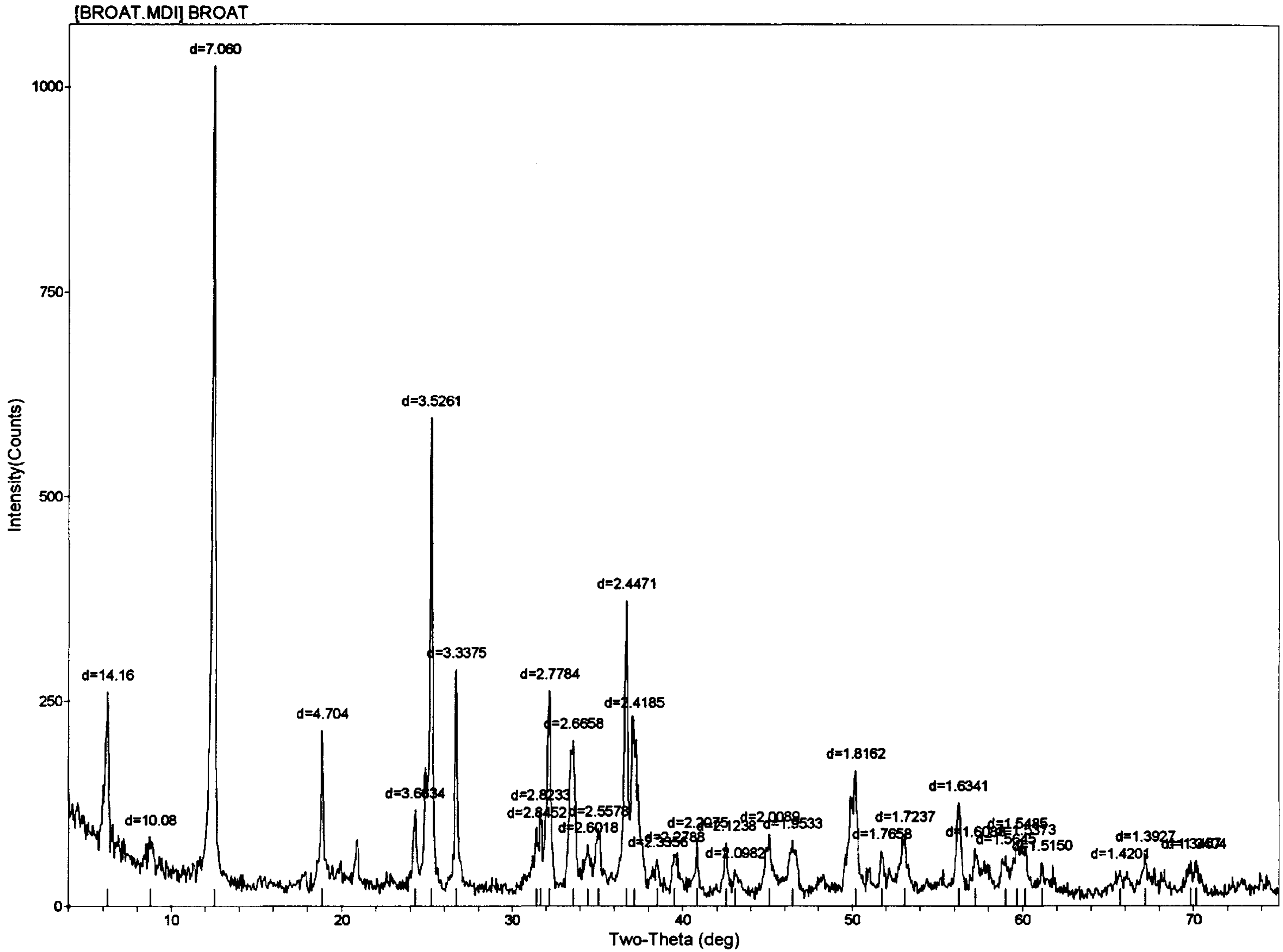
[BROAT.MDI] BROAT



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Tuesday, December 11, 2007 05:21p (MDI/JADE8)



Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Wednesday, December 12, 2007 04:39p (MDI/JADE8

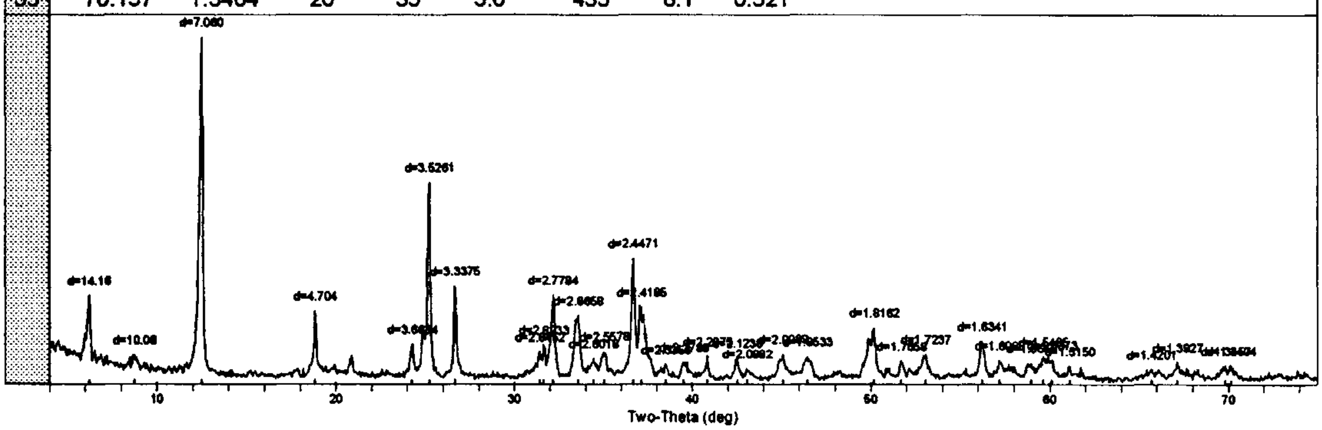
[BROAT.MDI] BROAT	Peak Search Report

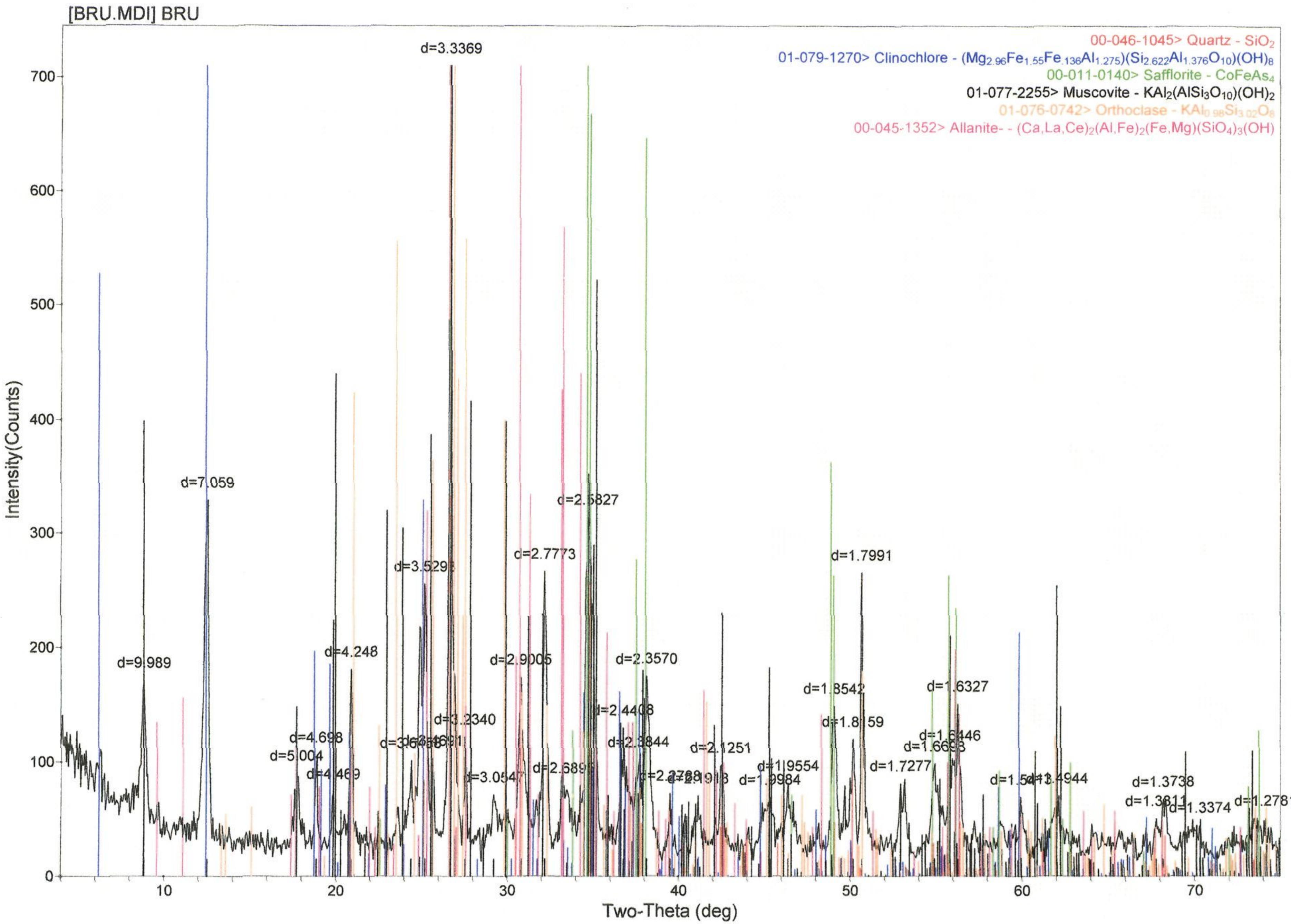
SCAN: 4.0/75.0/0.05/1(sec), Cu, I(max)=1025, 12/06/07 04:24p

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	6.237	14.1603	82	179	18.0	819	15.3	0.194
2	8.765	10.0808	51	33	3.4	181	3.4	0.230
3	12.528	7.0600	30	995	100.0	5360	100.0	0.229
4	18.851	4.7036	25	189	19.0	967	18.0	0.217
5	24.276	3.6634	41	76	7.6	275	5.1	0.154
6	25.237	3.5261	24	572	57.4	3013	56.2	0.224
7	26.689	3.3375	24	264	26.5	1191	22.2	0.192
8	31.416	2.8452	27	66	6.6	953	17.8	0.618
9	31.668	2.8233	34	81	8.1	856	16.0	0.449
10	32.192	2.7784	39	223	22.4	1206	22.5	0.230
11	33.591	2.6658	40	162	16.2	999	18.6	0.262
12	34.443	2.6018	47	28	2.8	73	1.4	0.112
13	35.055	2.5578	36	59	5.9	449	8.4	0.323
14	36.696	2.4471	33	339	34.0	2086	38.9	0.262
15	37.145	2.4185	34	193	19.3	2297	42.9	0.507
16	38.514	2.3356	28	29	2.9	111	2.1	0.164
17	39.513	2.2788	27	37	3.7	242	4.5	0.282
18	40.845	2.2075	16	65	6.5	344	6.4	0.226
19	42.531	2.1238	16	61	6.1	376	7.0	0.263
20	43.077	2.0982	20	24	2.5	196	3.7	0.341
21	45.094	2.0089	18	70	7.1	668	12.5	0.403
22	46.451	1.9533	18	62	6.3	742	13.8	0.506
23	50.190	1.8162	29	136	13.7	1316	24.6	0.411
24	51.726	1.7658	35	32	3.2	70	1.3	0.093
25	53.089	1.7237	22	66	6.6	738	13.8	0.474
26	56.248	1.6341	27	99	10.0	586	10.9	0.251
27	57.215	1.6088	29	41	4.1	386	7.2	0.397
28	58.991	1.5645	26	35	3.6	257	4.8	0.308
29	59.662	1.5485	29	51	5.1	882	16.5	0.742
30	60.141	1.5373	26	46	4.6	766	14.3	0.708
31	61.122	1.5150	25	28	2.8	164	3.1	0.250
32	65.695	1.4201	21	22	2.2	227	4.2	0.444
33	67.157	1.3927	24	40	4.0	262	4.9	0.282
34	69.835	1.3457	19	36	3.7	485	9.0	0.565
35	70.157	1.3404	20	35	3.6	435	8.1	0.521





Materials Data, Inc.

