North American Tungsten Corporation Ltd.

ISSUED FOR USE

GEOCHEMICAL CHARACTERIZATION OF WASTE AND MINERALIZED ROCKS, MACTUNG DEPOSIT, YUKON TERRITORY

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EBA Engineering Consultants Ltd.
p. 867.668.3068 • f. 867.668.4349
Calcite Business Centre • Unit 6, 151 Industrial Road • Whitehorse, Yukon Y1A 2V3 • CANADA

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INTRODUCTION

1.1 BACKGROUND

The Mactung property is owned by North American Tungsten Corporation Ltd. (NATCL). The property was discovered in 1962 and significant exploration work was completed on the property between 1963 and 1967 including geological and geochemical studies, both on the surface and underground. Twenty six diamond drill holes were completed on the property between 1968 and 1972. In 1973, an adit with 726 m of lateral underground development and 27 m of raising was completed in the lower ore zone and a 295 tonne bulk sample was collected for metallurgical testing. From 1973 to 1986, further work was done on the property, including 43 underground drill holes for delineation of the lower zone. Minor work was completed throughout the 1990's. In 2005, 6639 m of diamond drilling was completed to expand and upgrade the resources for the property. The 2005 exploration program also included bulk sampling. The 2008 advanced exploration drilling program had a total of 4,464 m of diamond drilling. The 2008 program included drilling for resource infill, geotechnical, and hydrogeologic assessments on the property.

1.2 SETTING

The site is located in the Selwyn Mountain Range, near MacMillan Pass, Yukon, just on the Yukon side of the Yukon/NT border (Figure 1). It is a remote site with seasonal access by gravel road, approximately 6 hours drive north east of the town of Ross River. The elevation range of the site is from 1,520 m to 1,880 m.

1.3 CLIMATE

Climate information from the Macmillan Pass area weather station for the period from August 2006 to September 2007 is shown in Figure 2. The mean temperature at this site is generally below freezing from the start of October to the start of May with potential for above freezing temperatures during October and April. The mean annual temperature of the property is -8 degrees Celsius with approximately 60 to 75 mm of precipitation per year, most of which falls as snow.

Snowpack is present at the site starting September and typically remains at the minesite until June. The presence of the snowpack helps to mitigate temperatures due to the insulating effect of the snow.

1.4 SCOPE OF STUDY

This report has been prepared to review the results of geochemical characterization testing as required under the Yukon Environment and Socio-economic Assessment Act (YESAA). Geochemical characterization information is also required for permitting of the production phase of the project. The scope of the project includes the proposed underground workings that are anticipated to have a mine life of 11 years.

The proposed underground mine will intersect Units 1, 2B and 3C. Underground development to collect a bulk sample was conducted in 1973, which produced most of the waste rock that is stored on site close to the portal. Correspondence with Mr. D. Tenney of NATCL indicated that there is an ice plug at the portal and this was confirmed during 2008.

1.5 YUKON REGULATORY REQUIREMENTS

YESAA guidelines for sampling and characterization of waste rock and mineralized rocks for mining require that a minimum of three samples be collected from each trench or excavation area for ABA analysis. Samples should be collected from freshly exposed rock and have detailed geological descriptions recorded. The YESAA guidelines also describe the geochemical tests that are suggested to satisfy the definition of adequate characterization.

It is important to note that specific requriments are project specific and the YESAA guideline suggestions may be modified to meet the site specific condicitons of the project.. Regulators defer to the standards and methods for evaluation of maximum potential acidity and neutralization potential in mine rock outlined in Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia (Price, 1998).

2.0 ACID ROCK DRAINAGE AND METAL LEACHING CLASSIFICATION METHODS

The basic method used for the evaluation of acid rock drainage (ARD) in mining are acid base accounting (ABA) tests. The samples selected for testing should be representative of the rocks that will be mined, including both ore and waste rock. A detailed description of the ABA analytical procedure is appended.

2.1 DETERMINATION OF ARD POTENTIAL

Acid-Base Accounting (ABA) is an analytical procedure that compares the acid generating and acid neutralizing constituents of a material. The resulting comparison can be represented quantitatively as either net neutralization potential (NNP) or neutralization potential ratio (NPR). The NNP value is the numerical difference between the neutralizing potential (NP) and the acid generation potential (AP) of the rock (NNP = NP – AP). The NPR is a ratio of these same values (NPR = NP/AP).

There are a number of accepted ABA procedures, however the method used to characterize materials at the Mactung property is the Sobek NP method, which is a standard accepted method of determining NP. As with most method, the Sobek procedure uses a crushed representative rock sample, which is subjected to a known excess of hydrochloric acid. The temperature of the mixture is raised to ensure a complete reaction. NP is determined by measuring the amount of acid remaining through titration with sodium hydroxide. A stoichiometric calculation is then used to determine the degree to which the sample was able to neutralize the acid. Price (1998) also recommends a second method of calculating NP which is the calculation of the carbonate NP based on the inorganic carbon content of the rock. Comparisons between the two methods allows for consideration of the source of buffering within the rock types being tested. Where the results from using these two methods differ, it is often taken as an indication that buffering is occurring from non-carbonate mineralization.

The AP in a rock is calculated by measuring the potential of sulphide minerals (pyrite, pyrrhotite, chalcopyrite, etc.) in the material being tested to oxidize into sulphuric acid. This process becomes complicated when sulphate minerals and/or organic sulphur are present in significant quantities. Sulphate minerals will not oxidize to sulphuric acid, however, their oxidation products may dissolve to generate acidity and, consequently, affect the results of the ABA test. Elemental sulphur will not oxidize to form sulphuric acid, therefore, using the total sulphur content of a sample may result in an over-estimation of the AP value.

Table 1 shows the classification system for materials based on NPR. This table is taken from Price (1998). Material with an NPR ratio between 2 and 4 is classified as non-acid generating (NAG) unless the characteristics of the material are such that the sulphide mineralization is highly reactive and the neutralization potential is non-reactive. Materials with an NPR ratio of less than 2 are classified as being potentially acid-generating (PAG).

TABLE 1. ACID ROCK DRAINAGE CLASSIFICATION SYSTEMS FOR MATERIALS

NPR	ARD Potential	Classification
NPR< 1	Likely	Likely acid generating unless sulphides are non-reactive.
1 < NPR< 2	Possibly	Possibly acid generating if NP insufficiently reactive or is depleted faster than sulphides.
2 < NPR< 4	Low	Not PAG unless: significant preferential exposure of sulphides in fractures zones, or highly reactive sulphides with non-reactive NP.
NPR > 4	None	No ARD concern.

2.2 METAL LEACHING EVALUATION

The evaluation of metal leaching (ML) is a requirement under YESAA to determine potential environmental effects of the project. ML can have significant environmental impacts with or without ARD.

Shake flask testwork is one means of determining the potential for ML without the requirement of acid generation. Rock samples are mixed with de-ionized water at a 3:1 water to solids ratio and continuously agitated for 24 hours. The leachate is then filtered and analyzed for general parameters and dissolved metal concentrations. The dissolved metal concentrations are compared to the relevant water quality objectives for the site.

Should the elemental concentration of the anticipated discharge calculated based on the leachate tests exceed the relevant standard for individual elements then there is a potential for ML concerns associated with that element and mitigative measures may be required. The significance of the exceedence is dependent on the eco-toxicology of the element and also on the magnitude of the exceedence. Evalaution of the results of this form of testwork must also take in to consideration such factors as the site water balance, materials placement and water management practices.

3.0 PREVIOUS WORK

Historical papers and studies from 1975 to 1982 were reviewed by EBA with regards to site geology and geochemical studies. Following are the results of those reviews.

3.1 GEOLOGY

There has been significant geological characterization of the rock units at the Mactung site. Nine units have been mapped at the site, four or which are mineralized. There has also been significant historical surface mapping, diamond drill coring and petrographic analysis including thin section and X-ray diffraction studies of the rock types in the project area. Sample descriptions and petrographic analysis show that mineralogical content within a single lithologic unit can be highly variable. Several reports were reviewed in this study on the site geology and these are included in the reference section of this report.

Site lithologies in descending lithologic sequence consist of:

- Units 5/6 Bioclastic Grey Limestone, Shale and Chert Conglomerates
- Unit 4 Grapolitic Black Shale
- Unit 3H Hornfelsed Black Carbonaceous Pyritic Shale

- Unit 3F Partially Skarnified Interbedded Black Shale and Grey to Black Limestone
- Unit 3E Partially Skarnified Pellitic Interbedded Black Shale and Grey to Black Limestone
- Unit 3D Partially Skarnified Interbedded Shale and Limestone Slump Breccia
- Unit 3C Hornfelsed Black Shale with Interbeds of Limestone
- Unit 2B Skarnified Limestone Slump Breccias
- Unit 1 Pyllite (Mica Schist)

Mineralization is hosted within units 2B, 3D, 3E and 3F. There are sharp contacts observed between all units with the exception of gradational contact between units 3C and 3D. The primary ore mineral is scheelite and occurs in varying quantities within the mineralized units. Pyrhottite is also present and can comprise up to 60% of the rock over short intervals. Gangue minerals within the skarn include diopside, garnet, quartz, calcite, fluorite, clinozoisite, sphene, wollastonite, tremolite, plagioclase, chlorite, biotite, muscovite and andalusite. Petrographic analysis of individual rock samples are highly varied and general compositions of minerals in each rock unit is too varied for classification.

3.2 PREVIOUS GEOCHEMISTRY

Geochemical investigations were completed in 1978 and 1979 to evaluate the acid drainage potential of tailings produced from the bulk sample collected in 1973.

The following reports were reviewed:

- Colorado School of Mines (CSM) Research Institute. (1978). *Acid-Forming Potential of Mactung Tailings- Laboratory Investigation, Phase 1 Report.* Prepared for Amax Inc., Colorado.
- Colorado School of Mines Research Institute. (1979). *Acid-Forming Potential of Mactung Tailing- Phase 2*. Prepared for Amax Inc., Colorado.

These reports document an initial eight-week and a full 44-week testing program respectively. The testing program was designed to include several variants such as temperature, inoculation with bacteria and circulation vs. free flow.

The CSM tailings study related to the tailing produced from the pilot scheelite flotation plant of AMAX Inc. (the site owner at that time). The sample used for the test work consisted of Mactung pilot plant tailings material of known composition (8.07 %

Calcium; 13.80 % Carbonate; 5.83 % total Sulphur; 5.81% Sulphide Sulphur; and 0.02% Sulphate Sulphur). The results of the study did not indicate that acid generation was expected to occur from the tailings.

3.3 WATER QUALITY AND DOWNSTREAM EFFECTS

Downstream water quality effects from the Mactung site are documented in the following reviewed documents.

- Colorado School of Mines Research Institute. (1975). Study on Treatment of Scheelite-Flotation Circuit Effluent Mactung Project. Prepared for Amax Exploration Inc., Colorado.
- Colorado School of Mines Research Institute. (1976). Study of Downstream Effects of Effluent From Proposed Tailings Impoundment Mactung Project. Prepared for Amax Exploration Inc., Colorado.
- Kershaw, L.J. and Kershaw, G.P. (1982). *A Discussion of the Potential Environmental Effects of the Mactung Project on the Keele Peak Area.* Prepared for Amax Northwest Mining Co., Ltd., Vancouver.

These studies focused on water runoff from processing and tailings facilities and did not specifically address water runoff from individual mine components such as waste piles or discharge from adits. The CSM studies estimated the water quality of the Mactung tailings pond decant water that would be released to the receiving environment and this information is contained below in Table 2. The results in Table 2 are based on a simulated tailings pond test with the predicted results being reported based on CSM experience with similar operations. The current project utilizes dry stack tailings as the disposal methodology; however the simulated tailings pond water results would be applicable to the de-watered process water that reports to the Ageing Pond.

CCME Guidelines for the Protection of Aquatic Life are also shown in Table 2. A comparison of the decant water quality to the CCME guidelines shows that there is potential for the arsenic and copper guidelines to be exceeded. The chromium concentration is close to the CCME value and it is also possible that this element would exceed CCME during production.

TABLE 2. MACTUNG DECANT WATER CHEMISTRY (FROM CSM, 1975)			
Parameter	CSM Lab Testing	Predicted Maximum 24-hr Average Composition of Tailings Decant Water during Operations	CCME Guidelines
pH	8.51	8.0 to 9.0	6.0 to 9.0
Conductivity mmhos/cm	2.6	No estimate	
Total Suspended Solids, mg/L	2	< 10	
Total Dissolved Solids, mg/L	1648	<1800	
Alkalinity, mg/L	10	No estimate	
Total Organic Carbon, mg/L	15	<20	
Arsenic, mg/L	0.015	<0.05	0.005
Calcium, mg/L	272	No estimate	
Cadmium, mg/L	<0.002	<0.01	0.000024
Chromium, mg/L	0.006	No estimate	0.0089
Copper, mg/L	0.015	<0.05	0.002
Cobalt, mg/L	<0.005	No estimate	
Iron, mg/L	0.07	<0.05	0.3
Magnesium, mg/L	2.5	No estimate	
Manganese, mg/L	<0.02	<0.1	
Mercury, mg/L	<0.0001	No estimate	0.000026
Nickel, mg/L	0.03	<0.05	0.065
Zinc, mg/L	<0.005	<0.1	0.03
Chloride, mg/L	796	No estimate	
Total Cyanide, mg/L	0.038	<0.05	
Sulphate, mg/L	47	No estimate	

EBA conducted a geochemical comparative study between the Cantung and Mactung deposits and determined that the deposits have similar geochemical and geological characteristics (EBA, 2008). EBA (2008) included a singular result of process water from the Cantung tailings pond #3 that were deemed to be potentially similar in nature to the anticipated Mactung process water. The copper concentration for this singular sample was above CCME guidelines; however, it is important to note that the majority of copper was in the total form and not dissolved.

The proposed Mactung mine intends to utilize dry stack tailings disposal and as a result the process water will be filtered from the tailings and diverted to a reservoir. Fresh water is required for the proposed mine and NATCL anticipates there to be a 0.22 m^3/sec water surplus between process water requirements and process water discharges under normal operating conditions. The difference in the tailings deposition methods between the CSM study and the current proposed mine may result in some changes to the estimated discharge water quality. The longer contact time between the tailings solids and the process water for sub-aqueous disposal as presented in the CSM study allows for greater metals leaching potential from the tailings; however most readily soluble metals will be dissolved during the processing prior to tailings discharge. Therefore, the water quality in the tailings filtrate is expected to be better in the Mactung tailings than the Cantung.

The Mactung project is located 160 km from the Cantung property which is of similar geological origin. An ongoing humidity cell conducted on a tailings composite from the Cantung mine has almost 80 weeks of available results. Results provided to EBA by NATCL show that leachate from the tailings humidity cell marginally exceeded CCME guidelines for copper (0.00278, CCME 0.002) and selenium (0.00287, CCME 0.001). It is important to note that the results of humidity cell testwork represent weakly diluted pore water whereas actual run-off from the actual tailings will be more strongly diluted by natural precipitation and run-off. The approximately 3x exceedance of the CCME guidelines shown for the Cantung tailings humidity cell requires only slight dilution to be within the guidelines.

4.0 DATA REVIEW RESULTS

4.1 SUMMER 2008 FIELD OBSERVATIONS AND SAMPLING

EBA conducted sampling during the summer of 2008 to allow for further geochemical characterization of materials present at the Mactung property. The proposed Mactung site is mostly located above treeline. Vegetation in the area of the minesite is patchy as shown by Photo 1. Field examination was conducted in the area of the existing adit and waste dump to characterize the waste, determine the presence of natural sulphidic outcrops and also to observe vegetative growth in areas where sulphidic outcropping was noted.

4.1.1 Waste Characterization

Waste from the previous exploration activities at the site is stockpiled in the area shown on Photo 2. Samples of the waste rock were collected from this area on August 7, 2008 to characterize the behaviour of this material since exposure. The exact age of the waste rock at the sampling location is not known; however, D. Tenney, NATCL (pers. comm..) reported the materials to most likely be from the bulk sample collected in 1975. The only other underground sampling work that was conducted at the site was during 1983 which means the waste materials have been exposed at surface for 25 to 33 years. Advanced weathering was observed in shallow test pits excavated around the perimeter of the dump.

Iron rich waste rock was observed to be weathering to gravel sized lodestones. Iron staining was evident at depth in test pits excavated into the crest of the waste rock dump (Photo 3). These stained layers were inclined and are taken to represent preferential flow paths along material depositional boundaries within the waste rock dump. These flow paths may represent different ages of waste rock exposure from past site activities; however this is assertion would not be possible to substantiate.

4.1.2 Natural Sulphidic Outcropping

EBA observed natural outcropping of sulphidic rock on the slopes above the existing adit (Photo 4), and also in an area approximately 150 m to the east of the adit (Photo5). No characterization samples were collected from the slope above the existing adit. The slope is composed of boulder sized angular talus, with little to no mineral soil. The slope in this area is at an average angle of 32^0.

4.1.3 Vegetative Growth Downgradient of Former Waste Dump and Sulphidic Outcropping

Observations were made of the soils and vegetation downgradient of the existing waste pile at the site. The waste in this area was disposed of directly onto the natural ground surface (Photo 6). Some revegetation of the mine waste was noted however, in general the former waste dump had sparse vegetation. Soil cover in this area is thin (<0.2 m) and an iron stained layer in the upper horizons was observed immediately adjacent to the waste rock. Vegetation growth in areas with no prior ground disturbance was observed along the entire perimeter of the waste dump (Photo 7) and there were no evident changes in the vegetation further downgradient from the waste dump. Two linear areas of iron staining were observed downgradient of the existing waste rock dump; however, these areas were subject to prior ground disturbance so it is not possible to definitively state whether these areas are related to the existing waste rock dump (Photo 8).