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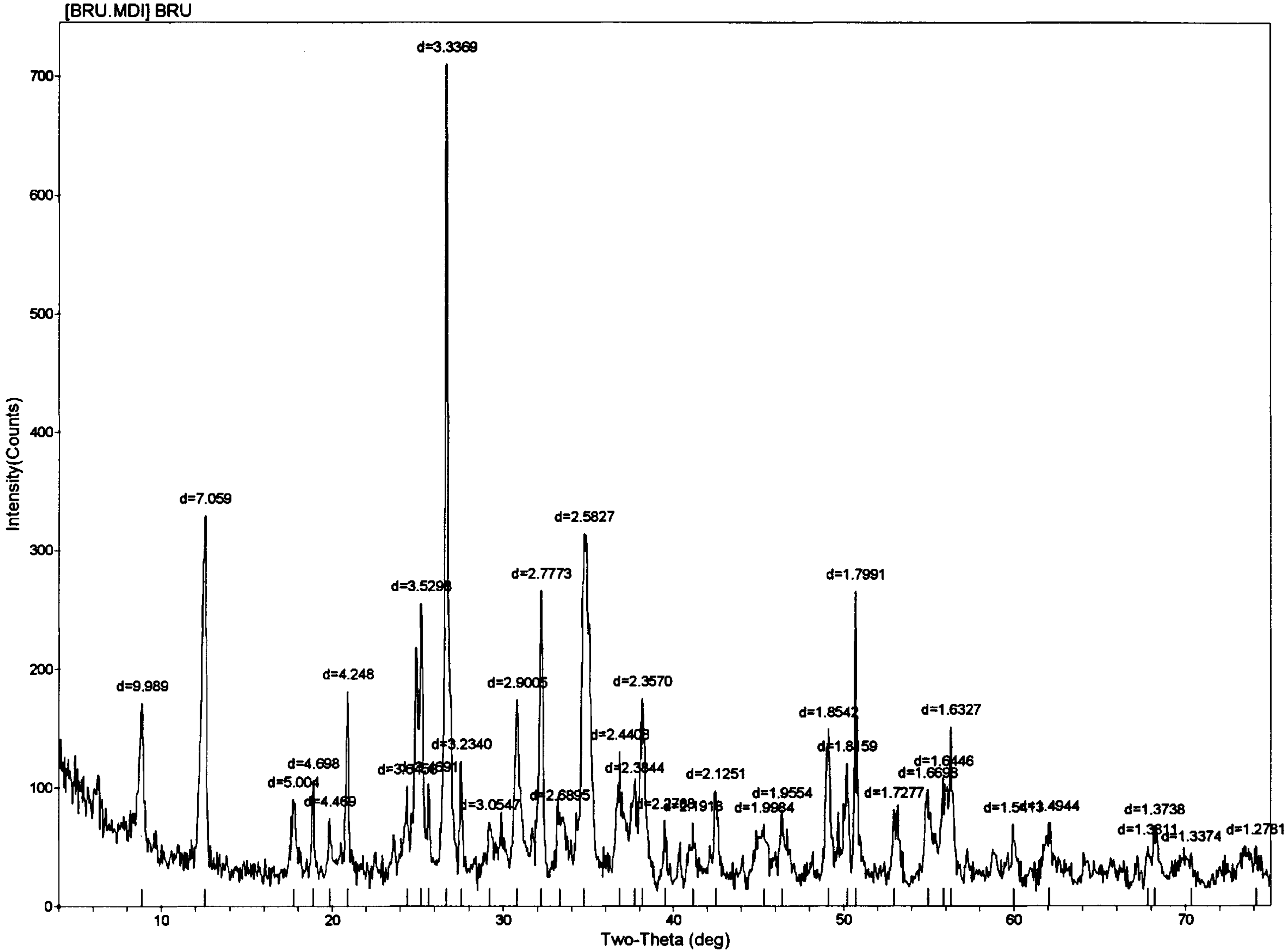


Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Wednesday, December 12, 2007 04:43p (MDI/JADE8

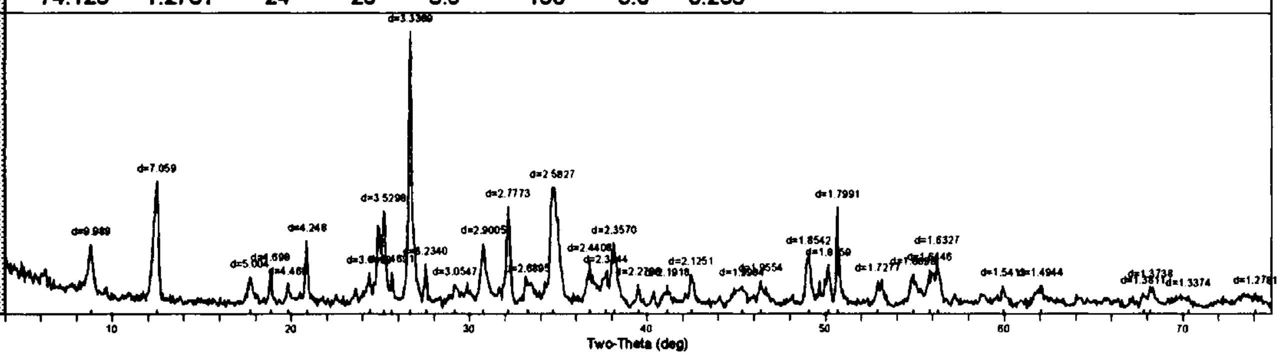
[BRU.MDI] BRU	Peak Search Report

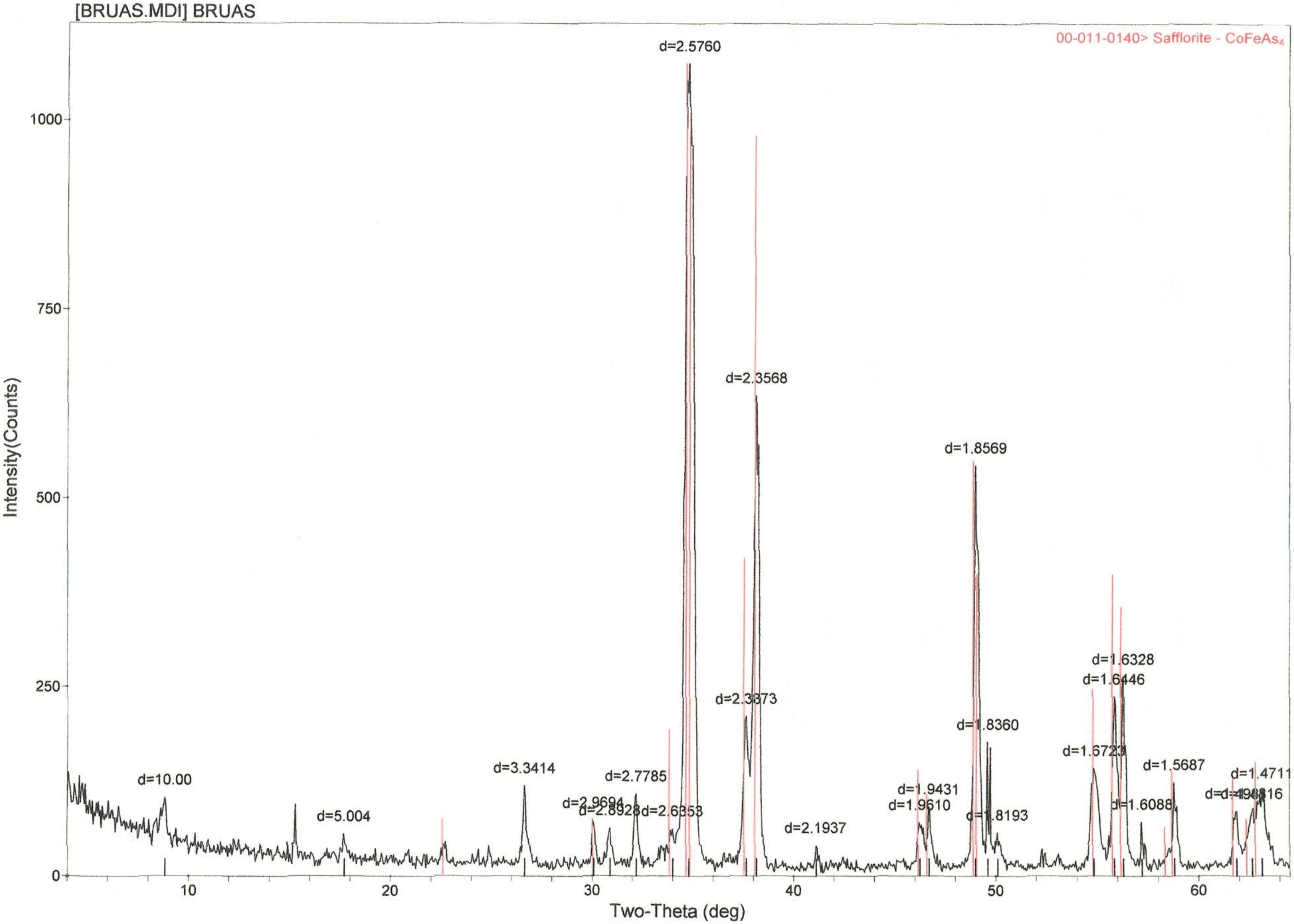
SCAN: 4.0/75.0/0.05/1(sec), Cu, I(max)=710.0, 12/07/07 01:14p

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	8.846	9.9887	42	129	19.4	1304	41.8	0.428
2	12.529	7.0594	36	293	43.9	1957	62.7	0.284
3	17.709	5.0042	30	60	8.9	370	11.9	0.264
4	18.872	4.6984	31	75	11.2	209	6.7	0.119
5	19.850	4.4691	35	39	5.8	82	2.6	0.090
6	20.897	4.2475	34	147	22.0	573	18.4	0.166
7	24.395	3.6458	42	59	8.9	215	6.9	0.154
8	25.210	3.5298	38	217	32.6	2144	68.7	0.419
9	25.659	3.4691	38	65	9.8	317	10.2	0.206
10	26.693	3.3369	44	666	100.0	3119	100.0	0.199
11	27.559	3.2340	29	93	14.0	361	11.6	0.165
12	29.212	3.0547	29	42	6.3	377	12.1	0.381
13	30.802	2.9005	48	126	18.9	668	21.4	0.225
14	32.204	2.7773	30	236	35.4	1245	39.9	0.225
15	33.287	2.6895	39	40	6.0	375	12.0	0.398
16	34.705	2.5827	42	272	40.8	2972	95.3	0.464
17	36.792	2.4408	37	93	14.0	748	24.0	0.341
18	37.695	2.3844	36	66	9.9	707	22.7	0.453
19	38.151	2.3570	19	156	23.4	1980	63.5	0.540
20	39.513	2.2788	21	51	7.6	206	6.6	0.172
21	41.152	2.1918	24	46	6.9	287	9.2	0.266
22	42.505	2.1251	31	66	9.9	337	10.8	0.217
23	45.344	1.9984	22	47	7.0	625	20.0	0.567
24	46.400	1.9554	23	58	8.7	666	21.4	0.487
25	49.094	1.8542	27	122	18.4	800	25.6	0.278
26	50.198	1.8159	52	68	10.2	257	8.2	0.160
27	50.703	1.7991	28	237	35.6	904	29.0	0.162
28	52.957	1.7277	24	57	8.5	467	15.0	0.351
29	54.943	1.6698	20	78	11.7	933	29.9	0.508
30	55.859	1.6446	27	81	12.2	1136	36.4	0.594
31	56.300	1.6327	28	123	18.4	1217	39.0	0.421
32	59.969	1.5413	26	43	6.4	237	7.6	0.235
33	62.057	1.4944	28	42	6.3	386	12.4	0.391
34	67.801	1.3811	26	24	3.6	384	12.3	0.681
35	68.208	1.3738	27	40	6.1	345	11.1	0.363
36	70.336	1.3374	19	25	3.7	438	14.0	0.749
37	74.125	1.2781	24	26	3.9	156	5.0	0.255





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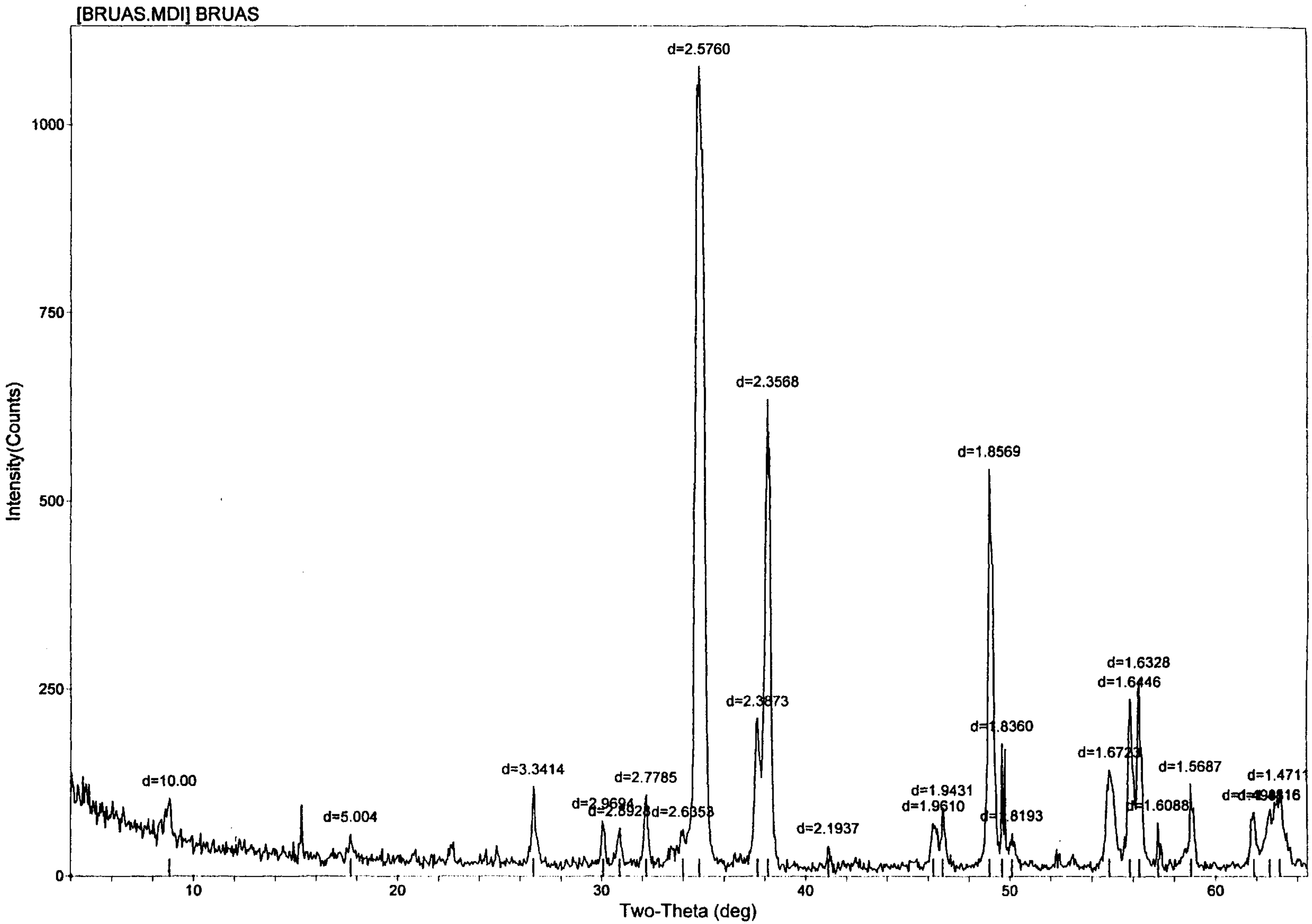
Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Monday, December 10, 2007 01:57p (MDI/JADE8)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500
750
1000
10
20
30
40
50
60

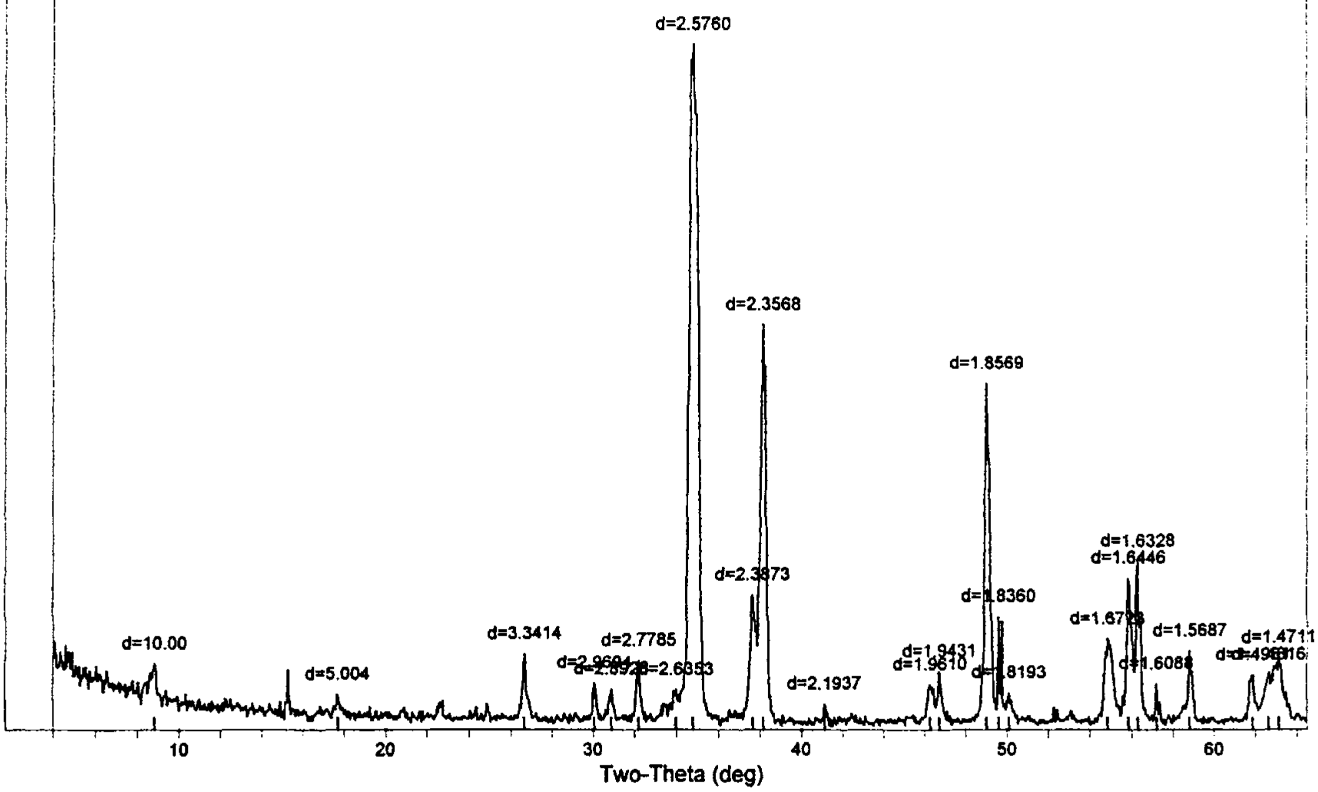
[BRUAS.MDI] BRUAS	Peak Search Report

SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=1077, 12/10/07 01:47p

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	8.834	10.0019	59	44	4.2	199	1.8	0.192
2	17.709	5.0043	26	29	2.7	60	0.5	0.089
3	26.657	3.3414	15	104	9.8	553	5.0	0.227
4	30.070	2.9694	17	56	5.3	218	2.0	0.166
5	30.887	2.8928	18	45	4.2	168	1.5	0.160
6	32.190	2.7785	18	90	8.5	390	3.6	0.184
7	33.991	2.6353	16	46	4.4	465	4.2	0.426
8	34.798	2.5760	20	1057	100.0	10959	100.0	0.441
9	37.649	2.3873	24	187	17.7	1991	18.2	0.452
10	38.155	2.3568	12	623	58.9	4715	43.0	0.322
11	41.114	2.1937	11	29	2.7	107	1.0	0.158
12	46.259	1.9610	13	57	5.4	550	5.0	0.409
13	46.711	1.9431	13	78	7.4	656	6.0	0.357
14	49.016	1.8569	13	530	50.2	3254	29.7	0.261
15	49.613	1.8360	19	158	14.9	390	3.6	0.105
16	50.100	1.8193	17	40	3.8	294	2.7	0.311
17	54.853	1.6723	11	131	12.4	1303	11.9	0.423
18	55.859	1.6446	18	219	20.7	1579	14.4	0.307
19	56.299	1.6328	31	232	22.0	1300	11.9	0.238
20	57.213	1.6088	18	53	5.0	121	1.1	0.097
21	58.819	1.5687	15	108	10.3	570	5.2	0.223
22	61.885	1.4981	16	69	6.6	425	3.9	0.261
23	62.652	1.4816	16	69	6.6	1913	17.5	1.174
24	63.150	1.4711	18	94	8.9	1542	14.1	0.697



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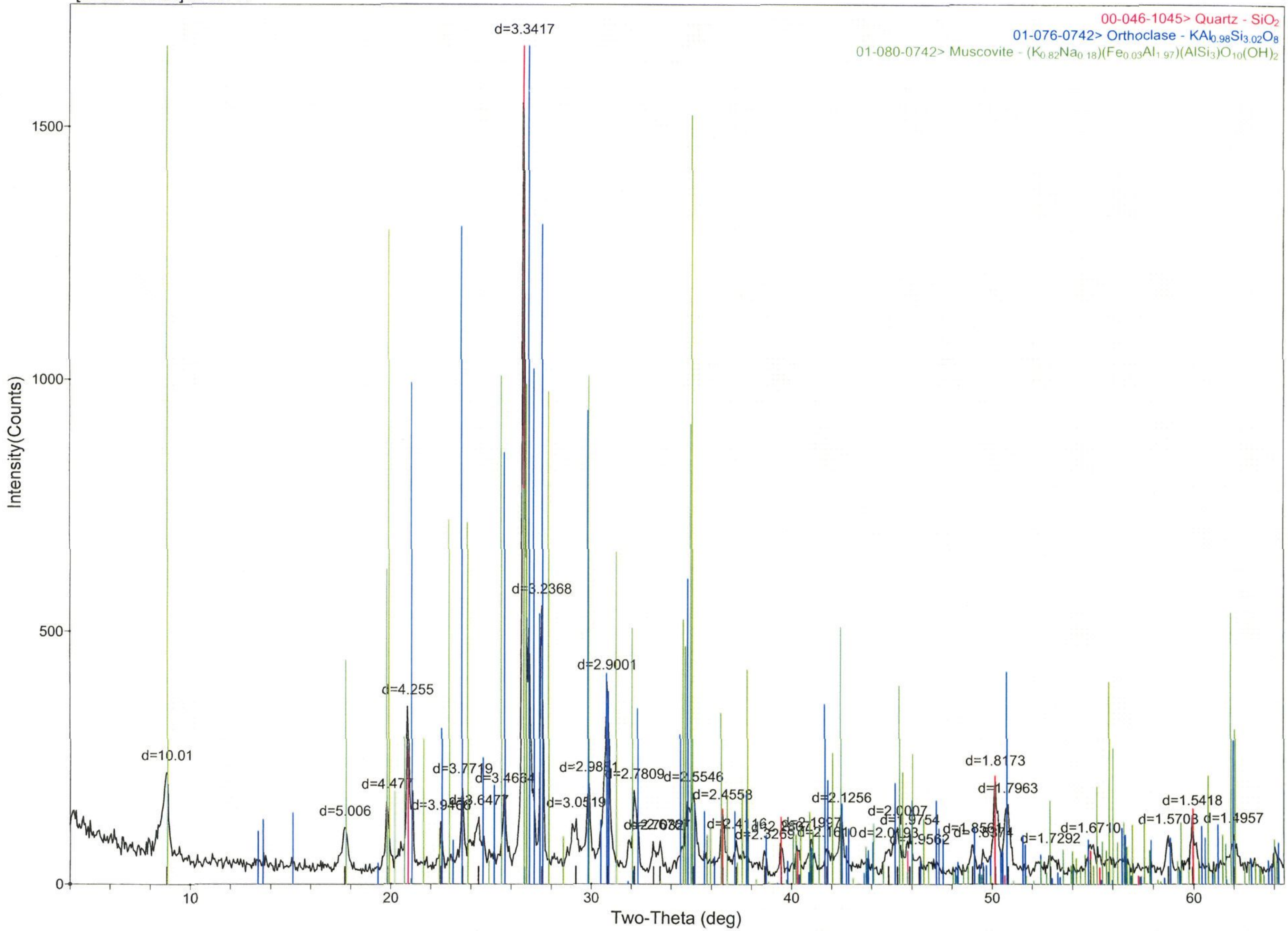
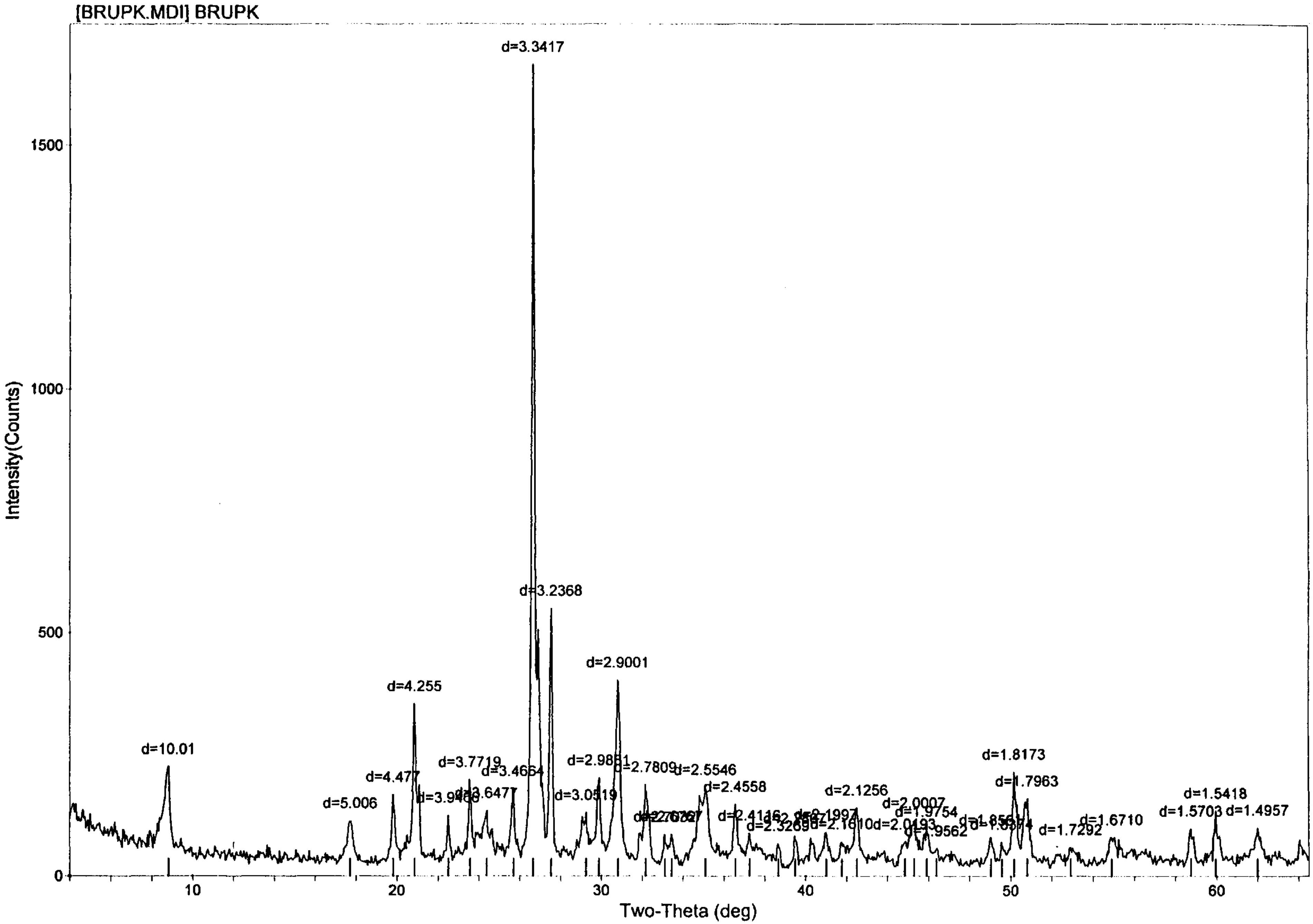
Materials Data, Inc. [XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Monday, December 10, 2007 01:59p (MDI/JADE8)