The area approximately 150 m east of the adit is a natural outcrop with low herbaceous vegetation growth. The iron content of the background sample is over 5% indicating naturally elevated iron. The vegetation in this area was not observed to be different from other vegetation growing in the surrounding area; although no detailed vegetation work was conducted at these specific sampling sites. The talus slope upslope of the adit had little to no vegetative growth observed.

4.1.4 Flow From Existing Adit

Observations made at the portal during August indicate the presence of an ice plug. EBA deemed that water flowing from the adit during August was a result of snow melt and upslope run-off entering the adit through cracks in the roofing timbers; however detailed inspection was not possible for safety reasons. This assertion is supported by observations of water dripping from the roof in the visible portion of the adit.

4.2 GEOCHEMICAL CHARACTERIZATION OF ORE GRADE AND WASTE ROCK

This section of the report presents results of characterization testwork for the proposed underground workings. Three of the nine mapped units at the site will be intersected by the proposed underground development. These are Units 1, 2B and 3C. In the current proposed mining plan, Unit 4 and Units 5/6 will form basement rocks and will not be excavated during mining.

Samples for this study were collected from core of various ages from past drill programs. Core samples were selected for testwork by Mr. Dave Tenney, Chief Geologist for the Mactung project. Samples for ABA and metals analysis were submittd to ALS Chemex is Vanvouver BC. Mr. Tenney also completed the geological descriptions for each sample and evaluated extent of weathering that may have influenced the analytical results. Detailed petrography samples were collected and submitted to Vancouver Petrographics for analysis. Thin sections representative of each rock type were inspected to quantify sulphide and carbonate mineralization and to evaluate extent of weathering of the mineral grains in each section. Copies of the mineralogical assessment are appended to this report with a brief summary description provided in Section 4.5.

4.2.1 ABA Results for Ore Grade and Low Grade Ore Units

Unit 2B is the mineralized host rock to be mined in the proposed underground development at the Mactung Mine. A total of 15 samples of ore grade (11) and low grade ore (4) were submitted for ABA analyses. The samples varied in age from 1972 to 2005 with 10 samples from the more recent core. The analytical results are summarized in Table 3, below, with full results contained in Appendix A. Figure 3 contains a summary of the ABA results for all geochemical program samples.

The results of the ABA analysis classify all but two of the ore grade samples as potentially acid-generating (PAG) using the methods outlined in section 2.0. Sample 36011 had a paste pH value that was only slightly above a value of 5.5 which is taken as the threshold for ongoing acid generation for the purposes of this report. This sample had the lowest NNP and a sulphide concentration of greater than 15%. The low grade ore samples are classified as 50% non acid generating (NAG) and 50% PAG. The average NPR for the low grade ore samples was 4.09 which suggested that the low grade ore is overall net acid neutralizing.

Comparison of the results for the more recently drilled core samples versus older core samples showed that the older core tended to have a lower paste pH. This indicates that some weathering of sulphide mineralization has occurred and that oxidation products are present on the core surface. Drill core for the Mactung project are stored inside of a building at the site which limits the ability of moisture to interact with the core samples. The older samples have neutral pH values which indicate that the time to acidity for the Mactung ore would be estimated at greater than 35 years. This number may not be applicable to materials that are exposed at surface to weathering processes; however, this estimate may be applied to materials that potentially would be disposed of within the underground workings.

TABLE 3. RESULTS OF ACID BASE ACCOUNTING - ORE GRADE SAMPLES

Sample ID	Core Age	Fizz Rating	Paste pH	Max. Potential Acidity (MPA)	Net Neutralization Potential (NNP)	Neutralization Potential Ratio (NPR) = (NP:MPA)	ARD Potential
		Unity	Unity	t CaCO3/ 1000 t	t CaCO3/ 1000 t	Unity	
36010	2005	2	7.9	209	-174	0.17	Likely
36011	2005	1	5.8	528	-515	0.02	Likely
36012	1972	1	7.3	494	-476	0.04	Likely
36013	2005	2	8.9	28	0	1.00	Likely
36014	2005	2	8.4	35	0	0.99	Likely
36015	1972	1	7.3	317	-30	0.04	Likely
36016	2005	2	8.2	79	-18	0.77	Likely
36018	1972	2	7.7	83	-48	0.42	Likely
36020	2005	2	8.6	24	14	0.42	Likely
36023	2005	2	9.1	30	3	1.11	Possible
36024	1979	2	8.8	34	-12	0.65	Likely
36017	2005	1	8.8	105	-86	0.18	Likely
36019	2005	2	8.8	14	55	4.91	No Concern
36021	1972	2	8.1	167	-141	0.16	Likely
36022	2005	4	9.0	48	489	11.09	No Concern

A comparison of the sulphur and carbon analyses are presented in Table 4, below. Sulphide sulphur represents the majority of the sulphur content of the samples. This suggests minimal weathering has occurred of the sulphide mineralization within the samples. Carbon content is often taken as a surrogate measurement of the amount of neutralization potential present in the rock. The results also show minimal carbon present in the rock. The lack of carbon in the samples corresponds to a low NP in many of the samples.

TABLE 4. SULPHUR AND CARBON ANALYSES - ORE GRADE SAMPLES				
Sample ID	Total Sulphur	Sulphate Sulphur (carbonate leach)	Sulphide Sulphur	Total Carbon
	(%)	(%)	(%)	(%)
Ore Grade Samples				
36010	6.7	0.08	6.62	0.32
36011	16.9	0.12	16.80	< 0.05
36012	15.8	0.06	15.75	< 0.05
36013	0.9	0.06	0.84	0.08
36014	1.13	0.08	1.05	0.06
36015	10.15	0.07	10.08	< 0.05
36016	2.52	0.06	2.46	< 0.05
36018	2.66	0.07	2.59	< 0.05
36020	0.77	0.05	0.72	< 0.05
36023	0.95	0.04	0.91	0.23
36024	1.09	0.04	1.05	0.07
Low Grade Ore Samples				
36017	3.37	0.06	3.31	< 0.05
36019	0.45	0.04	0.41	< 0.05
36021	5.34	0.04	5.3	0.12
36022	1.55	0.04	1.51	3.17

4.2.2 ABA Results for Waste Units

Waste rock units encountered by the proposed underground development are Unit 1 and Unit 3. The underground mining will generate waste through the development of access drifts, and open stope dilution along the ore-waste contact. There are no planned surface stockpiles for waste rock as waste materials will be utilized as backfill in the underground mining. Approximately 50% of the total tailings produced by the proposed underground workings will be disposed of underground as backfill.

Waste rock samples collected from the 2007 geotechnical drilling program were used to evaluate the ARD and ML potential of local borrows in these areas. Rock samples were collected from the mill site, ravine dam and main tailings dam areas and submitted to ALS Chemex for ABA and ML analysis. The results of the ABA testwork on the waste rock samples for the project area are shown in Table 5, below. Complete lab reports are presented in Appendix A, attached. Figure 3 contains a summary of the ABA results for all geochemical program samples.

TABLE 5. RESULTS OF ACID BASE ACCOUNTING - WASTE ROCK

Sample ID	Rock Unit	Fizz Rating	pH	Max. Potential Acidity (MPA)	Net Neutralization Potential (NNP)	Ratio (NP:MPA)	ARD Potential	Rock Type
		Unity	Unity	t CaCO3/ 1000 t	t CaCO3/ 1000 t	Unity		
36001	1	1	9.2	29	-16	0.44	Likely	Hornfels
36002	1	1	8.8	24	-9	0.63	Likely	Hornfels
36003	1	1	8.7	24	-11	0.55	Likely	Hornfels
36004	1	2	8.6	13	24	2.88	Low	Phyllite
36005	1	1	8.4	2	6	4.27	No Concern	Phyllite
36006	1	1	9.3	21	3	1.13	Possible	Phyllite
36007	1	2	7.7	18	40	3.26	Low	Schist
36008	1	2	8.7	28	-6	0.77	Likely	Schist
36009	1	1	7.0	8	-1	0.90	Likely	Schist
36025	3C	1	8.7	44	-33	0.25	Likely	Hornfels
36026	3C	2	8.9	24	8	1.33	Possible	Hornfels
36027	3C	2	8.7	8	16	3.07	Low	Hornfels
36028	3C	2	9.0	17	6	1.36	Possible	Pelite
36029	3C	2	9.3	30	-5	0.83	Likely	Pelite
36030	3C	1	7.6	16	12	1.76	Possible	Pelite
36031	2B	4	9.1	28	731	27.29	No Concern	Limestone skarn
36032	2B	3	8.4	29	307	11.56	No Concern	Limestone skarn
36033	2B	2	8.2	114	-84	0.26	Likely	Limestone skarn
Mill Site Waste								
36034	3*	1	6.9	62	-42	0.32	Likely	Grey pelite
36035	3*	4	9.5	1	621	995	No Concern	Calcareous tremolite garnet skarn
Ravine Dam Site Waste								
36036	3*	3	8.3	30	72	3.36	Low	black shale – carbonaceous with quartz and pyrite
36037	3*	3	8.2	53	35	1.67	Possible	black shale – carbonaceous with quartz and pyrite
36038	3*	3	7.9	48	96	2.99	Low	Calcareous black shale – carbonaceous with pyrite
Tailings Dam Borrow Site Waste								
36039	3*	3	8.5	37	69	2.90	Low	Grey/black pelite – carbonaceous with pyrite
36040	3*	3	9.3	32	84	3.64	Low	Grey/black pelite – carbonaceous with pyrite
36041	3*	2	8.9	45	-12	0.73	Likely	Grey/black pelite – carbonaceous with pyrite

The results show that waste rock generated by the underground workings will be a mixture of PAG and NAG. The limestone unit is predominantly NAG. The hornfels, pelite, and schist rock types are dominantly PAG material. The phyllite rock type is generally NAG although some PAG exists within this unit.

The sample results from the surface borrow areas returned a mixture of NAG and PAG results. Sample 36034 is a grey pelite that is classified as PAG, however the majority of the rock in the vicinity of the Mill site is limestone which has a high neutralization potential resulting in a predicted NNP for the excavation. The Ravine Dam samples classified 2 of 3 as NAG and one sample marginally classified as PAG. The overall classification of materials at this site is net neutralizing. The main tailings dam location classified 2 out of 3 samples as NAG. The one PAG sample is from a depth of greater than 11 m so it is anticipated that any borrow material generated from this location will be net neutralizing.

Table 6, below, contains results of the sulphur and carbon analyses for waste rock samples. The results show that waste rock in the surface borrow areas tends to be higher in carbon content which corresponds to a higher NP. The underground waste samples generally contain more carbon however there is still a large number of samples that do not have detectable carbon. The carbon and NP show high variability and there is no observable relation between carbon content and ARD potential for discrete rock types.

TABLE 6. RESULTS OF SULPHUR AND CARBON ANALYSES - WASTE ROCK				
Sample ID	Total Sulphur	Sulphate Sulphur (carbonate leach)	Sulphide Sulphur	Total Carbon
	%	%	%	t CaCO3/ 1000 t
36001	0.94	0.04	0.90	0.05
36002	0.76	0.04	0.72	< 0.05
36003	0.76	0.04	0.72	< 0.05
36004	0.40	0.03	0.37	< 0.05
36005	0.06	0.03	0.03	< 0.05
36006	0.68	0.04	0.64	< 0.05
36007	0.56	0.06	0.50	0.24
36008	0.91	0.05	0.86	0.10
36009	0.25	0.03	0.22	< 0.05
36025	1.42	0.02	1.40	< 0.05
36026	0.77	0.02	0.75	< 0.05
36027	0.24	0.02	0.22	0.05
36028	0.54	0.02	0.52	0.05
36029	0.96	0.01	0.95	< 0.05
36030	0.51	0.02	0.76	< 0.05
36031	0.89	0.02	0.87	8.32
36032	0.93	0.03	0.90	3.87
36033	3.66	0.07	3.59	0.24
Mill Site Samples				
36034	1.99	0.04	1.95	0.05
36035	0.02	0.02	< 0.01	2.09
Ravine Dam Samples				
36036	0.97	0.04	0.93	1.22
36037	1.69	0.05	1.64	1.00
36038	1.54	0.05	1.49	1.36
Main Tailings Dam Samples				
36039	1.17	0.04	1.13	0.69
36040	1.02	0.02	1.00	1.22
36041	1.45	0.02	1.43	0.11

4.2.3 ABA Results for Existing Waste Rock Dump and Background Sampling

Waste from past exploration actitivies at the site was disposed of in the area of the existing adit. The age of this waste is not less than 25 years old (D Tenney, pers. comm.). Samples of this waste rock were characterized in order to better understand the behaviour of this material over longer time frames. The analytical results are summarized in Table 7, with full results contained in Appendix A.

The paste pH values for the samples indicate that the materials in the Pad 1 and Pad 3 have little to no effective neutralization potential remaining. Samples from Pad 2 and Pad 4 were slightly acidic to neutral with there still being some residual neutralization potential. The materials from all samples with the exception of Pad 3 were classified as having an NPR of less than 2.0, indicating that these materials are potentially acid generating. The one background sample that was collected adjacent to the site had acidic paste pH but had little to no remaining sulphur content.

TABLE 7. ABA RESULTS FOR WASTE ROCK DUMP AND BACKGROUND SAMPLES

Sample ID	Fizz Rating	paste pH	Max. Potential Acidity (MPA)	Net Neutralization Potential (NNP)	Neutralization Potential Ratio (NPR) = (NP:MPA)
	Unity	Unity	t CaCO3/ 1000 t	t CaCO3/ 1000 t	Unity
Pad 1a	1	4.5	29.4	-21	0.27
Pad 1b	2	5	359.4	-350	0.03
Pad 2	2	6.7	174.7	-148	0.15
Pad 3	2	5	32.2	38	2.17
Pad 4	2	7.8	50.3	1	1.01
BG-1	1	5.5	2.2	1	1.37

A comparison of the sulphur and carbon analyses are presented in Table 8, below. The results show that there is a high degree of variability in the materials comprising the waste dump. Sulphide sulphur is still the dominant sulphur type indicating that there is still ARD potential for materials like those from Pad 1b and Pad 2. Sulphate sulphur within the samples in Table 8 would have been generated as a result of weathering of sulphide mineralization within the rock types. The minimum age of the Pad series of samples is 25 years which allows for some basic kinetic calculations to be performed.

TABLE 8. SULPHUR AND CARBON ANALYSES - WASTE ROCK DUMP AND BACKGROUND SAMPLES

Sample ID	Total Sulphur	Sulphate Sulphur (carbonate leach)	Sulphide Sulphur	Total Carbon
	(%)	(%)	(%)	(%)
Ore Grade Samples				
Pad 1a	0.94	<0.01	0.94	<0.05
Pad 1b	11.5	0.26	11.24	0.05
Pad 2	5.59	0.42	5.17	0.18
Pad 3	1.03	0.01	1.02	0.61
Pad 4	1.61	<0.01	1.61	0.54
BG-1	0.07	<0.01	0.07	<0.05

Table 9, below, shows the calculation of the potential sulphide depletion rates based on the determination of the sulphate sulphur concentrations for samples where sulphate sulphur was observed. The major assumption in this approach is that all sulphur present when the rock was first excavated was in the form of sulphide sulphur and that there was no sulphate sulphur species present. As the initial carbonate content of the samples is not known it is not possible to determine the rate of NP depletion for the materials which would allow for estimation of the anticipated time to acidity. Extension of the estimated rate of sulphide depletion to determine the length of time that would be required to fully deplete all sulphide mineralization cannot be conducted with any degree of confidence. Factors that influence the rate of sulphide depletion that are not known for the site include the availability of sulphide mineralization for weathering and increase in sulphide oxidation rates associated with acid-rock drainage. The latter factor may range from 10x to 50x the stable sulphide oxidation rates for PAG materials that still have available NP.

TABLE 9. SULPHIDE DEPLETION CALCULATIONS FOR MACTUNG WASTE DUMP SAMPLES

Sample ID	Total Sulphur	Sulphate Sulphur (carbonate leach)	% Sulphate Sulphur of Total Sulphur	Sulphide Depletion
	(%)	(%)	(%)	(%/yr)
Pad 1b	11.5	0.26	2.3	0.09
Pad 2	5.59	0.42	7.5	0.300
Pad 3	1.03	0.01	1.0	0.04

4.2.4 Comparison of Sobek and Carbonate Neutralization Potential

A comparison of carbonate NP (Carb-NP) and Sobek NP (Sobek–NP) was conducted for samples with detectable inorganic carbon and is presented in Table 10, below. The comparison of Carb-NP to Sobek-NP allow for identification of potential non carbonaceous sources of neutralization. The calculation of the Carb-NP is based on the reported inorganic carbon content and a detailed description of the technique is outlined in Price (1997). A ratio greater than 1 for Sobek-NP:Carb-NP indicates that non-carbonaceous sources of neutralization are present within the rock.