[BRUPK.MDI] BRUPK

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Two-Theta (deg)
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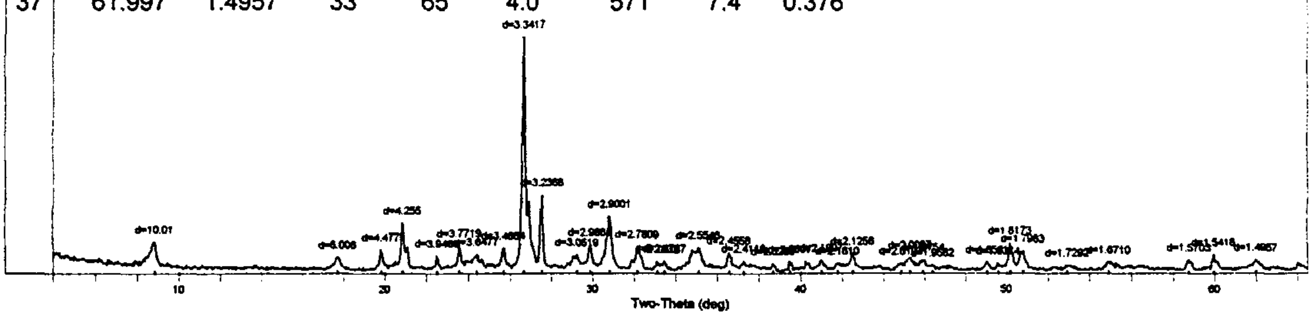
[BRUPK.MDI] BRUPK	Peak Search Report

SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=1663, 12/10/07 02:25p

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	8.826	10.0114	65	158	9.8	1162	15.0	0.313
2	17.705	5.0056	30	82	5.1	634	8.2	0.329
3	19.816	4.4768	30	136	8.5	637	8.2	0.199
4	20.858	4.2553	46	307	19.1	1533	19.8	0.212
5	22.511	3.9466	35	88	5.5	275	3.6	0.132
6	23.568	3.7719	53	143	8.9	386	5.0	0.115
7	24.382	3.6477	54	79	4.9	744	9.6	0.399
8	25.678	3.4664	55	123	7.7	456	5.9	0.157
9	26.654	3.3417	55	1608	100.0	7733	100.0	0.204
10	27.535	3.2368	45	505	31.4	1843	23.8	0.155
11	29.239	3.0519	52	77	4.8	633	8.2	0.351
12	29.877	2.9881	66	134	8.4	528	6.8	0.167
13	30.807	2.9001	56	346	21.5	1954	25.3	0.240
14	32.161	2.7809	35	151	9.4	945	12.2	0.266
15	33.113	2.7032	31	53	3.3	428	5.5	0.342
16	33.450	2.6767	30	55	3.4	428	5.5	0.329
17	35.099	2.5546	39	142	8.8	1747	22.6	0.524
18	36.560	2.4558	48	98	6.1	361	4.7	0.157
19	37.255	2.4116	51	36	2.2	182	2.3	0.214
20	38.664	2.3269	21	45	2.8	202	2.6	0.192
21	39.478	2.2807	20	61	3.8	227	2.9	0.159
22	40.997	2.1997	38	51	3.1	199	2.6	0.167
23	41.765	2.1610	41	29	1.8	210	2.7	0.308
24	42.494	2.1256	36	103	6.4	795	10.3	0.329
25	44.848	2.0193	26	43	2.7	626	8.1	0.613
26	45.290	2.0007	26	87	5.4	1520	19.7	0.739
27	45.902	1.9754	36	59	3.7	510	6.6	0.369
28	46.379	1.9562	31	25	1.6	274	3.5	0.460
29	49.039	1.8561	38	40	2.5	137	1.8	0.146
30	49.573	1.8374	29	40	2.5	261	3.4	0.275
31	50.158	1.8173	42	171	10.7	972	12.6	0.241
32	50.787	1.7963	27	131	8.2	1162	15.0	0.377
33	52.907	1.7292	26	32	2.0	393	5.1	0.517
34	54.901	1.6710	28	51	3.2	412	5.3	0.345
35	58.752	1.5703	30	66	4.1	305	3.9	0.196
36	59.949	1.5418	31	102	6.3	583	7.5	0.243
37	61.997	1.4957	33	65	4.0	571	7.4	0.376



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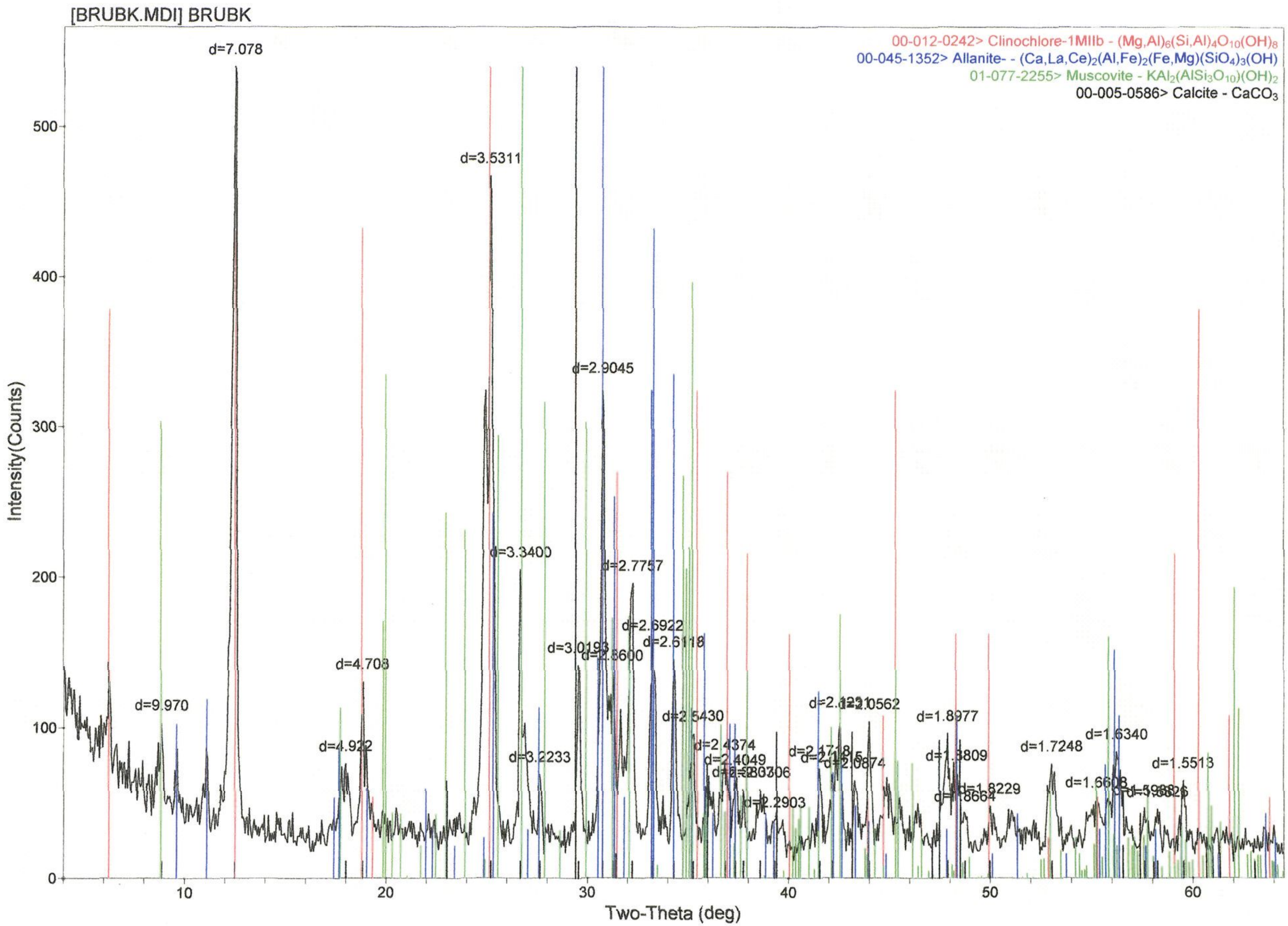
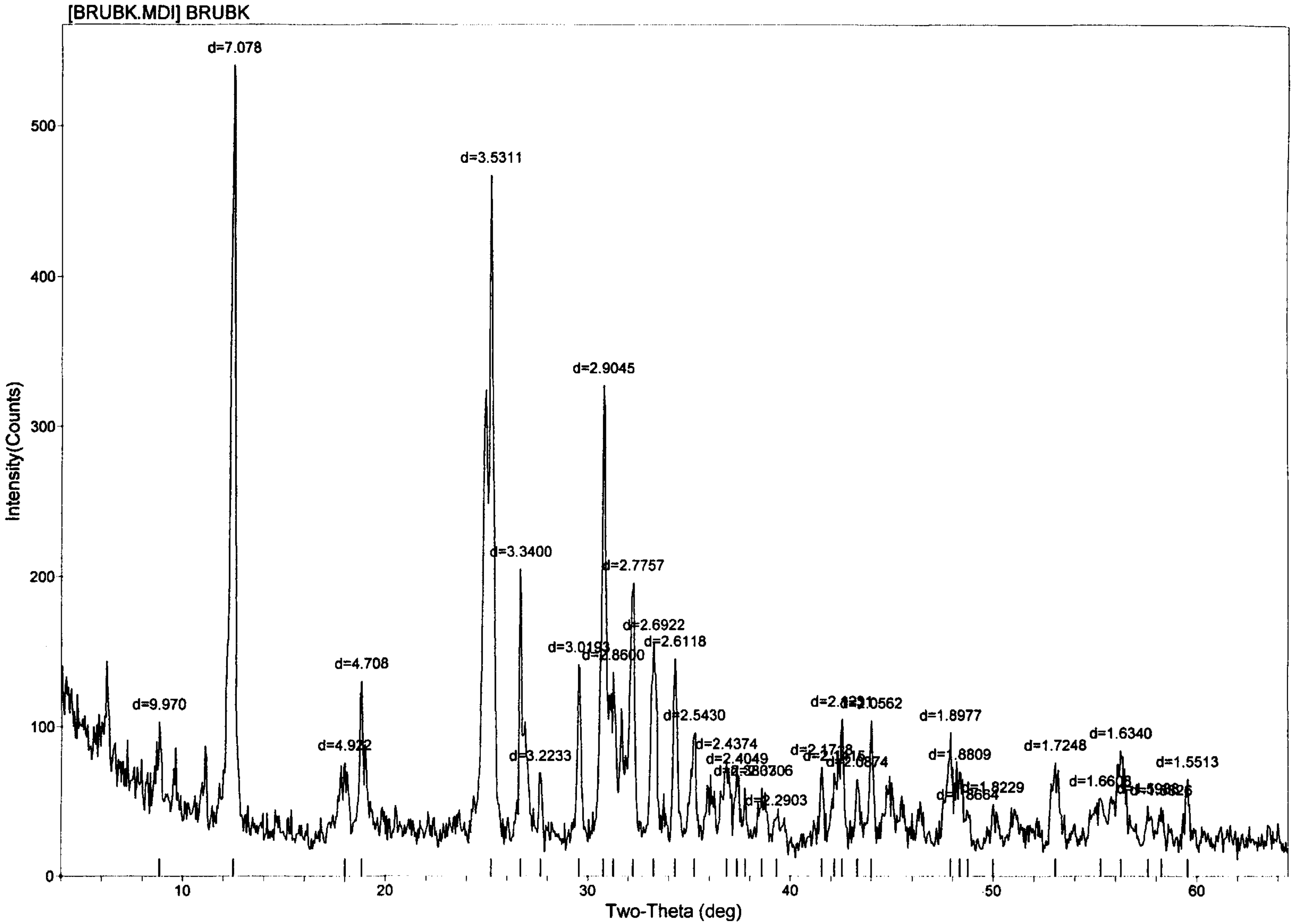


Materials Data, Inc.

[XRD]<C:\Documents and Settings\XRD Computer\MDI\DataScan\Controllers\Goniom1\data-2006> Monday, December 10, 2007 05:19p (MDI/JADE8)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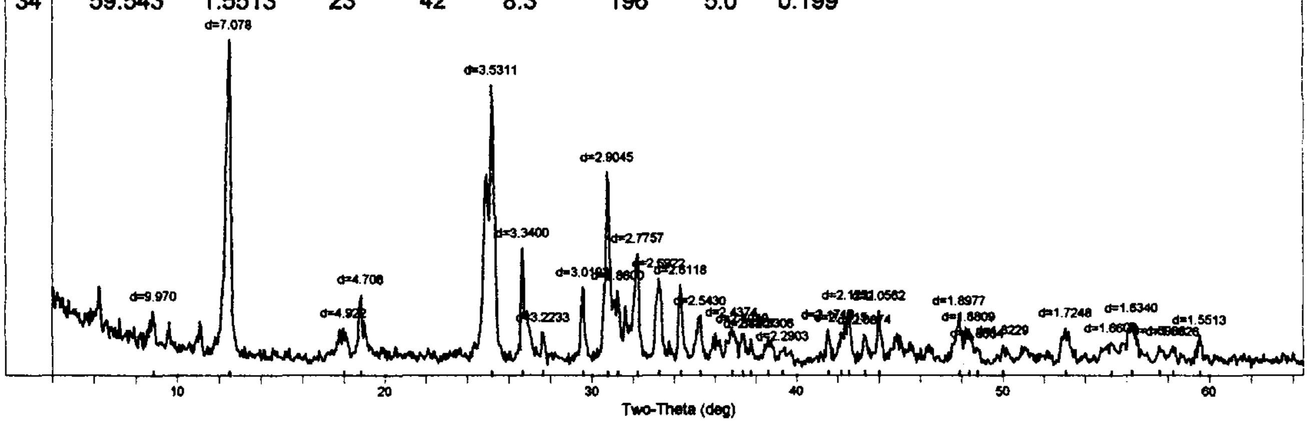
[BRUBK.MDI] BRUBK	Peak Search Report

SCAN: 4.0/64.5/0.05/1(sec), Cu, I(max)=540.0, 12/10/07 03:05p

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	8.862	9.9705	57	46	9.1	123	3.2	0.114
2	12.495	7.0783	37	503	100.0	3168	81.3	0.268
3	18.006	4.9224	37	39	7.7	330	8.5	0.363
4	18.834	4.7078	39	91	18.1	421	10.8	0.196
5	25.201	3.5311	32	435	86.4	3895	100.0	0.381
6	26.668	3.3400	37	168	33.5	695	17.9	0.175
7	27.652	3.2233	38	31	6.2	62	1.6	0.084
8	29.561	3.0193	28	113	22.4	494	12.7	0.186
9	30.759	2.9045	30	297	59.1	2388	61.3	0.341
10	31.249	2.8600	33	103	20.5	1124	28.9	0.463
11	32.224	2.7757	31	165	32.7	1355	34.8	0.350
12	33.251	2.6922	35	121	24.1	676	17.4	0.238
13	34.306	2.6118	37	108	21.5	431	11.1	0.169
14	35.265	2.5430	32	64	12.7	332	8.5	0.222
15	36.846	2.4374	46	31	6.1	132	3.4	0.183
16	37.362	2.4049	28	39	7.7	275	7.1	0.302
17	37.757	2.3807	28	31	6.1	275	7.1	0.381
18	38.599	2.3306	31	28	5.6	115	3.0	0.174
19	39.308	2.2903	19	20	4.0	265	6.8	0.555
20	41.548	2.1718	31	42	8.3	129	3.3	0.131
21	42.164	2.1415	32	37	7.4	490	12.6	0.556
22	42.547	2.1231	31	74	14.7	506	13.0	0.290
23	43.312	2.0874	33	32	6.4	106	2.7	0.139
24	44.001	2.0562	36	68	13.4	257	6.6	0.162
25	47.896	1.8977	26	70	14.0	877	22.5	0.529
26	48.351	1.8809	24	46	9.1	651	16.7	0.604
27	48.752	1.8664	22	21	4.2	126	3.2	0.253
28	49.994	1.8229	24	24	4.9	135	3.5	0.235
29	53.051	1.7248	26	50	10.0	383	9.8	0.323
30	55.265	1.6608	27	25	4.9	291	7.5	0.497
31	56.254	1.6340	22	62	12.2	804	20.7	0.555
32	57.607	1.5988	24	23	4.5	167	4.3	0.312
33	58.253	1.5826	23	23	4.6	286	7.3	0.520
34	59.543	1.5513	23	42	8.3	196	5.0	0.199



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AcmeLabs ACME ANALYTICAL LABORATORIES LTD.
852 E. Hastings St. Vancouver BC V6A 1R6 Canada
Phone (604) 253-3158 Fax (604) 253-1716
www.acmelab.com

Client: **B.N. Church Geological Services**
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Submitted By: B. Neil Church
Receiving Lab: Acme Analytical Laboratories (Vancouver) Ltd.
Received: November 19, 2007
Report Date: February 04, 2008
Page: 1 of 2

CERTIFICATE OF ANALYSIS VAN07002397.2

CLIENT JOB INFORMATION

Project: None Given
Shipment ID:
P.O. Number
Number of Samples: 20

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
Soil Pulverize	20	Soil Pulverize		
1EX	20	4 Acid digestion ICP-MS analysis	0.25	Completed
7TD	3	4 Acid digestion ICP-ES analysis.	0.5	Completed

ADDITIONAL COMMENTS

Version 2 to include 7TD analysis

Invoice To: B.N. Church Geological Services
600 Parkridge St.
Victoria BC V8Z 6N7
Canada

CC:

BRITISH COLUMBIA CERTIFIED ASSAYER
Raymond Chan

61

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Client: **B.N. Church Geological Services**
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

CERTIFICATE OF ANALYSIS VAN07002397.2

	Method	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX
	Analyte	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
	Unit	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	0.1	0.1	0.2	1	0.01	1	0.1	0.1	0.1	1	0.1	0.1	0.1	1	0.01	0.001
MM-1	Silt	2.3	78.8	12.9	135	0.2	94.2	27.1	1370	5.78	41	2.0	<0.1	6.3	174	0.5	3.0	0.2	171	3.19	0.073
MM-2	Silt	1.3	44.9	6.3	80	<0.1	64.5	21.5	831	4.59	22	10.1	<0.1	3.9	449	0.2	1.8	<0.1	149	3.86	0.087
MM-3	Silt	1.6	45.7	8.1	109	0.1	129.7	34.7	1289	7.24	105	2.9	<0.1	5.1	381	0.2	5.0	0.9	264	3.89	0.070
MM-4	Silt	1.3	42.4	8.1	102	<0.1	199.6	27.2	1066	5.11	22	1.6	<0.1	2.9	404	0.3	1.5	<0.1	170	2.22	0.084
MM-5	Silt	1.3	38.3	12.7	107	0.1	265.1	33.3	1131	5.78	83	2.2	0.3	5.0	297	0.3	1.8	0.3	174	2.77	0.079
MM-09	Silt	8.5	40.4	6.9	67	<0.1	121.8	1698	800	5.53	7354	33.5	1.7	7.3	258	0.2	11.0	7.3	168	1.75	0.101
MM-10	Silt	1.1	40.0	5.7	84	<0.1	60.1	23.0	1124	5.65	19	5.2	<0.1	3.6	471	0.2	0.8	<0.1	209	4.16	0.122
MM-11	Silt	1.9	15.9	11.5	53	<0.1	16.1	37.6	563	2.81	96	2.3	<0.1	4.0	630	0.1	0.5	0.3	65	2.57	0.070
MM-12	Silt	1.9	59.1	7.4	137	0.1	394.5	40.4	1333	6.22	6	1.5	<0.1	3.5	137	0.4	1.0	0.1	179	1.57	0.068
BRS-1A	Silt	2.3	83.5	11.2	132	0.1	118.6	29.2	1265	5.73	40	1.8	<0.1	5.2	173	0.6	3.1	0.2	172	2.95	0.073
BRS-2A	Silt	1.1	38.7	5.3	101	<0.1	108.9	29.1	1392	7.49	28	2.4	<0.1	2.6	428	0.1	1.9	<0.1	289	4.12	0.085
BRS-3	Silt	1.2	30.0	6.2	111	<0.1	221.7	25.8	1088	5.05	15	1.2	<0.1	2.5	354	0.4	1.7	<0.1	173	2.21	0.079
BRS-4	Silt	1.2	40.3	7.2	121	0.1	143.0	39.1	1361	7.05	93	1.4	<0.1	2.8	344	0.3	4.2	1.5	240	3.59	0.061
BRS-5	Silt	28.6	29.8	11.4	100	<0.1	426.5	2043	1106	6.07	3683	2.5	0.4	4.3	246	<0.1	6.3	2.1	173	2.51	0.066
BRS-10A	Silt	6.7	53.7	5.6	83	<0.1	62.3	24.2	1043	5.78	61	6.2	0.1	6.4	380	0.2	3.6	<0.1	204	3.04	0.069
BRS-12	Silt	1.6	59.2	6.2	135	<0.1	354.8	37.8	1340	6.09	5	1.3	<0.1	3.1	124	0.5	0.9	0.1	180	1.47	0.065
BREX	Silt	15.1	97.5	91.2	46	0.2	10.2	12.1	228	2.01	20	0.1	<0.1	0.1	33	0.2	1.6	10.1	37	0.49	0.007
BROAT	Silt	5.9	17.5	3.1	173	0.2	66.3	>4000	1018	23.75	>10000	8.8	24.9	4.3	26	<0.1	35.5	169.9	161	0.63	0.149
BRU	Silt	340.4	5.6	5.9	54	0.2	2459	>4000	435	12.99	>10000	2297	18.0	7.2	140	0.1	59.0	45.2	260	1.96	0.196
BRORE	Silt	938.0	11.9	7.9	34	0.3	4363	>4000	233	15.57	>10000	23.4	13.7	<0.1	23	0.1	176.7	68.4	189	0.44	0.008

Rock ?