TABLE 10. COMPARISON OF SOBEK-NP AND CABONATE-NP

Sample	Rock Type	Sobek-NP	Carb-NP	Ratio
36010	Skarn (ore grade)	35	27	1.3
36013	Skarn (ore grade)	28	7	4.0
36014	Skarn (ore grade)	35	5	7.0
36021	Skarn (low grade ore)	26	10	2.6
36022	Skarn (low grade ore)	537	264	2.0
36023	Skarn (ore grade)	33	19	1.7
36024	Skarn (ore grade)	22	6	3.7
Mine Waste				
36001	Hornfels (waste)	13	4	3.3
36007	Schist (waste)	57	20	2.9
36008	Schist (waste)	22	8	2.8
36027	Hornfels (waste)	23	4	5.8
36028	Peilite (waste)	23	4	5.8
36031	Limestone skarn (waste)	759	693	1.1
36032	Limestone skarn (waste)	336	323	1.0
36033	Limestone skarn (waste)	30	20	1.5
Mill Site				
36034	Pelite (waste)	20	4	5.0
36035	Skarn (waste)	622	174	3.6
Tailings Area				
36036	Black shale (waste)	102	102	1.0
36037	Black shale (waste)	88	83	1.1
36038	Black shale (waste)	144	113	1.3
Ravine Dam				
36039	Peilte (waste)	106	58	1.8
36040	Peilte (waste)	116	102	1.1
36041	Peilte (waste)	33	9	3.7

The results of the comparison of Sobek-NP to Carb-NP for ore samples showed a ratio range from 1.3 to 7.0. This indicates that there is some contribution to neutralization from non-carbonate mineralization within the ore. Limestone waste samples had comparable values for both Sobek-NP and Carb-NP which is expected for this material type. The remainder of the mine waste samples analyzed had a ratio range from 2.8 to 5.8 which also indicates that non-carbonaceous mineralization is contributing to the net buffering capacity of the waste rocks.

The borrow site samples showed good agreement between Sobek-NP and Carb-NP for most sites. Evidence of non-carbonate mineralization contributions to the buffering capacity was evident for some of the other areas investigated.

4.3 CONTAINED METALS ANALYSES

This section contains the results of metals analyses conducted on samples from the Mactung deposit. The samples described in this report (Geochemical Program Samples) are compared to the results from the exploration program and in-fill drilling conducted at the site during 2005 and 2007.

4.3.1 Exploration Program Samples

Select samples of drill core from the 2005 and 2008 exploration programs were analyzed for metals concentrations as part of ongoing exploration activities at the site. The analysis was conducted at Global Discovery Labs, which is owned and operated by Teck Cominco Limited. The result of the analyses were evaluated to determine the variability of the individual units present in the deposit. Table 11, attached, contains a summary metals concentrations for each major unit present at the site. Statistics were calculated for individual rock types present in each unit provided there was sufficient number of samples to warrant the statistical analysis. Selenium and sulphur were not analyzed as part of the 2005 exploration program but were added to the 2008 program.

The values in Table 11 show that copper is above average crustal abundance for most units with the largest concentrations being hosted in Unit 2B. The calcified silicate skarn and sulphide rock types had the highest concentration of copper within this unit. Sulphur is present in all of the tested rock units. Selenium which is also of interest in the project area is above average crustal abundance in Unit 2B but the highest concentrations of this metalloid are hosted within the sedimentary rocks of Unit 3D and Unit 3E.

Plots comparing copper versus iron, iron versus sulphur, and selenium versus sulphur were prepared in order to better understand the chemistry of the units at the site. Figure 4a through Figure 4c show the relation between copper and iron for the various units. Figure 5a and Figure 5b show the relation between iron and sulphur. These figures show that there is good agreement between these elements. The agreement between iron and sulphur is not surprising given that most of the sulphide mineralization present of the site are iron bearing. Within Unit 1, iron appears to be associated with the schist rock type. Figure 6a and Figure 6b compare selenium and sulphur content for samples submitted during the 2008 exploration program. These graphs show a generally good agreement between selenium and sulphur is content for Unit 1, Unit 2B, Unit 3C and Unit 3D. The relation between selenium and sulphur shows that selenium is associated with the sulphide mineralization present in the individual mineralized units. The correlation between copper, iron, selenium and sulphur show that much of these three elements are associated with the sulphide mineralization present in the rock types present at the site.

4.3.2 Geochemical Program Samples

The solids chemistry of the samples submitted for this program was evaluated using a 48 elemental ICP analytical package from ALS Chemex. The four-acid "near total" digestion method was used for this testwork. Price (1997) suggested that analytes at concentrations at 10 times the crustal abundance provides an initial identification of significant concentrations of minerals. Elevated concentrations of certain elements reflect the mineralized nature of the deposit and does not necessarily indicate that there will be environmental impacts from these elements. In some instances metals at normal concentrations have been found to have environmental impacts. Table 12, attached, contains a summary of the comparison of metal concentrations to the 10x crustal abundances as reported in Price (1997). The discussion below focuses only on elements with potential for environmental impacts at the Mactung site.

The results of the elemental analysis show concentrations of sulphur and selenium for all material types consistently above the 10X crustal concentration. The ore grade material types were generally also above 10X crustal concentration in tungsten and tin content. Molybdenum was noted to be higher in concentration in the waste rock and some of the ore grade material samples.

The geochemical program samples were also plotted along with the exploration samples in Figures 4 through Figures 6. The geochemical program samples show generally good agreement with the exploration program samples. The iron concentration for Unit 2B is lower than the remainder of the higher sulphide samples for this unit. This is a result of the iron method detection limit for the geochemical program samples having a maximum concentration of 10%. The samples for Unit 3C are on the lower end of the iron and sulphur content for this unit.

The samples from the existing waste dump had variable metal concentrations which is likely a reflection of the limited number of samples. Samples Pad 1b and Pad 2 have copper, sulphur and tungsten concentrations consistent with the ore grade materials at the site while the other pads are more representative of the other waste rock type present in the waste dump.

4.4 SHAKE FLASK TESTWORK FOR METALS LEACHING POTENTIAL

A total of 19 samples were submitted for shake flask analysis. The shake flask analyses were conducted by ALS Environmental of Vancouver, BC. A copy of the analytical certificate for the shake flask testwork is contained in Appendix B. Comparisons to water quality guidelines in this section include both the federal Metal Mining Effluent Regulations (MMER) and the Canadian Council of Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life. CCME is the federal/provincial/territorial body that sets water quality objectives on a nation wide level. The CCME standards are taken to be applicable to the Mactung property in the absence of Yukon specific water quality guidelines.

The Mactung property will be subject to regulation under the federal MMER once in production. Table 13, below, contains a comparison of shake flask leachate metal concentrations relative to the MMER guidelines. Table 14, attached, contains a comparison of shake flask leachate metal concentrations relative to the CCME aquatic life guidelines. As noted above, the leachate from the shake flask test would indicate the maximum concentration that might be observed in the pore water of the sample, at a dilution of 3 to 1. The leachate from the same material that would be noted in the field would be substantially lower.

TABLE 12. SHAKE FLASK METAL CONCENTRATIONS COMPARED TO MMER GUIDELINES						
Sample ID	Material Type	Arsenic [mg/L]	Copper [mg/L]	Lead [mg/L]	Nickel [mg/L]	Zinc [mg/L]
MMER – Monthly Mean		0.5	0.3	0.2	0.5	0.5
MMER - Grab		0.75	0.45	0.3	0.75	0.75
36010	Ore grade	<0.0013	<0.004	<0.00005	0.00254	0.0013
36011	Ore grade	<0.0003	<0.03	0.00015	<0.001	0.0059
36013	Ore grade	0.00763	<0.0013	<0.00005	<0.0005	0.0024
36014	Ore grade	<0.0034	<0.005	<0.00005	<0.0005	0.0014
36016	Ore grade	<0.0011	<0.004	<0.00005	0.00068	0.0014
36017	Ore grade	<0.0016	<0.0026	<0.00005	<0.0005	0.001
36019	Ore grade	0.00618	<0.0006	<0.00005	<0.0005	<0.001
36020	Ore grade	0.00824	<0.0015	<0.00005	<0.0005	0.0018
36021	Ore grade	<0.0005	<0.0042	<0.00005	0.00096	0.0014
36022	Ore grade	<0.0024	<0.0009	<0.00005	<0.0005	0.0011
36023	Ore grade	0.0111	<0.0027	<0.00005	<0.0005	0.0011
36034	Waste – Mill Site	<0.0003	<0.009	<0.00005	0.00919	0.0029
36035	Waste – Mill Site	<0.0011	<0.0011	0.000051	<0.0005	0.0016
36036	Waste – Ravine Dam	<0.0014	<0.0015	<0.00005	0.0163	0.0033
36037	Waste – Ravine Dam	<0.002	<0.0022	<0.00005	0.015	0.0035
36038	Waste – Ravine Dam	<0.0011	<0.0022	<0.00005	0.00239	0.0013
36039	Waste – Main Dam	<0.0022	<0.0016	<0.00005	<0.0005	0.0012
36040	Waste – Main Dam	<0.0022	<0.0016	<0.00005	<0.0005	0.001
36041	Waste – Main Dam	<0.0045	<0.0022	<0.00005	0.00068	0.0014

As shown in Table 13, all samples tested returned metal concentrations below the MMER monthly mean guidelines for all elements with most results being less than the method detection limit. This indicates that, compared with the MMER guidelines there should not be significant ML associated with the Mactung ore and waste rock used for site development purposes. No waste rock samples from the underground working were submitted for analysis as no fresh samples were available. Older core from the 1970's is available; however; this core may have already been subject to some ML of the outer surfaces and would not be representative of freshly disturbed waste rock.

The comparison of the metal leaching results to the CCME guidelines (Table 14) is complicated by the variable detection limits for different samples. The variability of the detection limits for the analytical testwork is a result of matrix interference with other elements and is a function of the sample matrix and spikes in the method blanks during analysis. If a spike is detected in the method blank then a different detection limit must be used to ensure acceptable data quality. To interpret the shake flask testwork results if the concentration of the parameter was below the detection limit, the detection limit was assumed to be the upper boundary of the readily mobile metals concentrations expected to be leached from the different rock types. Where the detection limit was higher than the CCME guideline for the specific parameter and the concentration of the parameter was below that limit, that concentration was used to determine the dilution factor required to meet the CCME guideline.

Copper and selenium required the highest dilution factors to meet CCME guidelines based on the shake flask results (15 and 13 times, respectively). The dilution required for copper was based on the concentrations being less than the detection limits so the dilution factor shown in Table 14 would be substantially higher than would be required in situ. Aluminum, cadmium and silver also required a greater than 10x dilution factor to achieve CCME guidelines. The cadmium and silver dilutions that were higher than the guidelines were all in waste rock and not from the ore grade or low ore grade material types.

The iron concentration noted in sample 36011 does not match with other test results and a comparison of the dissolved iron concentration with the other metal results indicate that the dissolved iron concentration is not correct. The lab re-analysed the sample and confirmed the result for this sample therefore, it appears that the sample was contaminated during collection.

The maximum dilution factor of 15 was required for all metals to meet CCME guidelines as noted in Table 14. The footprint of the infrastructure for the site is small enough that there will be substantial dilution of runoff from the dam and mill sites. Water balance information indicates that the natural inflows to the Ravine Dam will be approximately 15 times that of inflows from the mine.

Based on the low level of ML associated with the Mactung ore it is not anticipated that the tailings produced from the ore will have significant ML concerns.

4.5 MINERALOGICAL STUDIES

A total of 15 samples were submitted to Vancouver Petrographics for analysis using thin section microscopy. A copy of the report from Vancouver Petrographics is contained in Appendix C and contains detailed estimates of primary and replacement minerals within each sample. The discussion presented below focuses on the sulphidic mineralization within ore grade samples as this is the component that will potentially weather and produce acidic runoff. No discussion is presented on the waste samples as the disposal of this material will be underground with no discharge anticipated to the surface receiving environment. A summary of the estimated sulphide mineralization contents within the ore samples from the Mactung site are presented below in Table 15.

Sulphide mineralization was noted in low concentrations in all but one of the ore grade samples. Sulphide mineralization was predominantly fine grained pyrrhotite crystals occurring within the host rock and associated with some veins. Sample 36012 had the highest estimate sulphide mineralization within Zone B of the sample, from 20% to 25% pyrrhotite. This corresponds to sulphur content within Zone B from 8% to 9% based on sulphur constituting 40% of pyrrhotite by weight.

TABLE 15. SULPHIDE MINERALOGICAL ESTIMATES FOR MACTUNG ORE

Sample	Primary Minerals	Estimated Percentage	Main Grain Size (mm)
36012 – A (15 – 17% of sample)	pyrrhotite	1 - 2	0.05 – 0.2
36012 – B (70 – 75% of sample)	pyrrhotite	20 - 25	0.05 – 0.2
36012 – C (7 – 8% of sample)	pyrrhotite	1 - 2	0.03 – 0.07
36015	pyrrhotite	12 - 15	0.05 – 0.2
	chalcopyrite	0.7	0.05 – 0.2
36018	pyrite	7 - 8	0.2 – 1.0
	chalcopyrite	1 - 2	0.05 – 0.3
	vein: chlorite/pyrite	2 - 3	0.05 – 0.2
36024	pyrrhotite	3-4	0.03 – 0.05
	vein: diopside-pyrrhotite	0.3	0.07 – 0.15
36021	pyrrhotite	4 - 5	0.1 – 1
Low Grade Ore	chalcopyrite	0.3	0.05 – 0.2
	pyrite	minor	0.1
	replacement pyrrhotite	2 - 3	0.1 – 0.2

The grain-size information from the above samples was compared with the anticipated grain-size of the tailings that are to be produced at the site. The Mactung tailings will be a silty sand sized material with over 90% of the material having a grain-size of less than 0.2 mm. The range grain-sizes for the sulphide mineralization present in the ore body vary. Most of the sulphide mineralization present in the ore body is between 0.05 and 0.2 mm. This means that not all of the grains will potentially be impacted by the grinding and crushing of the ore. Destruction and modification of sulphide grains has the ability to influence the rate of sulphide weathering as a result of changes in the exposure of the sulphide mineralization and also through an increase in surface area.

An estimate of the mineralogical distribution for the ore zone has been reconstructed from past petrographic reports by Dave Tenney of NATCL and is contained in

Appendix C. This estimate indicates that the ore body contains approximately 5% calcite. Sulphide mineralization accounts for approximately 11% of the ore body. The distribution estimate indicates that Fe-Mn carbonates (ankerite and siderite) do not occur in significant concentrations to influence the calculation of NP.

4.6 TAILINGS GEOCHEMICAL CHARACTERIZATION

Metals analyses were conducted on samples of Mactung tailings as part of the CSM (1975) study on treatment requirements. The results of the analyses are presented in Table 16, attached. Results of metals analysis on monthly tailings composites from the nearby Cantung Mine are also presented in this table for comparative purposes. A comparative study of the Mactung and Cantung deposits has shown that they are geochemically similar in nature (EBA, 2008); however, this study was based on a limited sample size. The flowsheet of the mill at Cantung is also similar to the proposed Mactung mill flowsheet.

The results presented in Table 16 are anticipated to be comparable to the tailings solids which will be produced by the current proposed Mactung Mine as there have been little changes to the processing flowsheets since the 1975 study. Detection limits for some of the analyses from the 1975 CSM study are higher than those used for the Cantung tailings samples which limits the ability to compare the results. Differences in the tailings disposition methodology should not significantly influence the geochemistry of the tailings solids provided similar processing and recovery methods are used.

The geochemical studies completed in 1978 and 1979 were specific to the sample produced from the pilot scheelite flotation system. Since this work was completed there has been a significant increase in the projected resources for the Mactung project. The average sulphur content of ore to be milled at Mactung has been estimated at approximately 8% as compared to an average of 5.8% for ore used in the previous pilot milling program. The increase in the sulphide content of the Mactung underground deposit translates to a higher AGP for the ore and tailings. Tailings samples analyzed during the prior pilot milling program did not show evidence of acid generation and the studies did not anticipate ARD concerns at the site.

No testwork has been conducted to determine the anticipated time to acidity for PAG tailings produced at the Mactung mine, however based on site observations and analyses conducted on older core samples, and the average site temperatures, it is considered unlikely that the tailings will generate significant ARD during the life of the mine. NATCL proposes to initiate humidity cell and field-based bulk sample testwork to confirm this assumption once production has begun at the site. These further studies will focus on evaluating the time to acidity and long term affects of ARD in the post production phase and will be used in ongoing development of the final closure plan for the site.

A discussion on discharge water quality is contained in Section 3.3 of this report. The prior evaluation of the ML potential of the Mactung tailings did not identify any metals of concern which would result in exceedance of the current MMER guidelines. It is important to note that these samples contained approximately 2% less sulphide mineralization than the current deposit and at the time of the testwork the applicable receiving environment water quality guidelines for most parameters were lower than the current standards.

The results of shake flask testwork conducted on recent ore samples indicated that no dilution was required to achieve discharge limits for the receiving environment under the MMER regulation. The grain size of the ore materials tested was substantially greater than that of the proposed tailings which will affect the leaching of metals. The ML concentrations for the ore samples should therefore be taken as representing a minimum metals concentrations to be leached from the tailings. Additional testing of the ML potential for the ore should be conducted on materials ground to a representative grain-size in order to be able to make inferences with the respect to the behaviour of the tailings.

5.0 DISCUSSION AND CONCLUSIONS

The standard for prediction of ARD and ML at mine sites is by ABA, followed by kinetic testing as required. The majority of the geochemical characterization work for the Mactung site was completed between 1973 and 1982, prior to the implementation of current environmental permitting regulations. Testwork for ARD was conducted on samples that ranged in age from 1972 to 2005 and showed that the ore and much of the waste at the deposit were classified as being PAG. Low grade ore was overall classified as net-neutralizing however some PAG component was observed in the low grade ore.