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Client: B.N. Church Geological Services
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

CERTIFICATE OF ANALYSIS VAN07002397.2

	Method	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX
	Analyte	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb
	Unit	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
	MDL	0.1	1	0.01	1	0.001	0.01	0.001	0.01	0.1	0.1	1	0.1	0.1	0.1	0.1	1	1	0.1	0.1	0.1
MM-1	Silt	30.2	316	2.02	901	0.659	6.20	1.503	1.90	1.1	106.3	56	1.9	31.1	11.9	0.7	2	20	39.1	<0.1	64.7
MM-2	Silt	10.4	76	2.09	424	0.466	7.55	2.292	0.81	1.5	15.2	21	0.7	15.3	2.6	0.2	<1	17	21.8	<0.1	27.3
MM-3	Silt	15.1	368	3.43	445	0.830	6.14	1.586	0.89	4.4	45.9	29	1.5	14.0	6.9	0.4	<1	21	25.4	<0.1	32.7
MM-4	Silt	15.5	334	2.83	435	0.580	7.54	2.172	0.88	0.7	42.0	30	0.9	19.5	5.7	0.3	<1	19	36.6	<0.1	28.6
MM-5	Silt	24.0	986	3.30	438	0.595	6.02	1.974	0.77	16.3	45.2	47	1.4	20.6	7.5	0.5	<1	18	19.8	<0.1	23.5
MM-09	Silt	599.7	61	1.20	551	0.395	7.39	1.182	1.75	9.6	19.0	977	1.3	25.4	2.8	0.2	<1	14	229.6	0.2	49.1
MM-10	Silt	14.3	78	2.37	386	0.582	7.87	2.479	0.73	1.5	18.9	30	0.8	23.5	3.1	0.2	<1	22	13.8	<0.1	20.5
MM-11	Silt	23.9	21	0.95	583	0.348	8.61	3.018	1.60	0.9	69.3	39	1.2	10.2	5.4	0.4	1	8	21.6	<0.1	36.2
MM-12	Silt	18.0	1757	4.30	1603	0.654	5.41	1.245	1.19	1.0	93.5	36	1.4	20.4	11.3	0.6	1	18	31.2	<0.1	42.3
BRS-1A	Silt	26.0	183	2.40	914	0.625	6.37	1.472	1.91	1.2	86.3	49	1.8	22.9	11.3	0.6	2	21	45.6	<0.1	66.0
BRS-2A	Silt	12.6	215	2.71	371	0.918	7.20	2.239	0.72	1.7	23.0	27	1.0	22.3	4.5	0.3	<1	25	15.9	<0.1	19.9
BRS-3	Silt	13.5	569	3.50	464	0.557	7.93	2.128	0.98	0.8	47.2	27	1.2	18.9	5.1	0.3	<1	20	36.6	<0.1	29.1
BRS-4	Silt	13.0	343	4.43	444	0.750	6.03	1.478	0.79	2.2	39.9	26	1.2	14.3	6.9	0.4	<1	24	25.3	<0.1	29.8
BRS-5	Silt	26.4	1882	4.34	346	0.529	5.98	1.875	0.69	6.1	26.8	52	11.6	20.5	7.5	0.5	<1	17	20.1	0.4	18.1
BRS-10A	Silt	14.6	86	1.94	402	0.726	7.46	1.887	0.88	6.5	18.9	31	1.0	21.2	4.2	0.3	<1	21	49.6	<0.1	28.8
BRS-12	Silt	16.3	1498	4.46	1214	0.581	5.54	1.190	1.31	0.7	77.9	32	1.4	18.7	9.2	0.5	1	18	28.8	<0.1	43.8
BREX	Silt	0.7	11	0.29	18	0.078	1.31	0.254	0.11	22.6	2.5	2	0.6	2.4	0.1	<0.1	<1	4	7.3	0.5	6.0
BROAT	Silt	290.1	30	2.19	63	0.185	5.12	0.012	0.54	28.6	17.2	403	0.7	20.1	2.9	0.1	<1	8	60.9	4.3	26.3
BRU	Silt	>2000	23	0.65	102	0.131	3.84	0.037	1.57	3.3	22.6	>2000	1.3	172.4	1.6	<0.1	<1	17	16.6	2.1	42.5
BRORE	Silt	119.5	2	0.32	14	0.009	0.96	0.003	0.07	1.1	1.0	151	0.1	7.5	0.2	<0.1	<1	7	19.5	>10	2.5

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600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

CERTIFICATE OF ANALYSIS VAN07002397.2

Method		1EX	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD
Analyte		Hf	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	Sr	Cd	Sb	Bi	Ca	P	Cr	Mg	Al
Unit		ppm	%	%	%	%	GM/T	%	%	%	%	%	%	%	%	%	%	%	%	%	%
MDL		0.1	0.001	0.001	0.02	0.01	2	0.001	0.001	0.01	0.01	0.02	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	0.01
MM-1	Silt	3.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-2	Silt	0.7	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-3	Silt	1.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-4	Silt	1.3	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-5	Silt	1.6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-09	Silt	0.9	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-10	Silt	1.1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-11	Silt	1.8	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
MM-12	Silt	2.5	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-1A	Silt	2.9	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-2A	Silt	0.9	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-3	Silt	1.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-4	Silt	1.3	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-5	Silt	1.1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-10A	Silt	0.8	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BRS-12	Silt	2.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BREX	Silt	0.1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BROAT	Silt	0.8	<0.001	0.002	<0.02	0.02	<2	0.007	0.949	0.11	26.92	5.01	<0.01	<0.001	<0.01	0.02	0.74	0.17	0.005	2.51	5.94
BRU	Silt	0.8	0.036	<0.001	<0.02	<0.01	<2	0.280	4.003	0.05	14.69	14.47	0.02	<0.001	<0.01	<0.01	2.21	0.24	0.013	0.69	4.48
BRORE	Silt	<0.1	0.107	0.002	<0.02	<0.01	<2	0.566	11.43	0.03	18.18	11.24	<0.01	<0.001	0.02	<0.01	0.54	0.01	0.001	0.33	1.12

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Client: **B.N. Church Geological Services**
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

CERTIFICATE OF ANALYSIS VAN07002397.2

	Method	7TD	7TD	7TD
	Analyte	Na	K	W
	Unit	%	%	%
	MDL	0.01	0.01	0.01
MM-1	Silt	N.A.	N.A.	N.A.
MM-2	Silt	N.A.	N.A.	N.A.
MM-3	Silt	N.A.	N.A.	N.A.
MM-4	Silt	N.A.	N.A.	N.A.
MM-5	Silt	N.A.	N.A.	N.A.
MM-09	Silt	N.A.	N.A.	N.A.
MM-10	Silt	N.A.	N.A.	N.A.
MM-11	Silt	N.A.	N.A.	N.A.
MM-12	Silt	N.A.	N.A.	N.A.
BRS-1A	Silt	N.A.	N.A.	N.A.
BRS-2A	Silt	N.A.	N.A.	N.A.
BRS-3	Silt	N.A.	N.A.	N.A.
BRS-4	Silt	N.A.	N.A.	N.A.
BRS-5	Silt	N.A.	N.A.	N.A.
BRS-10A	Silt	N.A.	N.A.	N.A.
BRS-12	Silt	N.A.	N.A.	N.A.
BREX	Silt	N.A.	N.A.	N.A.
BROAT	Silt	0.02	0.58	<0.01
BRU	Silt	0.05	1.63	<0.01
BRORE	Silt	<0.01	0.07	<0.01

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Client: **B.N. Church Geological Services**
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

QUALITY CONTROL REPORT VAN07002397.2

	Method	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX
	Analyte	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
	Unit	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	0.1	0.1	0.2	1	0.01	1	0.1	0.1	0.1	1	0.1	0.1	0.1	1	0.01	0.001
Pulp Duplicates																					
MM-3	Silt	1.6	45.7	8.1	109	0.1	129.7	34.7	1289	7.24	105	2.9	<0.1	5.1	381	0.2	5.0	0.9	264	3.89	0.070
REP MM-3	QC	1.4	48.8	9.1	110	<0.1	127.1	35.3	1202	6.83	108	3.0	<0.1	4.4	404	0.2	5.0	0.9	251	3.68	0.081
Reference Materials																					
STD DST6	Standard	11.5	120.3	33.4	155	0.5	31.0	13.3	896	3.64	44	7.7	<0.1	6.7	292	6.1	5.5	4.9	101	2.02	0.091
STD DST6	Standard	11.9	122.1	30.8	153	0.4	31.0	13.5	896	3.68	47	7.0	<0.1	6.3	291	5.8	4.9	4.6	109	1.97	0.091
STD DST6	Standard	12.7	128.4	38.2	175	0.3	32.4	13.8	936	3.81	25	9.0	<0.1	8.2	337	7.5	6.1	5.8	103	2.08	0.092
STD DST6	Standard	12.3	148.8	38.8	188	0.3	35.6	15.7	967	4.03	28	8.9	<0.1	8.2	335	8.1	6.4	6.2	115	2.14	0.097
STD R3T	Standard																				
STD R3T	Standard																				
STD DST6 Expected		12.7	129.7	36.7	176	0.365	30.4	13.7	980	3.91	24.3	7.8	0	6.9	298	5.6	5.39	4.7	115	2.26	0.099
STD R3T Expected																					
BLK	Blank	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<1	<0.01	12	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<1	<0.01	<0.001
BLK	Blank	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.2	<1	<0.01	<1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<1	<0.01	<0.001
BLK	Blank																				
Prep Wash																					
G1	Prep Blank	1.6	3.7	22.8	60	<0.1	6.0	5.7	762	2.44	<1	3.5	<0.1	8.4	858	<0.1	<0.1	0.3	44	2.48	0.086
G1	Prep Blank	1.6	3.2	22.7	58	<0.1	5.4	5.3	790	2.44	<1	3.7	<0.1	9.4	829	<0.1	<0.1	0.3	54	2.63	0.083

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Client: B.N. Church Geological Services
600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

QUALITY CONTROL REPORT VAN07002397.2

	Method	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX	1EX
	Analyte	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb
	Unit	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
	MDL	0.1	1	0.01	1	0.001	0.01	0.001	0.01	0.1	0.1	1	0.1	0.1	0.1	0.1	1	1	0.1	0.1	0.1
Pulp Duplicates																					
MM-3	Silt	15.1	368	3.43	445	0.830	6.14	1.586	0.89	4.4	45.9	29	1.5	14.0	6.9	0.4	<1	21	25.4	<0.1	32.7
REP MM-3	QC	15.4	365	3.58	441	0.817	6.35	1.680	0.84	5.4	46.6	29	1.5	15.1	7.8	0.5	1	20	28.8	<0.1	35.0
Reference Materials																					
STD DST6	Standard	24.2	223	1.06	610	0.360	6.77	1.722	1.43	7.8	88.0	51	6.3	14.5	8.0	0.4	3	10	25.0	<0.1	59.6
STD DST6	Standard	23.4	221	0.99	596	0.365	6.73	1.636	1.39	7.6	55.7	48	5.6	14.0	7.6	0.4	3	10	25.3	<0.1	62.5
STD DST6	Standard	27.5	232	1.01	699	0.412	6.88	1.661	1.47	8.1	69.1	55	7.2	18.5	8.2	0.4	3	11	27.6	<0.1	63.8
STD DST6	Standard	29.3	217	1.05	684	0.401	6.97	1.740	1.59	8.0	68.6	56	6.8	16.3	7.8	0.5	2	12	29.9	<0.1	68.1
STD R3T	Standard																				
STD R3T	Standard																				
STD DST6 Expected		25.7	230	1.03	702	0.387	6.92	1.673	1.42	7.4	50.1	52	6.3	15.2	8.11	0.6	3.3	10.1	25.4		61.2
STD R3T Expected																					
BLK	Blank	<0.1	<1	<0.01	<1	<0.001	<0.01	<0.001	<0.01	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1
BLK	Blank	<0.1	<1	<0.01	<1	<0.001	<0.01	<0.001	<0.01	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.1	<0.1	<0.1
BLK	Blank																				
Prep Wash																					
G1	Prep Blank	28.7	28	0.67	970	0.265	8.06	2.610	3.04	1.5	8.6	52	1.5	14.6	17.3	1.1	2	5	41.9	<0.1	124.9
G1	Prep Blank	29.1	28	0.72	986	0.282	8.57	2.707	3.15	1.4	10.8	53	1.4	14.4	18.2	1.0	2	5	39.9	<0.1	131.2

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600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

QUALITY CONTROL REPORT VAN07002397.2

	Method	1EX	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD	7TD
	Analyte	Hf	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	Sr	Cd	Sb	Bi	Ca	P	Cr	Mg	Al
	Unit	ppm	%	%	%	%	GM/T	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	MDL	0.1	0.001	0.001	0.02	0.01	2	0.001	0.001	0.01	0.01	0.02	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	0.01
Pulp Duplicates																					
MM-3	Silt	1.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
REP MM-3	QC	1.5																			
Reference Materials																					
STD DST6	Standard	1.7																			
STD DST6	Standard	1.7																			
STD DST6	Standard	1.9																			
STD DST6	Standard	1.9																			
STD R3T	Standard		0.077	0.811	1.99	4.10	194	0.565	0.062	0.09	33.88	0.04	<0.01	0.023	0.04	<0.01	2.22	0.05	0.020	1.67	2.44
STD R3T	Standard		0.077	0.803	1.97	4.07	194	0.546	0.060	0.09	33.48	<0.02	<0.01	0.023	0.04	<0.01	2.21	0.05	0.019	1.65	2.41
STD DST6 Expected		1.8																			
STD R3T Expected			0.077	0.805	1.98	4.1	190	0.525	0.061	0.09	34.17	0.04	0.01	0.024	0.04		2.23	0.05	0.02	1.64	2.44
BLK	Blank	<0.1																			
BLK	Blank	<0.1																			
BLK	Blank		<0.001	<0.001	<0.02	<0.01	<2	<0.001	<0.001	<0.01	<0.01	<0.02	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01
Prep Wash																					
G1	Prep Blank	0.6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
G1	Prep Blank	0.7	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

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600 Parkridge St.
Victoria BC V8Z 6N7 Canada

Project: None Given
Report Date: February 04, 2008

QUALITY CONTROL REPORT VAN07002397.2

	Method	7TD	7TD	7TD
	Analyte	Na	K	W
	Unit	%	%	%
	MDL	0.01	0.01	0.01
Pulp Duplicates				
MM-3	Silt	N.A.	N.A.	N.A.
REP MM-3	QC			
Reference Materials				
STD DST6	Standard			
STD DST6	Standard			
STD DST6	Standard			
STD DST6	Standard			
STD R3T	Standard	0.33	0.59	<0.01
STD R3T	Standard	0.32	0.59	<0.01
STD DST6 Expected				
STD R3T Expected		0.31	0.59	
BLK	Blank			
BLK	Blank			
BLK	Blank	<0.01	<0.01	<0.01
Prep Wash				
G1	Prep Blank	N.A.	N.A.	N.A.
G1	Prep Blank	N.A.	N.A.	N.A.

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Geochemical 4-Acid Digestion

Groups 1E & 1EX ICP-ES & ICP-MS

Combines a strong 4-acid digestion that dissolves most minerals with a choice of either ICP-ES or ICP-MS analysis and you get highly cost-effective near-total determinations with *low to very low detection limits.*

A 0.25 g split is heated in HNO_3-$HClO_4$-HF to fuming and taken to dryness. The residue is dissolved in HCl. Solutions are analysed by your choice of ICP-ES (Group 1E) or ICP-MS (Group 1EX).

Requires minimum 1 g sample pulp.

Group 1E	Cdn	U.S.
35 elements	$11.00	$9.70

Group 1EX	Cdn	U.S.
41 elements	$15.60	$13.75

	Group 1E Detection	Group 1EX Detection	Upper Limit
Ag	0.5 ppm	0.1 ppm	200 ppm
Al*	0.01 %	0.01 %	20 %
As‡	5 ppm	1 ppm	10000 ppm
Au‡	4 ppm	0.1 ppm	200 ppm
Ba*	1 ppm	1 ppm	10000 ppm
Be*	1 ppm	1 ppm	1000 ppm
Bi	5 ppm	0.1 ppm	4000 ppm
Ca	0.01 %	0.01 %	40 %
Cd	0.4 ppm	0.1 ppm	4000 ppm
Ce	–	1 ppm	2000 ppm
Co	2 ppm	0.2 ppm	4000 ppm
Cr‡	2 ppm	1 ppm	10000 ppm
Cu	2 ppm	0.1 ppm	10000 ppm
Fe*	0.01 %	0.01 %	60 %
Hf*	–	0.1 ppm	1000 ppm
K	0.01 %	0.01 %	10 %
La	2 ppm	0.1 ppm	2000 ppm
Li	–	0.1 ppm	2000 ppm
Mg*	0.01 %	0.01 %	30 %
Mn*	5 ppm	1 ppm	10000 ppm
Mo	2 ppm	0.1 ppm	4000 ppm
Na	0.01 %	0.001 %	10 %
Nb	2 ppm	0.1 ppm	2000 ppm
Ni	2 ppm	0.1 ppm	10000 ppm
P	0.002 %	0.001 %	5 %
Pb	5 ppm	0.1 ppm	10000 ppm
Rb	–	0.1 ppm	2000 ppm
S	–	0.1 %	10 %
Sb‡	5 ppm	0.1 ppm	4000 ppm
Sc	1 ppm	1 ppm	200 ppm
Sn*	2 ppm	0.1 ppm	2000 ppm
Sr	2 ppm	1 ppm	10000 ppm
Ta*	–	0.1 ppm	2000 ppm
Th	2 ppm	0.1 ppm	4000 ppm
Ti	0.01 %	0.001 %	10 %
U	20 ppm	0.1 ppm	4000 ppm
V	2 ppm	1 ppm	10000 ppm
W*	4 ppm	0.1 ppm	200 ppm
Y	2 ppm	0.1 ppm	2000 ppm
Zn	2 ppm	1 ppm	10000 ppm
Zr*	2 ppm	0.1 ppm	2000 ppm

*The digestion is only partial for some Cr and Ba minerals and some oxides of Al, Hf, Mn, Sn, Ta, Zr.

‡Volatilization during fuming may result in some loss of As, Sb and Au.

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Assays
Multi-Element

Group 7
ICP & ICP-MS

The following multi-element assays provide optimum precision and accuracy for high-grade rock and drill core samples with a selection of digestion methods to best suit the ore type.

Groups 7AR, 7TD and 7PF report %-level concentrations as determined by ICP emission spectrometry.

Two new packages (Groups 7AX and 7TX) combine both ICP emission spectrometry and ICP mass spectrometry analysis to extend the lower detection limits and provide a broader spectrum of elements.

Group 7KP will provide total values for select elements.

Sample minimum 1 g pulp.

Group 7AR	Cdn	U.S.
Any element	$10.10	$8.90
Full Suite	$12.40	$10.95
Group 7AX	$18.20	$16.00

Group 7TD	Cdn	U.S.
Any element	$11.85	$10.40
Full Suite	$15.30	$13.45
Group 7TX	$22.20	$19.50

Group 7PF	Cdn	U.S.
Any element	$17.30	$15.25
Full Suite	$23.00	$20.30

Group 7KP	Cdn	U.S.
Any element	*$11.85*	*$10.40*

Group 7AR
Hot Aqua Regia digestion on a 1 g split for base-metal sulphide and precious-metal ores. ICP-ES analysis.

Group 7AX
Same digestion as 7AR above but includes ICP-ES and ICP-MS analysis.

Group 7TD
Hot 4-Acid digestion on a 0.5 g split for sulphide and silicate ores. ICP-ES analysis.

Group 7TX
Same digestion as 7TD above but includes ICP-ES and ICP-MS analysis.

Group 7PF
Sodium peroxide fusion on 0.25 g for refractory-mineral ores.

Group 7KP
Phosphoric acid digestion for select elements.

	G7AR Det. Lim.	G7AX Det. Lim.	G7TD Det. Lim.	G7TX Det. Lim.	G7PF Det. Lim.	G7KP Det. Lim.
Ag	2 g/t	0.5 ppm	2 g/t	0.5 ppm	–	–
Al	0.01 %	0.01 %	0.01 %	0.01 %	–	–
As	0.01 %	5 ppm	0.02 %	5 ppm	–	–
B	–	–	–	–	0.01 %	–
Ba	–	5 ppm	–	5 ppm	–	–
Be	–	–	–	5 ppm	–	–
Bi	0.01 %	0.5 ppm	0.01 %	0.5 ppm	–	–
Ca	0.01 %	0.01 %	0.01 %	0.01 %	–	–
Cd	0.001 %	0.5 ppm	0.001 %	0.5 ppm	–	–
Ce	–	–	–	5 ppm	–	–
Co	0.001 %	0.5 ppm	0.001 %	1 ppm	–	–
Cr	0.001 %	0.5 ppm	0.001 %	1 ppm	0.01 %	–
Cu	0.001 %	0.5 ppm	0.001 %	0.5 ppm	0.01 %	–
Fe	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	–
Ga	–	5 ppm	–	–	–	–
Hf	–	–	–	0.5 ppm	–	–
Hg	0.001 %	0.05 ppm	–	–	–	–
K	0.01 %	0.01 %	0.01 %	0.01 %	–	–
La	–	0.5 ppm	–	0.5 ppm	–	–
Li	–	–	–	0.5 ppm	–	–
Mg	0.01 %	0.01 %	0.01 %	0.01 %	–	–
Mn	0.01 %	5 ppm	0.01 %	5 ppm	–	–
Mo	0.001 %	0.5 ppm	0.001 %	0.5 ppm	–	0.001 %
Na	0.01 %	0.01 %	0.01 %	0.01 %	–	–
Nb	–	–	–	0.5 ppm	0.01 %	0.001 %
Ni	0.001 %	0.5 ppm	0.001 %	0.5 ppm	0.01 %	–
P	0.001 %	0.001 %	0.01 %	0.01 %	–	–
Pb	0.01 %	0.5 ppm	0.02 %	0.5 ppm	–	–
Rb	–	–	–	0.5 ppm	–	–
S	–	0.5 %	–	0.5 %	–	–
Sb	0.001 %	0.5 ppm	0.01 %	0.5 ppm	–	–
Sc	–	0.5 ppm	–	1 ppm	–	–
Se	–	2 ppm	–	–	–	–
Sn	–	–	–	0.5 ppm	0.01 %	–
Sr	0.001 %	5 ppm	0.01 %	5 ppm	–	–
Ta	–	–	–	0.5 ppm	0.01 %	0.001 %
Th	–	0.5 ppm	–	0.5 ppm	–	–
Ti	–	0.001 %	–	0.001 %	–	–
Tl	–	0.5 ppm	–	–	–	–
U	–	0.5 ppm	–	0.5 ppm	–	0.001 %
V	–	10 ppm	–	10 ppm	–	–
W	0.001 %	0.5 ppm	0.01 %	0.5 ppm	0.01 %	0.01 %
Y	–	–	–	0.5 ppm	–	–
Zn	0.01 %	5 ppm	0.01 %	5 ppm	0.01 %	–
Zr	–	–	–	0.5 ppm	–	–

Note: Highlights in table indicate partial digestion if refractory minerals are present.

Appendix C

Mines Branch Investigations

Industrial Confidential

Mines Branch Investigation Report IR 58-89

MINERALOGICAL REPORT ON A GOLD-URANIUM ORE FROM THE NORTHERN GEM MINING CORP. LTD., MINTO, B. C.-- Reference No. 2/58-5

by

M. R. Hughson*

ABSTRACT

Widely scattered grains of uraninite are present in a siliceous gold ore from Minto, British Columbia. The uraninite grains are usually about 1/10 mm or less in diameter. Arsenic and cobalt minerals are abundant. Siderite is the most common carbonate present.

* Scientific Officer, Radioactivity Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

INTRODUCTION

A 500 lb sample of lump rock was received from the Northern Gem Mining Corporation Limited on February 6, 1958. The sample was reported to be a composite of high-grade, medium-grade, and disseminated ore from three levels of the underground workings at the company's property near Minto, B. C.

In a letter, dated December 6, 1957, from the president of the company, Mr. A.R. Allen, 422 Standard Building, 510 West Hastings Street, Vancouver 2, B. C., it was requested the Mines Branch undertake metallurgical tests for the extraction of cobalt, uranium and gold.

This report describes the mineralogical investigation only, the ore dressing tests being covered later in another report. Representative hand specimens and a minus ten mesh head sample were used for the mineralogical investigation.

CHEMICAL ANALYSES

The results of chemical assays (R.D. -4161) of a head sample are shown below in Table 1.

TABLE 1

U_3O_8	0.070%
ThO_2	<0.01%
Co	2.57%
Ni	0.119%
Fe	15.55%
Cu	0.03%
Mo	0.015%
Pb	<0.002%
As	24.1%
S(total)	4.37%
CO_2(evolution)	4.39%
P_2O_5	0.16%
Au	0.98 oz/ton
Ag	0.08 oz/ton

ROCK COMPOSITION

This sample consists of highly mineralized rock, chiefly siliceous, but in some specimens the gangue is a ferruginous carbonate. The specific gravity of a minus ten mesh head sample is 3.81. Table 2 summarizes the mineral composition in a sized fraction of the ore.