The older core used for the geochemical program had generally lower paste pH values than the newer core which corresponds to the presence of weathering products on the surface of the samples. None of the samples tested were classified as being currently acid generating indicating a long time to acidity. The ABA results show that in general samples with greater than 2% total sulphur may be classified as being PAG.

The analysis of assay results for exploration and geochemical program samples shows that there is a good correlation between copper and iron, iron and sulphur, and selenium and sulphur. This relation is not surprising considering that most of the sulphide mineralization is pyrrhotite (Fe_7S_8) and chalcopyrite ($CuFeS_2$). The relation between selenium and sulphur indicates that the selenium is associated with the sulphide mineralization. Oxidation of sulphides at the site would be expected to result in increased loadings of copper, iron and selenium due to these associations.

Prior testwork by CSM (1975) on effluent quality from the Mactung site reported the estimated decant water quality during operations. This estimate was based on a simulated tailings pond test. The results of this estimate suggest that there may be exceedances of the CCME guidelines (aquatic life) for arsenic, copper and possibly chromium during the operations in the tailings leachate, which would be considerably less than the guidelines when the decant reports to the Ravine Dam and subsequently to the environmemt. EBA (2008) reported results for a process water sample from the Cantung #3 tailings pond which contained elevated copper concentrations. A review of total versus dissolved metals concentrations for this sample identified that the majority of the copper was in the total metals component and not dissolved. This information suggests that settling of suspended solids within the Ravine Dam reservoir may result in lower copper concentrations.

Shake flask testwork conducted on ore grade samples indicate that there is some potential for neutral ML to occur (primarily aluminum and selenium). There were no exceedences of the federal MMER guidelines for discharges to the receiving environment in the decant from the shake flask tests. A dilution of 15 is required for the leachate from the shake flask tests to achieve CCME water quality guidelines for aquatic life. This dilution calculation is based on the highest non-detectable concentration for the copper concentration.

Water balance information for the Ravine Dam reservoir at the site indicates that natural inflows can be up to 15 times greater than inputs from the milling operations. It is also important to note that site diversion ditching will divert approximately half of the natural drainage around the Ravine Dam which will result in a 2x dilution factor immediately downstream of this structure. Geochemical modeling of the reservoir during the production phase is not included in the scope of this report.

Geochemical characterization of the tailings was completed in the early 1970's and 1980's and is equivalent to standard kinetic testing. The prior testwork did not indicate concerns with ARD, however, the average sulphur content of the deposit has risen from 5.8% to 8% since the earlier testwork programs were conducted. The short summer season helps to limit the period of exposure and oxidation of material types at the site.

The current lack of kinetic testwork for the project limits the ability to discuss long term trends in water quality for the site. The apparent long time to acidity indicates that there should be not be significant concerns associated with acid runoff during the underground mine life.

Shake flask extraction tests indicate that the MMER water quality objectives for the materials tested would not be exceeded during the mine operations. NATCL is currently evaluating a metallurgical program that will include characterization testing of tailings and process water.

6.0 CLOSURE

We trust that this report is sufficient for your needs at this time. This report has been prepared according to current professional standards and is subject to the EBA Environmental Report General Conditions (attached) which form part of this report. Limitations associated with this report are included in the Environmental Report General Conditions. Should you require any additional information please do not hesitate to contact the undersigned at (867) 668-2071 ext 248.

Respectfully Submitted,
EBA Engineering Consultants Ltd.

Scott C. Davidson, M.Sc., P.Geo. (BC)
Geoscientist
Whitehorse Environmental Group
Direct Line: (867) 668-2071 ext 248
E-mail: sdavidson@eba.ca

Lara Reggin, P.Geo. (BC)
Senior Engineering Geologist
Pacific Region
Direct Line: (604) 685-0275 ext 254
E-mail: lreggin@eba.ca

Bengt Pettersson B.Sc. M.A.
Project Director, Whitehorse Environmental Group
p. 867.668.3068 • f. 867.668.4349
E-mail: bpettersson@eba.ca

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In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

PHOTOGRAPHS

Photo 1
August 8, 2008. Aerial View of Mactung Mine Area

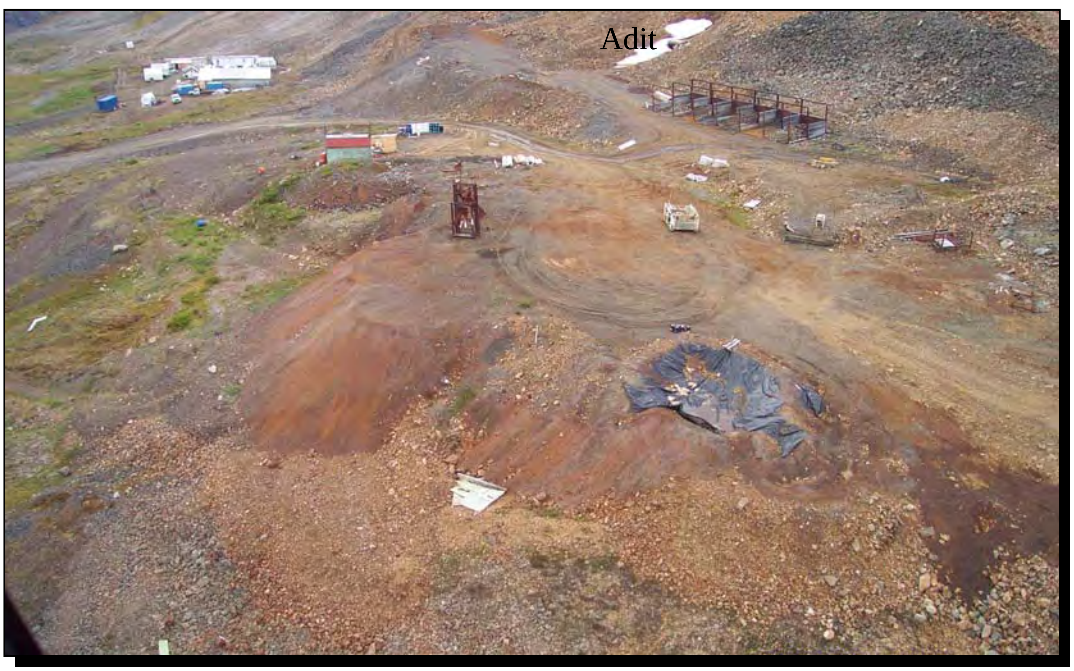


Photo 2
August 8, 2008. Aerial View of Existing Waste Materials Dump at Mactung

Photo 3
August 8, 2008. Iron Staining Below Surface in Existing Mactung Waste Dump Test Pit

Photo 4
August 8, 2008. Natural Sulphidic Rock Outcropping Above Existing Adit

Photo 5
August 8, 2008. Existing Sulphidic Outcropping East of Waste Dump

Photo 6
August 8, 2008. Waste Rock on Native Ground

Photo 7
August 8, 2008. Vegetation Growing Along Base of Waste Rock Dump

Photo 8
August 8, 2008. Aerial View of Existing Waste Dump Showing Linear Areas with Iron Staining.

TABLES

TABLE 11: SUMMARY STATISTICS FOR MACTUNG ROCK METAL CONCENTRATIONS

Unit	Lithology	Statistic	Cu	Pb	Zn	Ag	As	Ba	Cd	Co	Ni	Fe	Mo	Cr	Bi	Sb	V	Sn	W	Sr	Y	La	Mn	Mg	Ti	Al	Ca	Na	K	P	S	Se
Unit 1	All	n	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31	31
		Max	1271	51	566	0.6	46	1450	7	36	119	9.34	135	179	171	15	1215	16.7	4195	504	22	51.5	1270	12300	5050	99700	47000	7600	28100	4981	4.96	36
		Min	19.2	4	32	0.04	0.3	61	0.03	6	18	1.71	0.54	31	0.39	0.05	25	2	3.9	28	3	11	199	0.2	0.04	1.52	1.24	0.08	0.07	292	0.07	1
		Median	125.25	4	73	0.4	3	252.5	1	14.8	35.55	3.24	4	73.5	8	5	66.5	4.5	311.5	80.25	10	19.5	425	1.14	0.155	3.015	3.955	0.195	1.01	835.5	0.76	5
	Hornfels	n	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
		Max	834	42	566	0.6	11	1180	5	22	119	6.35	46.6	114	171	5	1215	15.3	4195	504	22	39.8	1270	11900	4180	81200	47000	6400	20900	3692	3.65	36
		Min	36	4	57	0.12	0.7	63	0.06	7	23.8	1.96	2	60	1.97	0.06	25	2	20.4	28	3	11	214	0.29	0.04	1.52	1.24	0.1	0.15	292	0.22	2
		Median	126.5	4	78.5	0.4	2.5	238.5	1	13.6	36.5	2.93	4.39	84.5	8	5	73.5	4.5	158	87	9	21	418	1.14	0.155	2.96	3.61	0.21	1.025	671.5	0.77	5
	Phyllite	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4
		Max	310	15	80	0.4	12	1110	1	30	52.9	4.85	135	179	23	15	92	9	1195	421	18.5	48.1	546	11100	5050	99700	32700	7300	28100	3462	1.31	5
		Min	19.2	4	32	0.04	0.3	239	0.03	11.7	18	1.71	0.54	43	0.44	0.05	42	5	3.9	51.4	7	18	199	1.14	0.14	3.62	3.71	0.19	0.96	390	0.07	1
		Median	93.7	11.8	65	0.11	3	480	0.07	16.5	38.5	3.16	3.33	73	1.67	0.41	71	6.3	805	71	14	39.1	342	3900	3330	50400	6100	2000	16100	622	0.585	1.5
Unit 2B	All	n	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	233	233
		Max	6741	73	1139	4.6	362	402	17	143	84	35.66	567	245	1329	89	640	76.7	13410	1002	103	65	9200	40000	3190	76400	284000	4500	16200	23810	18.26	95
		Min	9	1.8	1	0.39	0.2	5	0.22	1	1	0.27	2	4	3.06	0.14	2	2	2	2	2	2	30	0.01	0.01	0.08	0.17	0.01	0.01	104	0.05	3
		Median	463	6	42	1	5	25	1	14	19	5	6	32	34	5	14	7	912	70	6	16	566	0	0	3	5	0	0	1355	4	10
	Sulphides	n	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	139	26	26
		Max	5422	42	790	3.4	98	277	7	143	74	35.66	88	111	885	89	291	23	13410	463	103	65	4519	2.9	0.15	7.73	26.64	0.39	1.92	14720	18.26	95
		Min	9	4	5	0.4	2	5	1	1	1	0.48	2	4	5	5	2	2	18	9	2	2	138	0.04	0.01	0.38	0.76	0.02	0.01	231	1.97	5
		Median	452	6	42	1	5	25	1	14	19	5	6	32	32	5	14	7	920	70	6	16	566	0	0	3	5	0	0	1363	4	10
	Calc Skarn	n	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	283	131	131
		Max	6741	46	1139	4.6	362	350	12	94	65	30	328	137	943	72	295	76.7	9396	916	35	56	9200	40000	3190	76400	284000	4500	16200	14350	14.57	72
		Min	11	1.8	1	0.39	0.2	5	0.22	1	1	0.43	2	4	3.06	0.14	2	2	2	2	2	2	40	0.01	0.01	0.14	0.17	0.01	0.01	104	0.16	3
		Median	368	5	45	1	6	25	1	12	19	4	6	33	37	5	16	8	917	68	6	18	719	0	0	2	5	0	0	1087	4	10
	Hornfels	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	1	1
		Max	495	39	988	1	16	152	17	11	84	3.33	46	117	145	15	640	32	2541	314	12	33	521	0.71	0.14	6.54	21.54	0.24	0.34	6066	2.09	12
		Min	25	4	1	0.4	2	7	1	1	1	0.98	2	6	5	5	2	2	247	52	2	2	176	0.05	0.01	0.36	2.42	0.04	0.01	322	2.09	12
		Median	130	8	35	0	2	72	1	6	35	2	18	77	13	5	59	3	440	116	7	17	263	0	0	2	5	0	0	748	2	12
	Limestone	n	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	2	2
		Max	2681	22	153	2.4	18	402	1	65	26	17.53	256	50	1329	31	9	14	3246	1002	10	33	1259	1.7	0.12	8.68	27.37	0.37	0.32	12740	0.57	5
		Min	10	4	1	0.4	2	5	1	1	1	0.45	2	4	5	5	2	2	52	35	2	2	160	0.02	0.01	0.27	4.07	0.03	0.01	178	0.51	5
		Median	74	8	27	1	3	22	1	5	7	2	4	12	37	7	3	7	489	233	4	4	607	0	0	1	14	0	0	1279	1	5
Unit 2BL	All	n	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	3	3
		Max	1070	14	174	1.3	26	1200	1	43.2	37.8	8.53	59.5	46	51	23	72	35.1	3130	676	15.5	35.6	2750	18100	2830	73200	327000	3000	17600	2020	3.52	6
		Min	25.2	4	9	0.09	2	13	0.16	1	5	0.97	1.75	9	2.26	0.77	2	6	41.9	68	2	2	412	0.05	0.01	0.22	4.45	0.03	0.01	204	0.83	2
		Median	93	6	29	1	3	104	1	5	10	3	5	22	5	9	4	10	1353	217	4	6	741	0	0	1	17	0	0	737	1	5
	Sulphides	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	n/a	n/a
		Max	757	10	58	1.3	12	115	1	21	17	8.19	32	37	51	14	8	14	1707	405	5	19	1123	0.25	0.05	2.58	22.85	0.09	0.13	1303	n/a	n/a
		Min	35	4	9	0.4	2	13	1	1	5	0.97	2	9	5	5	2	6	231	77	2	2	412	0.05	0.01	0.22	4.87	0.03	0.01	204	n/a	n/a
		Median	86	5	24	1	2	69	1	4	8	3	5	20	5	10	4	10	1232	205	3	2	699	0	0	1	15	0	0	523	n/a	n/a
Unit 3C	All	n	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	55	55
		Max	5640	25	1431	4.7	93	2570	25	72	96	18.61	212	225	1102	97	918	16	10530	493	37	47	6184	13300	3680	53000	35500	2800	23900	67360	11.81	89
		Min	32	4	18	0.07	0.2	5	0.06	1	1	1.05	2	9	0.26	0.06	2	0.9	4.2	17	2	2	74	0.03	0.01	0.55	1.77	0.03	0.01	250	0.17	3
		Median	280	6.3	61	0.4	4	105	1	9	44	3.04	15.85	80	16.5	5	116.5	3	919.5	91.5	13	19	343.5	0.5	0.08	2.64	3.73	0.13	0.265	4229.5	1.13	9
	Calc Skarn	n	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	14	14
		Max	2886	15	1077	2.8	45	386	23	52	52	18.61	65	139	1102	72	304	16	5620	144	37	32	2936	0.65	0.12	3.51	13.84	0.21	0.41	60320	10.38	27
		Min	85	4	22	0.4	2	5	1	2	1	1.52	2	20	5	5	6	2	258	17	2	4	175	0.03	0.01	1.15	2.58	0.03	0.01	541	0.72	5
		Median	548	4	41	0.5	3	36	1	11	28	4.64	13	42	48	5	24	4	1063	61	9	15	615	0.22	0.03	1.94	3.7	0.1	0.04	1782	2.47	15.5
	Hornfels	n	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	23	23
		Max	2865	25	1300	1.3	40	2340	13	72	96	13.19	212	225	358	47	765	11	10530	317	30	37	620	10800	3250	49900	35500	2800	23900	32130	9.31	89
		Min	60.5	4	18	0.07	0.2	27	0.06	3	22	1.05	2	39	0.26	0.06	32	0.9	4.2	48	6	9	113	0.13	0.02	1.87	1.99	0.06	0.01	250	0.25	3
		Median	271	4	67	0.4	4	168	1	9	51.2	2.64	22.2	111	8	5	185	2.9	776	89	15	17	249	0.67	0.11	3.06	3.36	0.14	0.45	5394	0.91	8
	Pelites	n	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	3	3
		Max	1033	14	1431	0.9	31	2570	25	25	75	6.91	87	163	89	62	743	14	4371	299	32	47	721	13300	3680	53000	33900	2300	19000	27140	0.98	10
		Min	88.1	4	24	0.16	0.3	21	1	5	23	1.74	2	11	0.66	0.1	2	1	10.1	35	5	14	74	0.15	0.02	1.18	1.77	0.09	0.04	531	0.5	7
		Median	347	9	69	0.4	2	105	1	10	52	3.5	18.35	81	16	12	187	4	1043	91	13	30	299	0.69	0.1	3.59	3.44	0.14	0.47	3293	0.55	7
	Limestone	n	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	n/a	n/a
		Max	1647	16	125	0.9	25	247	2	32	55	10.21	11	78	191	97	104	14	7648	493	25	44	1181	0.87	0.07	3.26	21.71	0.16	0.24	67360	n/a	n/a
		Min	32	4	33	0.4	3	17	1	1	2	1.12	2	9	5	5	5	2	89	58	6	2	113	0.17	0.02	0.55	3.5	0.09	0.03	2839	n/a	n/a
		Median	112	10	53	0.4	11	84	1	8	19	2.94	7	35	24	33	29	5	2067	153	16	16	667	0.39	0.04	1.78	8.9	0.12	0.1	22280	n/a	n/a
Unit 3D	All	n	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	73	73
		Max	2502	31	330	2.4	252	7847	10	88	98	22.28	73	194	1300	360	225	21	25240	573	39	48	3505	1.3	0.1	3.79	28.54	0.22	0.67	97710	12.89	128
		Min	13	4	1	0.4	2	5	1	1	1	0.17	2	4	5	5	2	2	75	6	2	2	28	0.01	0.01	0.07	0.48	0.01	0.01	97	-0.05	5
		Median	323	7	49	0.4	8	76	1	9	34	3.41	6	48	9	18	40	6	3754	114	15	18	593	0.33	0.03	1.72	8.19	0.08	0.08	25550	1.56	22
	Sulphides	n	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	n/a	n/a
		Max	1520	31	290	1.5	33	634	7	39	88	10.4	40	75	364	110	86	18	18500	287	39	36	1993	1.13	0.06	3.51	18.8	0.21	0.51	84830	n/a	n/a
		Min	18	4	3	0.4	2	5	1	1	1	0.43	2	4	5	5	3	2	184	15	2	2	34	0.01	0.01	0.51	0.8	0.01	0.01	97	n/a	n/a
		Median	347	17	53	0.7	7	58	1	8	40	3.84	5	44	5	33	33	7	4153	100	16	9	677	0.34	0.02	1.95	8.18	0.1	0.07	30420	n/a	n/a
	Calc Skarn	n	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	48	48
		Max	1639	20	330	2	252	7847	10	48	98	20.42	73	127	1031	360	216	16	25240	374	31	48	3505	1.3	0.1	3.64	19.85	0.21	0.67	74370	12.89	128
		Min	13	4	5	0.4	2	5	1	1	2	1.04	2	12	5	5	2	2	75	27	4	2	102	0.03	0.01	0.36	1.17	0.02	0.01	1324	-0.05	5
		Median	342	6	49	0.4	8	83	1	10	33.5	3.55	7	50	13	15.5	41	6	3851	118.5	14	19	618	0.34	0.03	1.715	8.68	0.08	0.08	26115	1.75	22
	Hornfels	n	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	10	10
		Max	2502	17	243	2.2	23	949	3	88	78	22.28	24	194	561	79	225	13	11830	573	38	48	1456	0.97	0.09	3.79	28.54	0.22	0.63	97710	4.64	69
		Min	60	4	9	0.4	2	13	1	3	10	1.08	2	15	5	5	16	2	175	60	10	4	91	0.07	0.01	0.99	2.78	0.02	0.01	3826	0.22	5
		Median	460.5	7	41	0.4	7.5	98	1	9	36	3.55	6	65.5	29.5	5	49.5	4	2485	105	13.5	19	284.5	0.305	0.04	2.005	4.38	0.095	0.15	12120	2.115	17.5
	Limestone	n	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	n/a	n/a
		Max	167	19	77	2.4	35	2880	5	17	35	5.9	31	47	1300	196	108	21	15320	571	36	24	1334	0.62	0.04	2.04	27.45	0.14	0.2	83100	n/a	n/a
		Min	24	4	26	0.4	2	10	1	1	10	1.48	3	15	5	5	7	2	847	62	8	2	209	0.13	0.01	0.84	5.23	0.02	0.01	9708	n/a	n/a
		Median	68	11	55	0.4	11	69	1	4	16	2.24	8	20	31	56	29	6	4415	224	17	10	758	0.28	0.03	1.49	11.81	0.1	0.05	34610	n/a	n/a
Unit 3E	All	n	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	242	6	6
		Max	1962	40	738	1.9	93	303	12	82	118	11.68	108	145	551	115	220	20	8730	370	25	56	1701	1.16	0.18	5.41	14.1	0.32	0.62	58880	1.35	31
		Min	10	4	1	0.4	2	5	1	1	1	0.39	2	9	5	5	2	2	29	27	4	2	56	0.01	0.01	0.71	1.64	0.04	0.01	174	0.24	5
		Median	106	9	34.5	0.4	5	37.5	1	7	19	1.92	7	44	7.5	10	21	3	974	130.5	10	25	197	0.16	0.07	2.815	4.06	0.15	0.05	1632	0.895	10.5
	Sulphides	n	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	n/a	n/a
		Max	1962	21	134	1.3	16	198	4	82	82	11.68	19	56	21	115	38	14	8730	337	25	29	1701	0.53	0.06	3.57	14.1	0.15	0.16	58880	n/a	n/a
		Min	89	5	2	0.4	2	6	1	2	3	0.92	2	10	5	5	2	2	266	54	6	2	84	0.03	0.01	0.71	2.74	0.07	0.01	252	n/a	n/a
		Median	453.5	9.5	36	0.55	6	67	1	12.5	27	3.79	5.5	31	5	26.5	18	9.5	2179	155.5	16	16	402	0.265	0.025	1.8	8.225	0.13	0.06	27600	n/a	n/a
	Calc Skarn	n	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	n/a	n/a
		Max	935	19	738	1.9	93	192	12	37	40	8.6	28	104	551	39	94	11	4190	237	14	38	1009	0.72	0.12	4.26	7.78	0.23	0.13	3011	n/a	n/a
		Min	14	4	10	0.4	2	5	1	1	1	0.39	2	12	5	5	2	2	79	27	4	9	87	0.01	0.01	1.04	2.43	0.05	0.01	174	n/a	n/a
		Median	65	8	22	0.4	6	26	1	5	11	1.82	9	41	33	7	16	3	648	136	9	29	225	0.07	0.07	2.8	4.36	0.14	0.01	842	n/a	n/a
	Hornfels	n	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	3	3
		Max	334	40	316	0.8	18	167	5	22	118	4.59	43	145	138	30	150	10	2986	253	20	38	377	0.86	0.16	4.41	6.03	0.3	0.62	12770	1.35	24
		Min	10	4	1	0.4	2	11	1	1	1	0.47	2	9	5	5	2	2	32	64	4	10	60	0.02	0.01	1.43	2.27	0.08	0.01	362	0.78	6
		Median	121	7	31	0.4	5	42	1	7	16	1.89	7	52	5	10	27	3	1005	125	9	26	180	0.17	0.07	2.82	3.86	0.15	0.09	1612	1.01	15
	Pelites	n	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	n/a	n/a
		Max	854	25	421	1.1	59	303	3	26	53	5.76	108	102	276	60	113	20	5075	370	24	56	971	1.16	0.16	5.41	13.14	0.32	0.38	8223	n/a	n/a
		Min	23	4	12	0.4	2	8	1	1	5	0.52	2	16	5	5	2	2	29	61	5	8	94	0.03	0.02	1.61	1.66	0.04	0.01	588	n/a	n/a
		Median	99	11	45	0.4	4	41	1	7	24	1.96	6	46	9	14	28	4	1026	127	9	22	209	0.18	0.07	2.86	4.05	0.17	0.08	2041	n/a	n/a
	Limestone	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	n/a	n/a
		Max	112	18	35	0.4	11	51	1	3	28	1.91	11	100	40	33	19	6	3258	271	13	35	250	0.05	0.13	3.93	7.51	0.2	0.02	1150	n/a	n/a
		Min	32	11	10	0.4	2	21	1	1	10	0.75	5	24	5	6	6	2	489	115	6	12	118	0.03	0.04	2.18	2.8	0.11	0.01	674	n/a	n/a
		Median	83	16	19	0.4	6.5	37.5	1	2	15	1.655	9.5	39	10	21	15	3.5	1290.5	154	6.5	17	189.5	0.04	0.05	3.645	4.065	0.135	0.01	896.5	n/a	n/a
	Black Shale	n	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	n/a	n/a
		Max	465	21	180	0.7	27	81	2	28	61	7.44	65	112	85	44	164	11	3882	169	17	43	1053	0.78	0.17	3.7	5.76	0.25	0.53	5596	n/a	n/a
		Min	64	6	29	0.4	2	9	1	8	23	1.33	3	36	5	5	29	2	50	71	10	22	85	0.12	0.07	1.79	2.35	0.06	0.07	1504	n/a	n/a
		Median	123	15	50	0.4	2	33	1	13	35	2.2	5	73	5	14	60	2	1524	102	10	29	173	0.19	0.09	3.12	4.22	0.21	0.11	2431	n/a	n/a
Unit 3F	All	n	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	5	5
		Max	1580	22	172	1.9	282	329	3	83	57	12.18	75	115	747	96	99	16	7919	401	18	53	3225	1.62	0.18	4.27	23.47	0.23	0.42	10280	0.6	21
		Min	1	4	1	0.4	2	5	1	1	1	0.22	2	4	5	5	2	2	20	21	2	2	60	0.02	0.01	0.29	1.76	0.01	0.01	119	0.25	5
		Median	67	6	29.5	0.4	5	29	1	4.5	7	1.91	12	29	72	6	9	5	778.5	124.5	5	23	366.5	0.16	0.04	2.145	4.2	0.1	0.02	921.5	0.39	17
	Calc Skarn	n	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	n/a	n/a
		Max	1580	21	172	1.9	282	329	2	83	56	12.18	75	100	747	96	80	16	7919	351	17	39	3225	1.62	0.15	3.84	18.69	0.18	0.33	10280	n/a	n/a
		Min	1	4	2	0.4	2	5	1	1	1	0.33	2	4	5	5	2	2	84	21	2	2	85	0.03	0.01	0.46	2.11	0.02	0.01	119	n/a	n/a
		Median	63.5	6	31	0.4	6	26.5	1	4	4.5	2.155	14	26	119	5	9.5	5	723.5	108	5	23	431	0.15	0.035	1.965	4.18	0.09	0.02	746	n/a	n/a
	Hornfels	n	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	n/a	n/a
		Max	640	18	78	1.2	23	234	3	32	57	5.22	57	102	706	72	67	13	7591	392	18	38	1170	0.79	0.18	4.27	23.47	0.23	0.41	8600	n/a	n/a
		Min	10	4	1	0.4	2	5	1	1	1	0.6	2	4	5	5	2	2	20	68	2	2	60	0.02	0.01	0.29	2.09	0.01	0.01	181	n/a	n/a
		Median	83.5	6.5	23.5	0.4	4	28.5	1	5	11.5	1.815	9	33	33.5	8.5	6.5	5	1013	135	6	23.5	326.5	0.195	0.04	2.28	3.98	0.11	0.035	1299	n/a	n/a
	Limestone	n	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	n/a	n/a
		Max	203	12	93	0.5	42	95	2	19	37	3.42	33	115	371	29	82	14	3180	401	17	53	624	0.62	0.14	3.92	19.5	0.23	0.42	5747	n/a	n/a
		Min	18	4	11	0.4	2	5	1	1	1	0.22	2	5	5	5	2	2	34	56	3	13	70	0.03	0.02	1.09	2.22	0.07	0.01	347	n/a	n/a
		Median	68	6	26	0.4	2	35	1	5	18	1.71	8	34	22	7	5	4	869	151	9	27	228	0.13	0.09	2.7	4.64	0.16	0.06	1295	n/a	n/a
Unit 3G	All	n	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	n/a	n/a
		Max	1268	9	56	1.6	11	266	1	15	23	8.96	163	145	718	15	66	7	1693	402	5	27	386	2.65	0.08	4.34	3.92	0.16	0.74	1824	n/a	n/a
		Min	6	4	4	0.4	2	6	1	1	3	0.56	2	30	5	5	2	2	126	31	2	12	39	0.07	0.01	0.45	1.18	0.04	0.01	50	n/a	n/a
		Median	28	4	17	0.4	2	33	1	2.5	6.5	1.315	18	44.5	46	5	2.5	2	432	191	2	19	130	0.31	0.01	1.76	2.575	0.075	0.03	565	n/a	n/a
Unit 3G	Calc Skarn	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	n/a	n/a
		Max	1268	8	25	1.6	11	97	1	15	8	8.96	163	79	718	5	5	2	375	247	3	23	312	0.63	0.04	2.31	3.33	0.12	0.05	683	n/a	n/a
		Min	22	4	4	0.4	2	6	1	1	3	0.9	14	30	5	5	2	2	225	112	2	13	73	0.07	0.01	1.42	1.83	0.07	0.01	119	n/a	n/a
		Median	86	5	19	0.4	4	32	1	4	4	2.16	33	36	54	5	2	2	297	193	3	21	174	0.13	0.01	1.87	2.85	0.08	0.01	552	n/a	n/a

1 A value equal to the detection limit was used for samples with concentrations less than the method detectino limit for the above statistical analyse

2 No exploration samples from Unit 3G and Unit 2BL were submitted for anlytical analysis during 200

TABLE 12: ICP METALS DETERMINATION FOR GEOCHEMICAL PROGRAM SAMPLES

MATERIAL TYPE	SAMPLE DESCRIPTION	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	Crustal Abundance (ppm):	0.075	82300	1.8	425	2.8	0.0085	41500	0.15	66.5	25	102	3	60	56300	19	1.5	3	0.25	20900	39	20
	10 x Crustal Abundance (ppm):	0.75	823000	18	4250	28	0.085	415000	1.5	665	250	1020	30	600	563000	190	15	30	2.5	2E+05	390	200
Mine Waste	36001	0.15	75800	0.7	1180	3.13	1.97	30900	0.06	78	14.7	65	24.4	185	37700	20.8	0.16	1.9	0.046	18400	39.8	104.5
Mine Waste	36002	0.21	55300	1.8	730	4.97	33.3	47000	2.37	49	9.8	84	11.55	214	34100	21.5	0.17	2.7	0.461	9400	28.2	78
Mine Waste	36003	0.12	81200	1.1	860	5.55	2.77	35000	1.07	71.9	13.2	67	20.9	81.6	26100	23.6	0.12	2.4	0.095	20900	32	96
Mine Waste	36004	0.11	99700	5	890	15.85	0.87	32700	0.05	85	14.9	66	25.9	56.8	17100	27.6	0.15	2.6	0.058	28100	39.8	201
Mine Waste	36005	0.04	87800	1.9	1110	3.54	0.44	6100	0.03	99.4	16.5	73	32.3	19.2	48500	24.8	0.15	2.4	0.087	26400	48.1	141
Mine Waste	36006	0.07	50400	0.3	480	1.73	1.67	13700	0.07	79.6	11.7	43	23.2	93.7	31600	15.55	0.12	3.2	0.052	16100	39.1	107.5
Mine Waste	36007	0.12	75900	3.9	1150	4.71	19.6	35100	0.04	79.2	18.4	60	23.1	64.8	26100	24.6	0.14	2.5	0.08	24400	39.9	111
Mine Waste	36008	0.13	93800	1.3	1450	3.94	2.18	20600	0.04	98.6	16.5	73	28.1	106.5	40600	31.2	0.16	2.7	0.09	28000	50.6	157
Mine Waste	36009	0.1	94600	39.9	910	3.31	0.39	3000	0.21	96.4	26.8	74	20.5	26.2	51000	26.5	0.15	2.2	0.066	26800	51.5	114
Ore Grade	36010	1.41	51600	11	100	6.3	492	104500	0.38	47.3	50.3	33	1.7	1100	148500	21.3	0.59	1.3	0.949	1500	25.3	18.1
Ore Grade	36011	2.41	38600	1	10	15	3.26	59100	0.55	9.15	81.3	5	1.38	4410	300000	35.3	0.69	0.2	0.281	1000	4.3	14.3
Ore Grade	36012	3.56	46700	0.2	60	6.69	796	32400	0.58	30.3	52.9	13	17.25	5210	273000	43.8	0.64	0.6	0.231	11100	14.5	92.3
Ore Grade	36013	0.39	76400	17	350	9.99	26.8	107500	0.5	71.3	15.1	49	4.16	290	75300	40.9	1	2	0.796	8000	38.4	31.5
Ore Grade	36014	1.25	58800	20	100	29.7	91.1	141000	0.25	43.2	22.7	27	4.29	129.5	105500	35.8	0.7	1.2	1.205	1100	22.5	27.8
Ore Grade	36015	1.53	67200	0.4	330	11.65	343	54400	0.5	58.5	35.6	41	16.2	2450	185500	44.8	0.86	1.4	0.459	16200	31.2	91.7
Ore Grade	36016	0.61	24100	16	10	14.45	6.3	160500	0.47	8.59	43.5	5	0.09	691	139500	25.2	0.54	0.3	0.839	100	3.6	10.6
Low Grade Ore	36017	0.76	60600	5	260	8.74	23.2	104000	0.26	62.2	30.3	36	5.3	907	93100	29.8	0.73	1.5	0.566	5700	30.8	32.2
Ore Grade	36018	0.85	40500	4.1	170	25.1	25.6	83300	0.3	28.2	15.5	26	6.2	828	98100	43.7	0.65	0.6	1.035	1000	14.5	36.1
Low Grade Ore	36019	0.45	73100	20	340	21.9	31.1	167500	0.28	56.7	13.2	36	1.2	49.4	91200	34.1	0.56	1.4	1.195	3200	31.1	26.2
Ore Grade	36020	0.46	54700	10	50	13.5	15.85	128000	0.22	53	9.5	37	3.04	159	93300	37.3	0.58	1.8	0.831	800	29.8	18
Low Grade Ore	36021	1.73	54300	1.5	30	16.95	420	82300	0.45	42.9	38.1	39	1.82	2540	121000	56.3	0.73	1.1	0.538	1000	21.9	21.4
Low Grade Ore	36022	0.54	25100	10	270	13.65	6.74	284000	0.47	25.6	11.6	21	1.34	170.5	61100	16.6	0.52	0.6	0.529	1500	12.9	17.1
Ore Grade	36023	0.43	62200	19	140	11.45	3.06	145500	0.28	61.9	16.9	33	2.98	292	81700	27.8	0.45	1.4	0.724	1700	32.3	29.4
Ore Grade	36024	0.86	71200	14	20	20.8	111	130000	0.29	67	9.8	36	1.56	960	76900	46.9	0.62	1.2	1.395	700	37.1	14.6
Mine Waste	36025	0.21	45100	0.4	1080	1.72	2.21	13000	0.06	42.7	10.7	39	9.12	170.5	30400	13	0.28	2.3	0.026	17700	23.8	71.1
Mine Waste	36026	0.24	44800	1.4	900	1.93	7.27	35500	1.88	44.8	7.3	72	7.29	163	21100	12.65	0.32	2.2	0.032	20300	25.3	48.6
Mine Waste	36027	0.07	49900	0.2	2340	2.07	0.26	18400	0.1	35	9.3	61	8.04	60.5	23000	13.1	0.29	2.6	0.019	23900	19.5	79
Mine Waste	36028	0.16	42800	0.3	1010	4.38	0.82	25400	1.72	44.1	7	71	9.27	124	17400	13.5	0.33	2.8	0.051	17400	24.6	52.4
Mine Waste	36029	0.28	53000	0.5	1320	2.38	1.15	33900	1.79	51.9	8.9	67	7.47	106	23900	15.55	0.38	2.8	0.043	15800	29.2	48.7
Mine Waste	36030	0.49	45200	12.4	2570	3.16	0.66	27400	1.14	56	8.5	60	9.17	88.1	20900	12.7	0.39	2.5	0.017	19000	30.2	46.9
Mine Waste	36031	0.09	20100	9	1200	1.52	2.26	327000	0.18	18.55	5	14	0.87	25.2	20200	5.45	0.2	0.5	0.075	2900	9.7	13.5
Mine Waste	36032	0.48	48400	26	490	11	4.98	199000	0.54	48.5	12.4	31	2.35	198	45500	21.5	0.66	1.6	0.373	6500	25.5	20.1
Mine Waste	36033	0.76	73200	6	740	6.97	21.7	57200	0.16	66.2	43.2	46	16.9	1070	85300	38.7	0.73	1.5	0.201	17600	35.6	82.9
Borrow Waste	36034	0.5	63400	0.9	690	2.53	0.59	24300	0.21	42.2	18.2	47	7.52	48.3	30800	18.45	0.34	4.2	0.033	35600	24.4	89.5
Borrow Waste	36035	0.1	20600	11	30	0.65	3.52	324000	2.07	47.9	4	10	0.12	5.8	16200	6.06	0.31	2	0.3	400	29.1	6.5
Borrow Waste	36036	1.38	21000	18.5	1310	1.55	0.64	41500	9.63	17.7	5	103	5.31	62.7	14500	10.25	0.2	1.4	0.048	9200	13.1	22.9
Borrow Waste	36037	1.23	27600	35.5	860	1.66	0.21	33800	8.67	27.8	6.1	94	4.7	98.5	16400	9.59	0.26	1.7	0.034	12600	21	51.1
Borrow Waste	36038	1.19	34000	30.4	600	2.06	0.25	44000	5.19	30.7	7	85	5.7	22.3	25500	10.85	0.25	2.1	0.029	11800	22.3	123.5
Borrow Waste	36039	1.45	52700	7.5	930	2.05	0.2	45500	3.94	48.7	9	69	10.05	165.5	24200	14.5	0.32	3.1	0.025	31000	31	89
Borrow Waste	36040	1.1	56600	3	1820	2.05	0.16	41400	3.46	31.3	9.3	50	10.2	103	25700	15.05	0.32	2.9	0.035	32600	19.1	101.5
Borrow Waste	36041	1.01	62200	18.8	930	2.29	0.2	27000	4.66	53.5	14.6	63	7.97	121	29600	16.7	0.44	2.9	0.065	36900	29.6	70.1
Old Mine Waste	PAD 1	0.61	63600	40.6	1940	4.18	70.7	26100	0.92	67.3	12.8	70	12	459	51100	23.2	0.25	2.6	0.191	19300	34.8	67.7
Old Mine Waste	PAD 1b	2.89	39600	2.1	60	13.15	724	57900	0.59	23.9	51.2	11	3.68	4010	20700	48.3	0.32	0.5	0.802	2500	12.4	27
Old Mine Waste	PAD 2	1.23	38200	85.8	350	6.51	251	54700	3.38	38.3	26	57	7.8	1665	10300	24.6	0.3	1.6	0.431	5800	21.2	30.7
Old Mine Waste	PAD 3	0.34	45400	24.6	1400	2.89	7.08	31400	5.16	48	11.1	78	13.8	228	27400	13	0.15	2.5	0.075	18600	26.9	58.1
Old Mine Waste	PAD 4	0.36	73700	10.2	1350	5.16	81.3	32600	1.14	80.3	17.6	62	19.05	449	52600	25	0.31	2.4	0.184	23400	40.4	85.9
Background	BG 1	0.15	110500	16.4	1410	2.71	1.08	<5000	0.21	136.5	2.9	93	21.3	36	59100	32.6	0.21	2.8	0.095	39800	67.9	113