TABLE 2

Gravity Separation of the Minus 100 Plus 150 Mesh Fraction of a Head Sample

Specific Gravity	Weight Percent	Minerals
<2.96	32	Chiefly feldspar, plus quartz, chlorite, calcite, dolomite and minor siderite.
2.96 to 3.40	20	Biotite, chlorite and siderite, plus traces of arsenopyrite, safflorite and allanite.
>3.40	48	Chiefly arsenides and sulpharsenides, plus minor allanite, siderite, biotite, and traces of uraninite, native gold and anatase.

The sample contains both light-and dark-coloured rock. Some of the dark-coloured rock consists of medium-grained biotite and chlorite with abundant arsenopyrite, safflorite and other arsenides and sulpharsenides. Minor amounts of feldspars are present, as well as small amounts of calcite and dolomite. In a finer-grained, schist-like, greenish-black specimen the biotite appears to be more extensively altered to chlorite. The arsenides and sulpharsenides, which are not abundant in this specimen, occur in narrow bands. Part of the dark-coloured rock consists of brownish-black, medium-grained allanite (Figure 2).

The light-coloured rock in this sample is composed of feldspar and quartz, with minor biotite and chlorite evenly scattered throughout. Fine-grained calcite and dolomite are present, sometimes in narrow veinlets. Metallic minerals are very scarce. A few of the specimens consist of fine-grained, pale-brown siderite with fairly abundant arsenides and sulpharsenides.

The total carbonate content indicated by chemical analysis is approximately 9%. About four-fifths of this is siderite, the remaining fifth being made up of calcite and dolomite.

Since chlorite did not separate from biotite in the gravity separation, they are estimated together to be about 15% of the sample.

Arsenopyrite (Fe AsS) and safflorite (Co As_2) are the only metallic minerals identified in this rock. However, since each of these minerals is a member of a group of similar minerals which are very difficult to differentiate either optically or by x-ray diffraction, the presence of other members of the arsenopyrite and safflorite groups is suspected. These would include glaucodot ((Co Fe) AsS) in the arsenopyrite group, and lollingite (Fe As_2) in the safflorite group.

The examination of ten polished sections showed only one grain of native gold, which occurs in the arsenide-sulpharsenide inter -

growth (Figure 3). It measures 17 microns in the long direction.

URANIUM MINERALOGY

Uraninite is the only uranium-bearing mineral present in this ore. It occurs as subhedral grains associated with allanite and sulpharsenides (Figure 1). Most of the uraninite grains are less than 1/10 mm in diameter,although a few as large as 1/4 mm are present.

Allanite occurs as masses of dark-brown, medium-grained, prismatic crystals (Figure 2). In thin section it can be seen that most of these crystals are twinned. Allanite usually contains small amounts of thorium and rare earths,and little or no uranium.

No secondary radioactive minerals were found in this rock.

CONCLUSIONS

(1) Disseminated, fine-grained uraninite is intergrown with allanite in a highly mineralized siliceous rock.

(2) Sulpharsenides, which are abundant in the allanite, are not always directly associated with the uraninite.

(3) Neither the carbonates nor chlorite is associated with the uraninite.

(4) Native gold is present as very fine grains intergrown in the sulpharsenides.

(Figures 1 to 3 follow,)
(on pages 6 and 7.)

PHOTOMICROGRAPHS

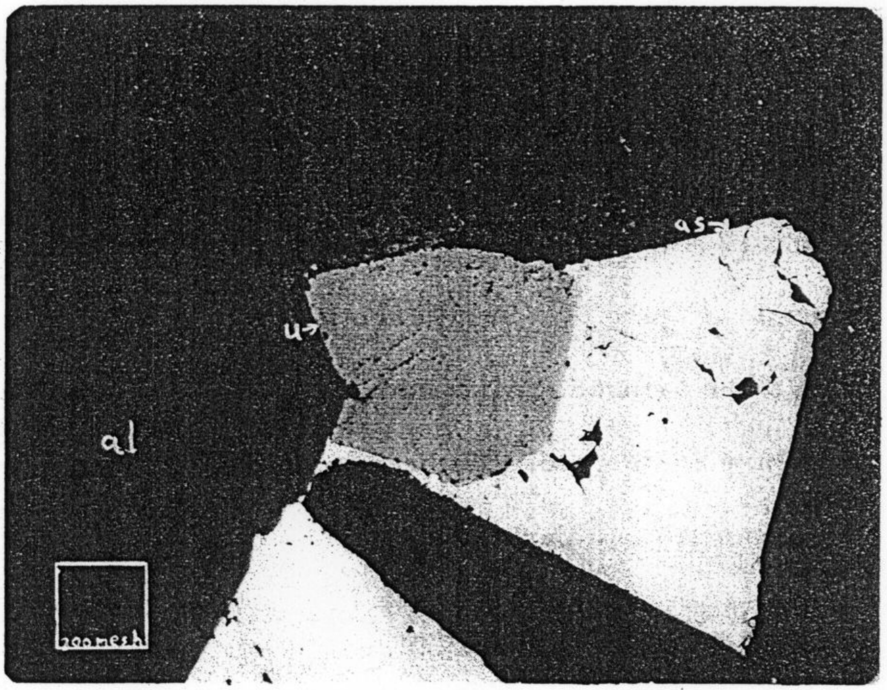

Figure 1 - A subhedral grain of uraninite (u) occurring with arsenopyrite (as) and allanite (al). Polished section. X150.

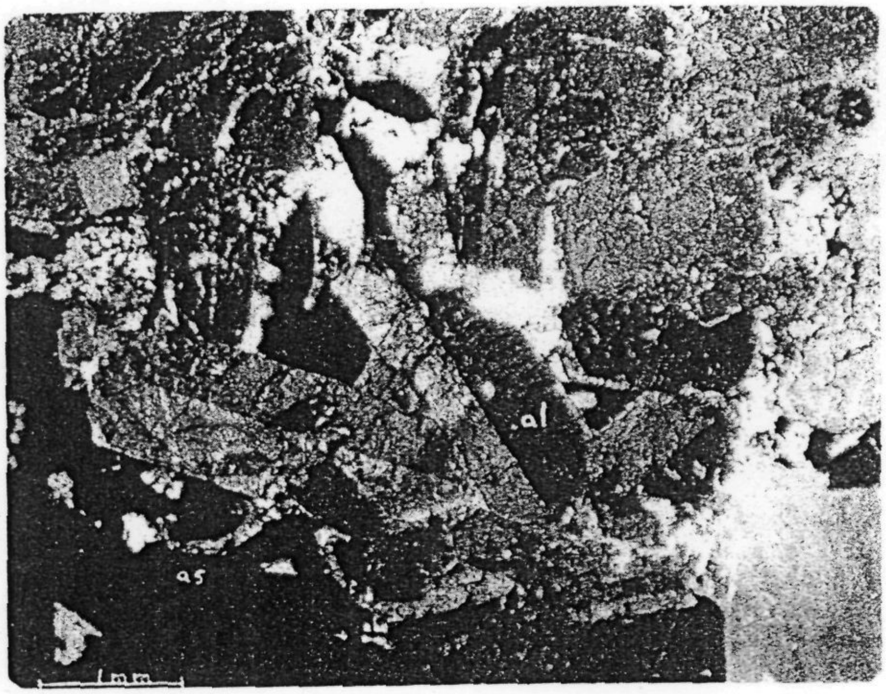

Figure 2 - Twinned crystals of allanite with arsenopyrite (as). Thin section. X18.

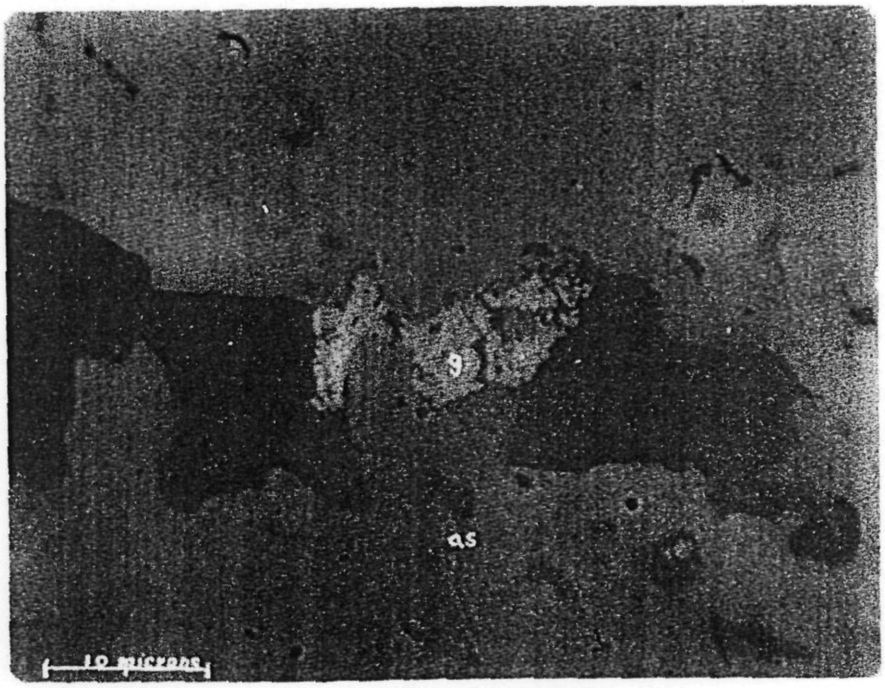

Figure 3 - Native gold (g) in arsenopyrite (as). Polished section. X2000.

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MRH:eew

Industrial Confidential

Mines Branch Investigation Report IR 59-49

AMALGAMATION, CYANIDATION, GRAVITY AND FLOTATION CONCENTRATION TESTS ON A GOLD ORE FROM THE NORTHERN GEM MINING CORPORATION LTD., MINTO, B.C.,

by

W. S. Jenkins*

- - - - - - -

SUMMARY OF RESULTS

The sample of ore contained 1.03 oz/ton gold; arsenic 23.7%; cobalt 1.78%.

The recovery of gold by amalgamation was 10.68%.

The extraction of gold by cyanidation of the ore was 63.1%.

The extraction of gold by cyanidation of roasted ore was 64.5%.

Gravity concentration by a jig and blankets recovered 61.8% of the gold in a combined concentrate which assayed 1.78 oz/ton gold.

Gravity concentration at -48 mesh recovered 74.3% of the gold in a table concentrate which assayed 2.08 oz/ton gold; 51.37% arsenic; and 5.89% cobalt.

Flotation concentration recovered 77% of the gold in a concentrate which assayed 2.80 oz/ton gold; 47% arsenic; 3.17% cobalt.

Cyanidation of a flotation concentrate, extracted 66.3% of the gold in the concentrate in 24 hours and 53.9% of the gold in terms of the original feed.

Cyanidation of a table concentrate extracted 75.36% of the gold in 24 hours and 45.2% of the gold in terms of the original feed.

Cyanidation of roasted concentrates extracted 60% of the gold in 24 hours and 64.5% after 96 hours, with overall recoveries of 57.1% and 61.4% respectively in terms of the original feed.

---

*Scientific Officer, Mineral Processing Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

CONCLUSIONS

The examination of the mineral concentrates showed that the arsenides contained most of the gold in the ore. The minerals allanite, quartz and feldspar contained a very small amount of gold.

The method to obtain a maximum extraction of gold appears to be cyanidation with a selective and extremely fine grind of the arsenide minerals. The period of agitation can best be determined in practice. In the tests, 24 hour agitation appeared to be sufficient and in some tests, it was noted that the 48 hour tailing was higher than the 24 hour tailing. In several tests the 24 and 48 hour tailings had the same assay.

The arsenides are amenable to gravity and flotation concentration.

An analysis for nickel in the cyanide solutions showed that a small amount of nickel was present. The only practical way of getting rid of nickel is to discard barren solution at regular intervals to avoid a build-up of nickel in the solution.

In some tests ore and concentrates were roasted to drive off arsenic prior to cyanidation. The extraction of gold from these cyanide tailings could be increased by treatment with hot 10% Na_2S solution or hot 10% NaOH solution or a combination of both solutions followed by recyanidation of the treated tailings. (Tests Nos. 15 and 16).

WSJ:EBM

Appendix D

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 Britsh Columbia (1967) with a Ph.D. in geology. I have practiced my profession continuously since graduation.
3. I am familiar with the district. This report is based on my personal examination of the property during 2007. I am the author of this report and verify the costs as reported to be true.
4. R.H. McMillan (of Victoria) and myself are the owners of the property.

Dated at Victoria, B.C., the 30th day of March, 2008

Submitted by:

B. Neil Church, Ph.D., P.Eng.
March 30th, 2008