MATERIAL TYPE	SAMPLE DESCRIPTION	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	Crustal Abundance (ppm):	23300	950	1.2	23600	20	84	1050	14	90	0.0007	350	0.2	22	0.05	2.3	370	2	0.001	9.6	5650	0.85	2.7	120	1.25	33	70	165
	10 x Crustal Abundance (ppm):	2E+05	9500	12	236000	200	840	10500	140	900	0.007	3500	2	220	0.5	23	3700	20	0.01	96	56500	8.5	27	1200	12.5	330	700	1650
Mine Waste	36001	11900	465	19.2	6400	12.8	25.1	460	9.9	188.5	<0.002	9100	0.07	12.8	3	8.6	136.5	0.88	0.06	15	4030	1.36	1.7	76	66.9	16.4	57	64.2
Mine Waste	36002	10300	1270	46.6	2800	16.2	84.3	710	4.3	98.7	0.079	8000	0.13	10.8	7	14.6	106	1	0.34	9.2	4180	0.95	16.8	1215	351	22	279	92.1
Mine Waste	36003	10400	391	4.78	4200	11.9	23.8	360	10.5	90.4	<0.002	7600	0.06	15.6	2	15.3	203	0.9	0.06	13.1	4130	1.2	2.2	91	20.4	17.1	106	76.1
Mine Waste	36004	3900	199	3.33	7300	11	52.9	530	14.8	164	0.006	4800	0.41	13.2	1	8	421	0.76	0.05	15.9	3330	1.47	3.9	71	880	14	32	88.2
Mine Waste	36005	11100	342	0.54	2000	18	38.5	390	11.8	166	<0.002	700	0.05	17.4	2	6.2	51.4	1.35	0.07	18.1	5050	1.59	2.6	92	3.9	18.5	73	78.8
Mine Waste	36006	8600	432	1.1	4000	11.8	18	930	6	173	<0.002	6900	0.06	9.3	1	6.3	51.8	1	<0.05	15.3	3390	1.27	3.5	42	80.1	18.1	48	96.5
Mine Waste	36007	11800	476	2.08	2700	14.6	28.7	490	18	155.5	0.005	6300	0.29	16.3	1	15.2	165	1.09	0.36	15.6	3400	1.51	2	81	780	19.1	64	80.6
Mine Waste	36008	12300	418	1.93	7600	14.2	35.1	570	11.8	234	0.002	8500	0.15	19.2	1	16.7	79.5	1.15	0.06	19.5	4660	1.93	2.3	92	214	20.4	68	86.4
Mine Waste	36009	4800	548	16.75	1800	13.2	47.9	510	16	187.5	<0.002	3300	12.65	15.1	1	3.7	50.5	1	<0.05	18.6	3500	2.03	2.7	66	19.1	13.2	448	72
Ore Grade	36010	15100	3220	3.9	1600	9.7	37.3	490	7	11.4	0.058	53800	1.44	6.4	9	67.6	134	0.56	8.5	8.8	2420	0.47	2.3	37	6290	13.9	218	35.7
Ore Grade	36011	8100	1330	13.05	2000	15.2	15.1	3530	5.6	14.8	0.054	100000	0.16	2.4	18	3.4	35.4	0.3	0.6	1.2	390	0.43	2.1	25	9350	4.6	48	7.4
Ore Grade	36012	10900	905	6.1	3600	11.9	21.5	4070	8.4	199.5	0.033	95200	0.41	5.9	32	4.9	74.4	0.06	11.1	3.6	910	1.46	2.9	30	6180	10.6	77	22.8
Ore Grade	36013	11500	4230	9.28	4500	16.2	30.1	1730	8.9	48	0.055	9700	0.17	14.5	4	26.6	122	0.82	0.84	11.8	2980	0.73	5.8	164	4520	17.8	206	69.5
Ore Grade	36014	11000	6080	15.85	1500	24.3	16.7	980	8.8	10.6	0.08	12500	2.61	11.2	4	51.1	134.5	0.67	2.45	10.7	2760	0.79	3.3	44	8920	12.4	327	35.7
Ore Grade	36015	15900	2100	3.99	3700	13.5	22	1440	8.4	176	0.107	78700	0.26	10.1	17	11.1	100.5	0.61	4.9	10.3	2540	1.99	3.1	36	9230	12.6	110	49.2
Ore Grade	36016	11600	9200	328	200	0.6	28.5	560	1.8	0.5	0.041	24000	0.48	4	3	76.7	32.1	0.05	0.13	0.6	390	0.26	0.7	33	2440	10.1	395	10.2
Low Grade Ore	36017	35300	3850	4.85	2500	11.2	27.5	1990	5	57.1	0.041	29700	0.14	11.5	8	39.7	124.5	0.62	0.61	8.9	2270	0.66	3.2	64	3990	21	153	53
Ore Grade	36018	7100	6340	9.41	1600	4.3	12.5	1520	3.6	8.9	0.032	27600	0.6	8.2	6	30	45.1	0.05	0.65	4.5	1170	0.36	2.8	32	7710	12.9	188	18.9
Low Grade Ore	36019	9100	5530	8.96	2500	16.5	18.2	530	6.7	15.8	0.027	5000	1.61	12.5	3	51.7	189.5	0.75	0.88	10.6	3190	0.3	3.1	70	2500	13.3	278	41.9
Ore Grade	36020	14900	5290	69	1700	19.9	31.9	3980	3.1	4.6	0.069	8100	0.35	12.6	4	24.3	169	0.79	0.55	8.5	3120	0.54	7	295	6460	24.5	252	71.1
Low Grade Ore	36021	14400	4500	4.47	1500	11.1	35.9	1670	4	14.1	0.05	47000	0.3	12.4	10	17.9	80.9	0.45	4.29	6.7	1930	0.51	3.6	110	4750	16.9	126	35.7
Low Grade Ore	36022	11800	3980	6.26	200	6.2	7.9	640	3.9	8.7	0.019	14300	1.93	7.1	4	52.8	345	0.24	0.14	3.5	1060	0.23	2.1	27	1770	8.6	172	16.1
Ore Grade	36023	40000	4650	3.52	2000	15.9	33.5	300	4.5	18.9	<0.002	9000	0.88	9.2	4	54.8	170	1.03	0.18	11.2	2900	0.02	2.1	58	590	16.9	290	43.3
Ore Grade	36024	28700	5750	2.09	1600	15.5	10.4	450	3.7	9.5	0.03	11200	0.24	12.8	4	52.8	140	0.75	1.6	10.5	2750	0.31	1.5	40	2690	12.1	265	43.8
Mine Waste	36025	7700	155	24.3	2800	7.1	51.2	250	5.8	112.5	0.012	12100	0.12	9.5	6	2.9	62.7	0.45	0.06	7.3	2220	0.95	6.1	274	14.6	10.6	42	90.3
Mine Waste	36026	10800	207	19.2	1900	12	49.2	6120	6.6	107.5	0.036	6500	0.16	9.1	7	6.2	149	0.75	0.28	7.2	2920	0.73	8.3	633	32.3	26.4	207	85
Mine Waste	36027	10000	220	22.2	1900	10.6	51.5	470	7.6	139.5	0.041	2500	0.06	10.2	3	0.9	84.1	0.71	<0.05	8.3	3250	1.02	8	537	4.2	16.3	83	102
Mine Waste	36028	7900	169	15.8	2300	18	51.2	1650	7	104	0.04	5000	0.1	8	7	4	106	1.12	0.06	7.4	3680	0.83	12.4	505	10.1	28	186	115
Mine Waste	36029	11900	161	18.35	1400	9.5	49.5	3970	4.1	93.1	0.035	9800	0.16	10.7	7	1	107	0.64	0.07	8.9	2780	0.77	8.8	421	11.4	27.6	208	109
Mine Waste	36030	13300	203	15.9	1000	14.6	66.3	4030	4.9	103.5	0.031	5500	1.59	9.2	10	2.5	85	0.88	0.06	8.7	3080	0.68	8.8	577	10.3	32	133	99.8
Mine Waste	36031	6900	764	1.75	500	3.6	8.7	2020	4.1	12.1	0.002	8300	1.17	4.4	2	7.2	676	0.2	<0.05	3.2	1020	0.11	2.4	28	41.9	6.9	52	17.1
Mine Waste	36032	16500	2750	3.48	1000	13.5	18.3	1370	6.8	31.5	0.012	10100	1.88	11.6	5	35.1	378	0.7	0.16	8.4	2830	0.29	3.3	60	1130	14.9	174	54.5
Mine Waste	36033	18100	1225	59.5	3000	17.8	37.8	1290	10.3	176.5	0.036	35200	0.77	14.7	6	10.2	199	0.85	0.71	10.5	2720	1.23	2.8	72	3130	15.5	97	50.9
Borrow Waste	36034	9000	153	11.7	5700	30.9	35.7	830	16.2	120.5	0.009	18700	1.71	14.6	5	2.8	137	1.87	0.08	9.7	5010	0.64	7.6	158	32.1	22.4	59	168.5
Borrow Waste	36035	6900	1295	0.35	100	18.4	2.6	3280	3.6	1.9	<0.002	200	0.38	4.2	3	226	251	0.64	0.06	4.7	2370	<0.02	2.7	33	34	25.8	86	77.6
Borrow Waste	36036	2400	161	40.8	300	13.6	147	730	16	49.2	0.024	9500	2.58	5	8	3.1	102	0.6	0.08	2.9	1720	1.05	12.1	693	4.8	7.6	630	68.2
Borrow Waste	36037	3300	159	45.3	300	15.8	154	900	8.3	54.1	0.02	15700	2.33	6.8	11	1.2	111.5	0.8	0.06	3.7	2090	1.17	17	814	3.3	14.8	484	71.8
Borrow Waste	36038	12800	475	40.8	600	16.6	146.5	1050	9.1	49.7	0.013	15500	5.89	11.4	7	0.8	75.2	0.88	0.15	4.2	2260	1.41	13.5	818	3.3	24.8	380	82.4
Borrow Waste	36039	19300	141	10.55	700	19.1	65.7	>10000	12.2	128.5	0.037	11100	5.12	9.5	10	1.4	121	1.11	0.1	8.1	3120	0.88	12.9	518	3.3	32.9	332	126.5
Borrow Waste	36040	25400	227	22.5	1700	9.2	57.5	1220	14.5	135	0.033	10000	6.73	9.1	7	1.3	127	0.58	0.08	9.4	2530	0.87	10.9	417	1.8	17	318	111
Borrow Waste	36041	18500	154	11.55	2100	10.5	61.1	3960	17.7	140.5	0.031	12800	5.55	10	8	1.4	224	0.62	0.1	10.8	2720	0.84	9.9	280	2.2	25.9	471	113
Old Mine Waste	PAD 1	12000	912	9.6	0.19	13.4	39.8	2990	883	135	0.017	9600	1.18	12.9	6	15.3	98.3	1.05	0.58	11.7	3540	0.97	6.6	297	1300	21.5	147	101.5
Old Mine Waste	PAD 1b	7000	3160	5.71	0.2	9.6	14	2660	18.7	36.9	0.053	87100	0.66	3.9	21	12.7	54.1	0.13	7.52	3.3	890	0.68	2.8	34	8530	7.1	93	17.9
Old Mine Waste	PAD 2	8500	1985	23.2	0.14	11.5	59.4	2990	12	55.4	0.092	52200	4.56	7.4	14	15.9	106.5	0.68	2.12	5.4	2480	0.87	9.4	607	6370	20.6	321	63.9
Old Mine Waste	PAD 3	9600	342	31.7	0.1	13.4	68.1	2440	63.9	118.5	0.051	10800	1.66	10.1	11	5.3	210	0.99	0.14	7.5	3420	0.98	11.8	709	198.5	25.3	433	90.1
Old Mine Waste	PAD 4	12600	1105	9.34	0.2	13.3	36.6	1480	32.6	189	0.021	16400	3.16	14	5	13.8	79.2	1.08	1.62	12.9	3750	1.3	4.9	188	2000	20.7	140	89.5
Background	BG 1	2800	131	2.13	0.21	17.7	6.9	650	53.3	207	<0.002	800	3.67	20.2	2	6	108	1.52	<0.05	21.6	5060	1.31	3	89	25.2	19.7	43	90.5

Red values indicate exceedance of 10x crustal abundance
No comparison available for similar deposits

TABLE 13: SHAKE FLASK METAL CONCENTRATIONS COMPARED TO CCME GUIDELINES

Sample ID	Material Type	Aluminum [mg/L]	Arsenic [mg/L]	Cadmium [mg/L]	Chromium [mg/L]	Copper [mg/L]	Iron [mg/L]	Lead [mg/L]	Mercury [mg/L]	Molybdenum [mg/L]	Nickel [mg/L]	Phosphorus [mg/L]	Selenium [mg/L]	Silver [mg/L]	Thallium [mg/L]	Zinc [mg/L]
CCME – aquatic life		**0.1**	**0.005**	**0.000017**	**.001/.00891**	**0.002**	**0.3**	**.0001-.0007**	**0.000026**	**0.073**	**0.025-0.15**	**0.04-0.1**	**0.001**	**0.0001**	**0.0008**	**0.03**
36010	Ore grade	0.0469	<0.0013	<0.00005	<0.0005	**<0.004**	<0.03	<0.00005	<0.0001	0.00246	0.00254	<0.3	**0.0026**	<0.00001	<0.0001	0.0013
36011	Ore grade	<0.011	<0.0003	<0.0001	<0.001	**<0.03**	**93**	0.00015	<0.0001	0.00021	<0.001	<0.3	**0.0075**	<0.00002	<0.0002	0.0059
36013	Ore grade	**0.723**	**0.00763**	<0.00005	<0.0005	<0.0013	<0.03	<0.00005	<0.0001	0.00368	<0.0005	<0.3	<0.001	<0.00001	<0.0001	0.0024
36014	Ore grade	**0.102**	<0.0034	<0.00005	<0.0005	**<0.005**	<0.03	<0.00005	<0.0001	0.054	<0.0005	<0.3	**0.002**	0.000013	<0.0001	0.0014
36016	Ore grade	<0.009	<0.0011	<0.00005	<0.0005	**<0.004**	<0.03	<0.00005	<0.0001	0.0518	0.00068	<0.3	**0.0012**	<0.00001	<0.0001	0.0014
36017	Ore grade	**0.162**	<0.0016	<0.00005	<0.0005	**<0.0026**	<0.03	<0.00005	<0.0001	0.00191	<0.0005	<0.3	<0.001	<0.00001	<0.0001	0.001
36019	Ore grade	**0.372**	**0.00618**	<0.00005	<0.0005	<0.0006	<0.03	<0.00005	<0.0001	0.00398	<0.0005	<0.3	<0.001	<0.00001	<0.0001	<0.001
36020	Ore grade	**0.305**	**0.00824**	<0.00005	<0.0005	<0.0015	<0.03	<0.00005	<0.0001	0.0149	<0.0005	<0.3	**0.0019**	<0.00001	<0.0001	0.0018
36021	Ore grade	0.0997	<0.0005	<0.00005	<0.0005	**<0.0042**	<0.03	<0.00005	<0.0001	0.00247	0.00096	<0.3	<0.001	<0.00001	<0.0001	0.0014
36022	Ore grade	0.032	<0.0024	<0.00005	<0.0005	<0.0009	<0.03	<0.00005	<0.0001	0.00277	<0.0005	<0.3	<0.001	<0.00001	<0.0001	0.0011
36023	Ore grade	**0.29**	**0.0111**	<0.00005	<0.0005	**<0.0027**	0.052	<0.00005	<0.0001	0.0269	<0.0005	<0.3	<0.001	<0.00001	<0.0001	0.0011
36034	Waste – Mill Site	0.0157	<0.0003	<0.00005	<0.0005	**<0.009**	<0.03	<0.00005	<0.0001	0.00171	0.00919	<0.3	**0.0013**	<0.00001	<0.0001	0.0029
36035	Waste – Mill Site	<0.012	<0.0011	<0.00005	<0.0005	<0.0011	<0.03	0.000051	<0.0001	0.00102	<0.0005	<0.3	<0.001	<0.00001	<0.0001	0.0016
36036	Waste – Ravine Dam	0.0431	<0.0014	**0.000106**	<0.0005	<0.0015	<0.03	<0.00005	<0.0001	0.148	0.0163	<0.3	**0.0129**	**0.000704**	<0.0001	0.0033
36037	Waste – Ravine Dam	0.0556	<0.002	**0.000199**	<0.0005	**<0.0022**	<0.03	<0.00005	<0.0001	0.283	0.015	<0.3	**0.0091**	**0.000581**	<0.0001	0.0035
36038	Waste – Ravine Dam	**0.138**	<0.0011	<0.00005	<0.0005	**<0.0022**	<0.03	<0.00005	<0.0001	0.01	0.00239	<0.3	**0.0061**	**0.000216**	<0.0001	0.0013
36039	Waste – Main Dam	**0.309**	<0.0022	<0.00005	<0.0005	<0.0016	<0.03	<0.00005	<0.0001	0.0216	<0.0005	<0.3	**0.002**	0.000043	<0.0001	0.0012
36040	Waste – Main Dam	**0.302**	<0.0022	<0.00005	<0.0005	<0.0016	<0.03	<0.00005	<0.0001	0.0211	<0.0005	<0.3	**0.0018**	0.000039	<0.0001	0.001
36041	Waste – Main Dam	**0.339**	<0.0045	<0.00005	<0.0005	**<0.0022**	<0.03	<0.00005	<0.0001	0.00972	0.00068	<0.3	**0.0097**	0.000098	<0.0001	0.0014
Dilution Factors to meet CCME		<10	<3	<12	none	152	none	none	<4	none	none	32	<13	<10	none	none

1 the CCME guideline for Chromium is dependent on speciation. Cr (III) is 0.0089 mg/L while Cr (VI) is 0.001 mg/L.

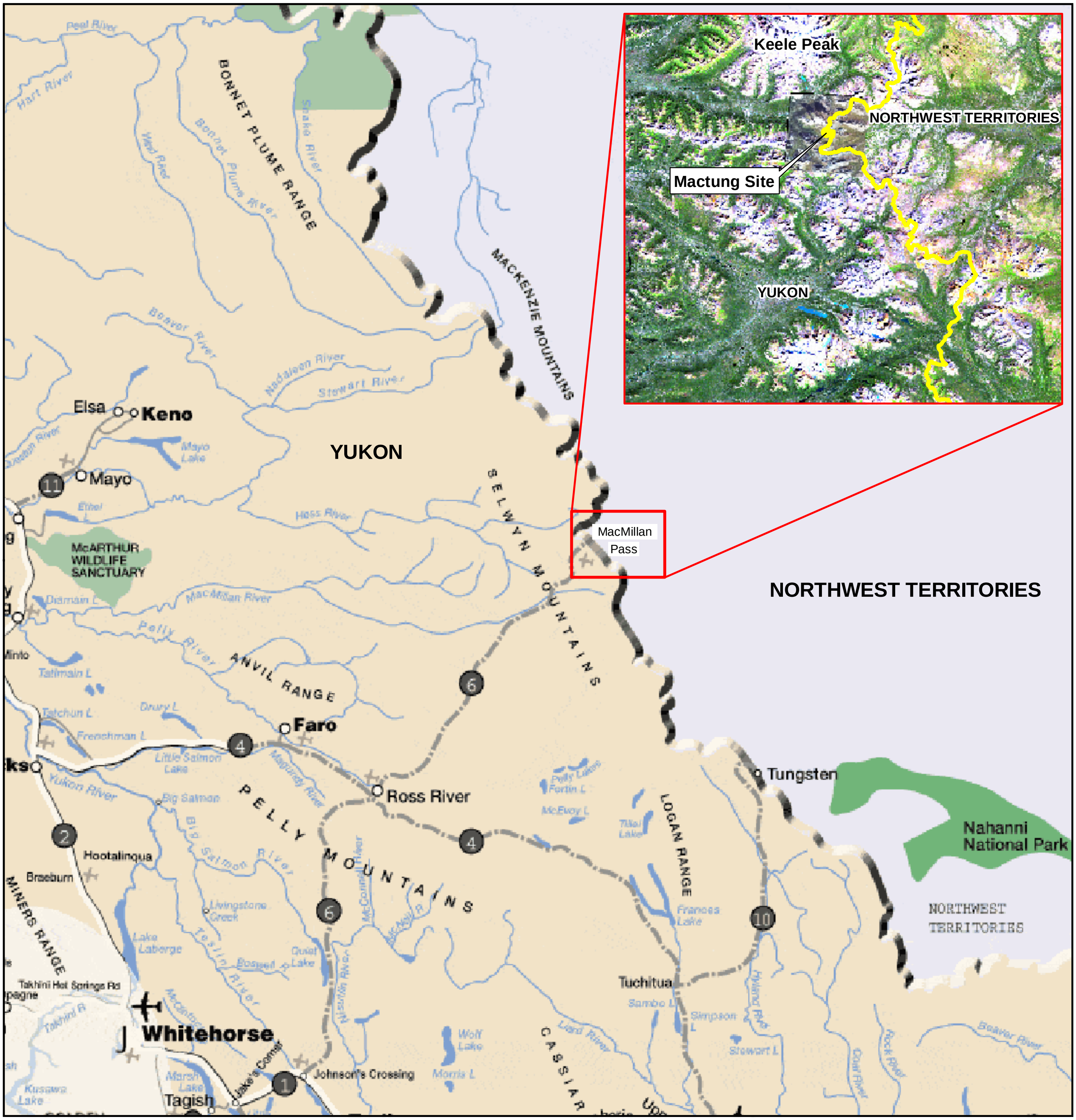
2 dilution factor shown represents required dilution for detection limit samples. No sample concentrations above detection limit.

TABLE 16: ICP METALS DETERMINATION FOR TAILINGS SAMPLES

	Crustal Abundance (ppm):	0.075	82300	1.8	425	2.8	0.0085	41500	0.15	25	102	60	56300	20900	39	23300	950	1.2	23600	84	1050	14	350	0.2	22	0.05	2.3	370	9.6	5650	0.85	2.7	120	1.25	70	165
	10 x Crustal Abundance (ppm):	0.75	823000	18	4250	28	0.085	415000	1.5	250	1020	600	563000	209000	390	233000	9500	12	236000	840	10500	140	3500	2	220	0.5	23	3700	96	56500	8.5	27	1200	12.5	700	1650
MATERIAL	SAMPLE[1]	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Se	Sn	Sr	Th	Ti	Tl	U	V	W	Zn	Zr
		ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Mactung - tailings	CSM-1975[2]	0.4	>0.1	6	64	3	69	>0.1		33	>1000	>1000	>0.1	>0.1	30	>0.1	>1000	27	>0.1	250	>1000	11	>0.1	0.5		6	160	220	10	>0.1		8	84	250	140	77
Cantung - tailings	Oct 2005 Comp 4A	1.3	4.12	6	100	13.2	536	10.3	3	37	36	1985	17.15	0.84		3.02	3460	4	0.31	36	390	12	5.64	<5		0.2		200		0.19			47	2490	526	
Cantung - tailings	Nov 2005 Comp 4A	1.4	3.64	8	80	14.2	582	9.92	<0.5	48	33	2440	20.2	0.77		2.84	3710	5	0.28	12	440	5	6.59	<5				187		0.17			44	2550	177	
Cantung - tailings	Dec 2005 Comp 4A	1.1	3.9	16	80	14.2	534	11.3	0.5	30	30	2160	17.6	0.69		2.72	3900	5	0.29	19	470	5	5.33	<5		0.2		243		0.17			44	3160	283	
Cantung - tailings	Jan 2006 Comp 4A	1.2	3.83	23	80	13.2	580	9.87	<0.5	51	29	2470	20.3	0.75		2.75	3920	5	0.31	9	490	9	6.58	<5				190		0.16			42	2410	208	
Cantung - tailings	Feb 2006 Comp 4A	1	3.57		97	15.7	613	10.46	1	43	32	1617	>15	0.89		2.85	4464	13	0.35	18	741	38						178		0.15			38	2359	263	
Cantung - tailings	Feb 2006 Comp AR	<0.2	1.85	7	29	3.9	622	5.65	1	40	13	1810	11.01	0.39	<10	1.47	753	6	0.1	12	646	35	>5	<5	<1	0.1		133	5	0.05	<10	80	14	1437	165	9
Cantung - tailings	Mar 2006 Comp 4A	<1	2.77		71	15.6	595	10	4	44	25	2615	>15	0.66		3.09	5289	5	0.27	15	617	38						139		0.11			28	2160	481	
Cantung - tailings	Mar 2006 Comp AR	<0.2	1.49	<5	23	3.9	579	5.67	3	40	9	2681	13.65	0.3	<10	1.71	879	4	0.09	9	513	36	>5	<5	<1			106	6	0.04	<10	87	9	1358	415	11
Cantung - tailings	Apr 2006 Comp 4A	<1	2.46		66	13	550	9.76	2	44	20	2702	>15	0.57		2.93	4119	8	0.26	10	561	40						130		0.09			22	2418	329	
Cantung - tailings	Apr 2006 Comp AR	<0.2	1.28	<5	21	2.9	626	5.27	2	45	7	2809	14.97	0.26	<10	1.55	843	4	0.07	8	523	42	>5	<5	<1			106	12	0.03	<10	115	6	1564	272	12
Cantung - tailings	May 2006 Comp 4A	<1	2.7		91	12.8	617	10.49	2	39	25	2004	>15	0.72		2.91	4531	9	0.27	12	556	42						150		0.12			28	1855	343	
Cantung - tailings	May 2006 Comp AR	0.3	1.44	<5	24	2.7	563	5.57	1	36	10	2083	12.11	0.29	<10	1.57	760	5	0.08	9	489	39	>5	<5	<1			114	12	0.04	<10	111	9	1456	217	10
Cantung - tailings	June 2006 Comp 4A	<1	2.32		86	9.9	656	10.4	<1	84	19	2330	>15	0.75		2.67	2842	11	0.25	11	593	41						252		0.09			24	2375	142	
Cantung - tailings	June 2006 Comp AR	<0.2	1.05	<5	24	1.7	637	7.05	<1	83	7	2668	>15	0.3	<10	1.59	624	6	0.05	8	480	40	>5	<5	<1	<0.1		221	10	0.03	10	133	8	1691	77	13

1 4A indicates 4-acid "near-total" digestion, AR indicates Aqua Regia digestion
2 Digestion method for 1975 tailings sample not known

FIGURES



LEGEND

Site Location

N
W E
S

NOTES Landsat TM imagery Earthsat acquired Sept,17, 1995
Bands 432 enhanced

MACTUNG

Location of Study Area

PROJECTION	DATUM
UTM Zone 9	NAD83

0 5 10 20 30 40
Kilometres

FILE NO.			
W23101021_021_Figure1.mxd			
PROJECT NO.	DWN	CKD	REV
W23101021.021	MEZ	SD	0
OFFICE	DATE		
EBA-VANC	July 31, 2008		

EBA Engineering Consultants Ltd.

Figure 1

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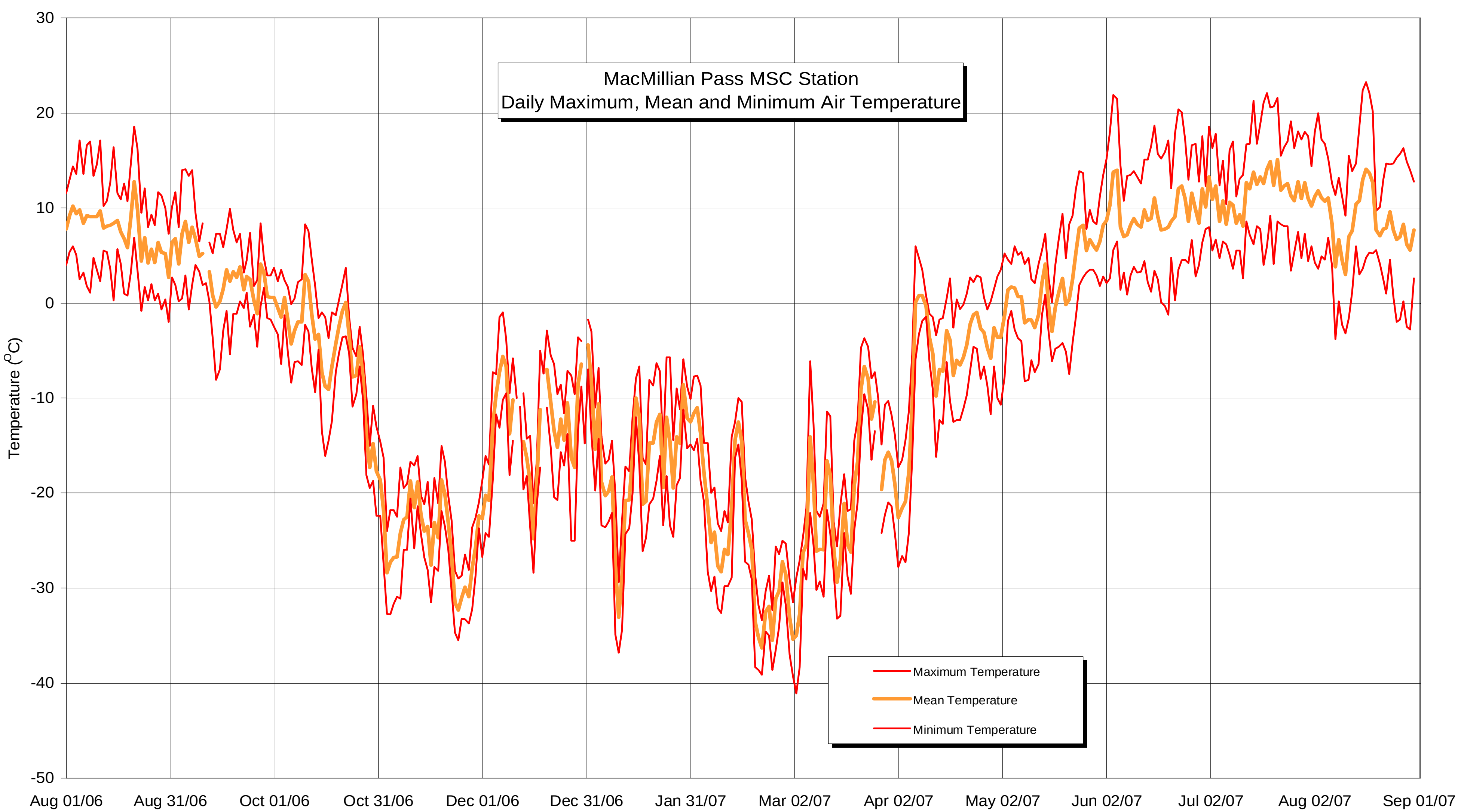


CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

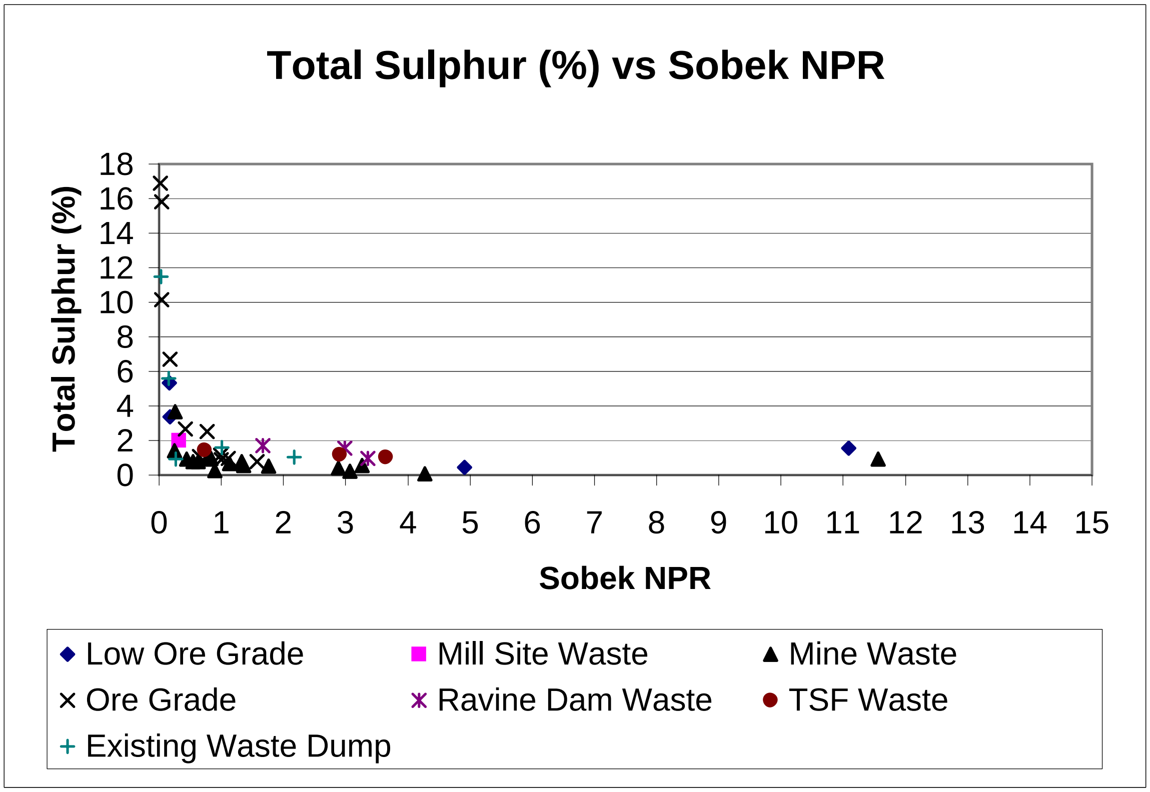
HAYCO HAY & COMPANY CONSULTANTS A DIVISION OF EBA

MACTUNG PROJECT 2007
HYDROMETEOROLOGICAL SURVEY

Aug 2006 - 2007 Air Temperature
Daily Max, Mean & Min
MacMillan Pass

PROJECT NO.	DWN	CKD	REV
W23101021	RFD	JAS	0
OFFICE	DATE		
EBA-VANC	December 2007		

Figure 2



NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

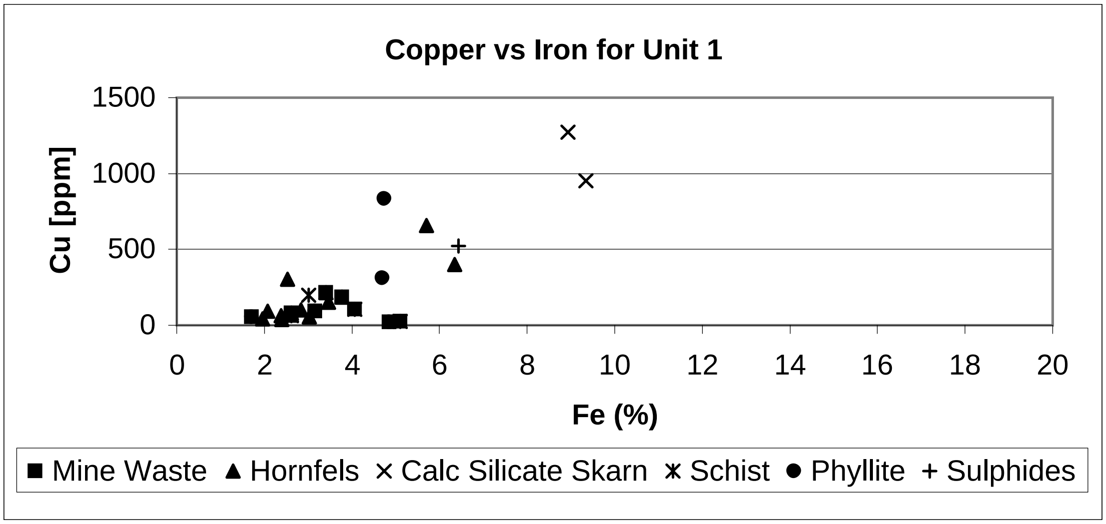
Proposed Mactung Mine

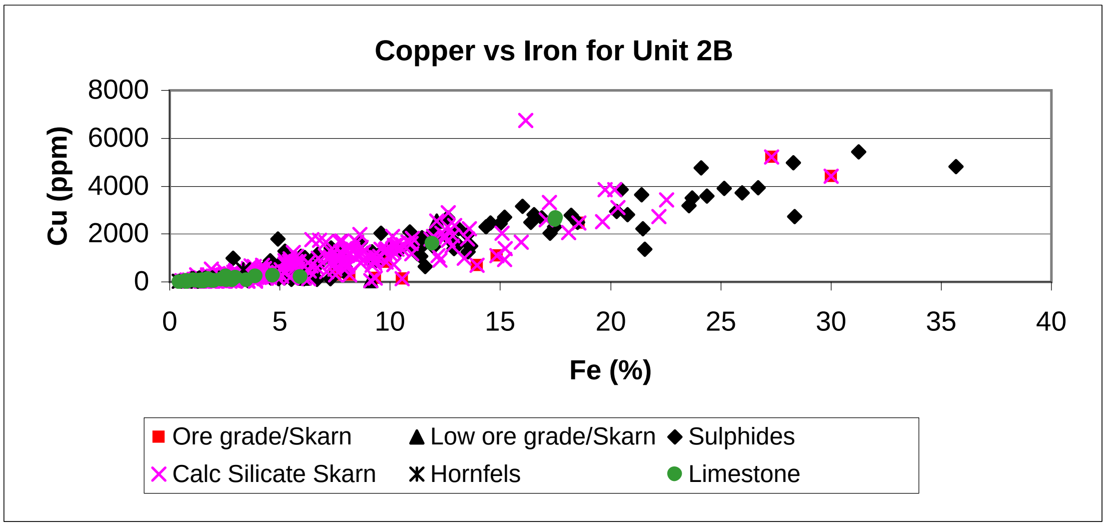
Sulphur versus Sobek-NPR
for Mactung Geochemical Samples

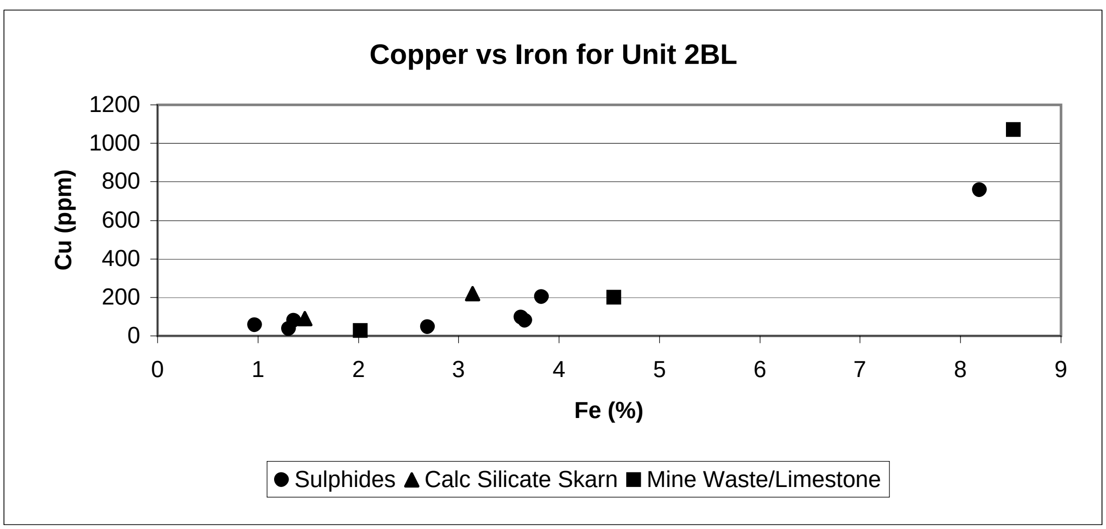
PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	BD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

EBA Engineering Consultants Ltd.

Figure 3







NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

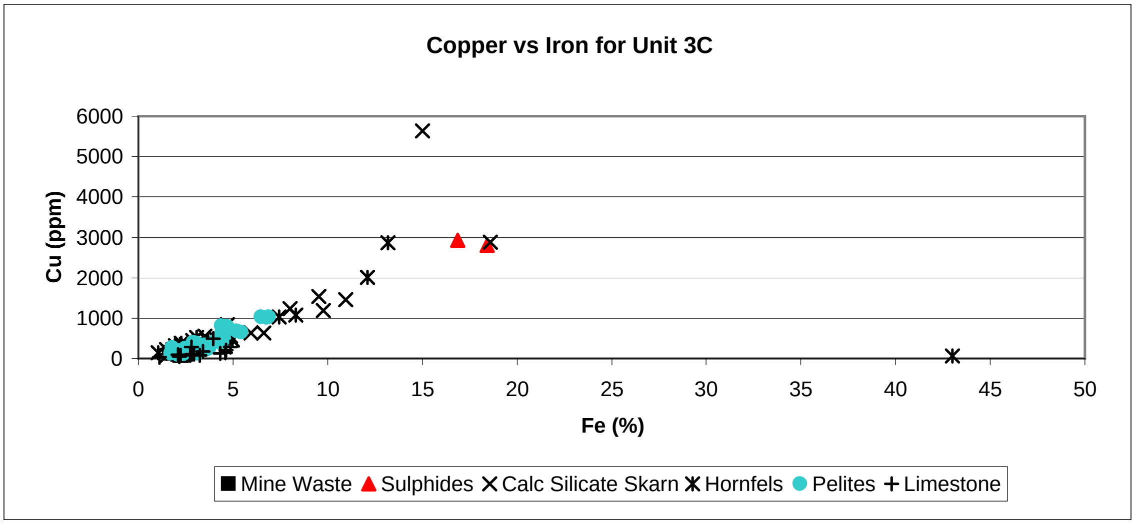
EBA Engineering Consultants Ltd.

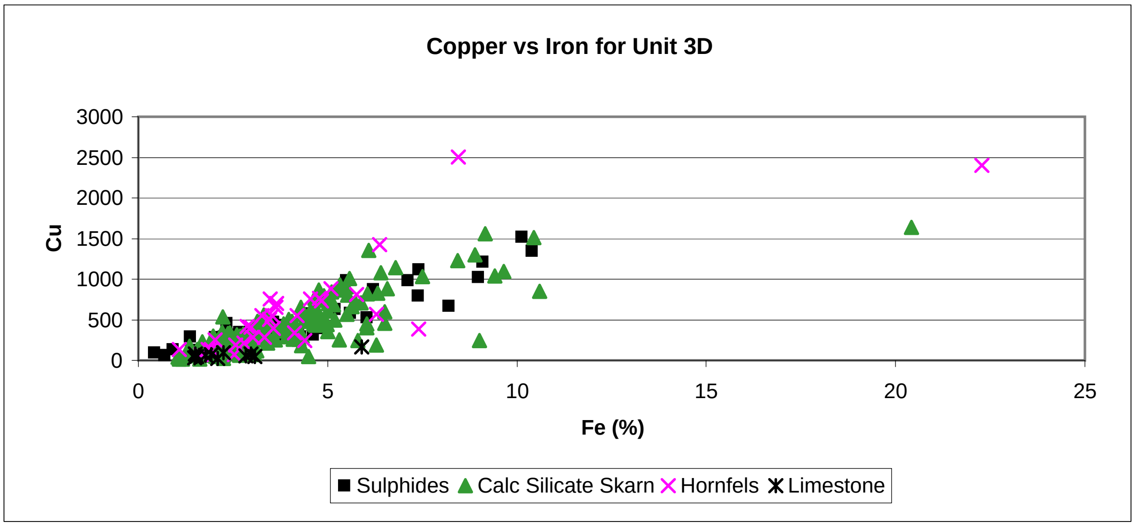
Proposed Mactung Mine

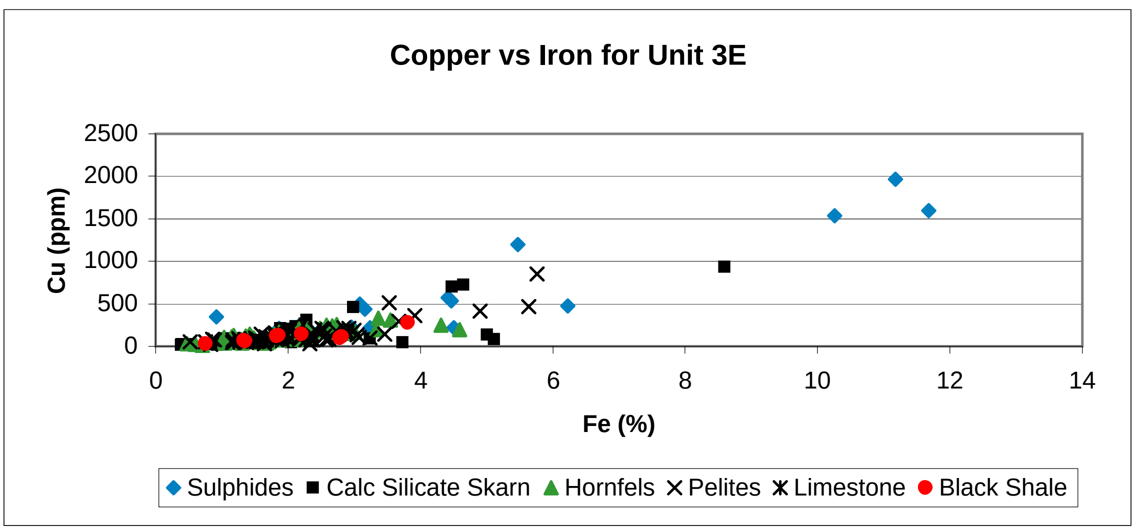
Copper versus Iron for Mactung Rock Units 1, 2B, 2BL

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SDD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 4a







NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

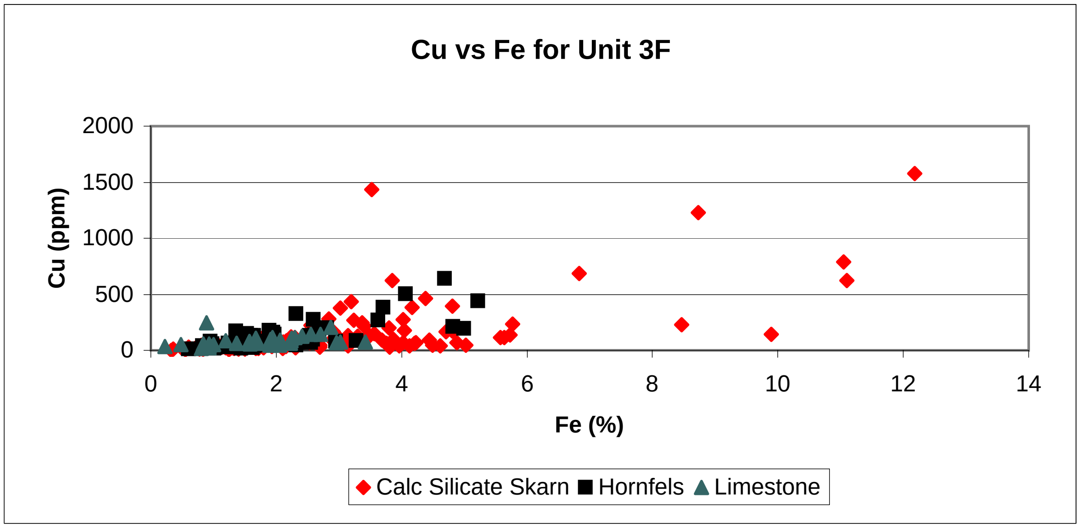
EBA Engineering Consultants Ltd.

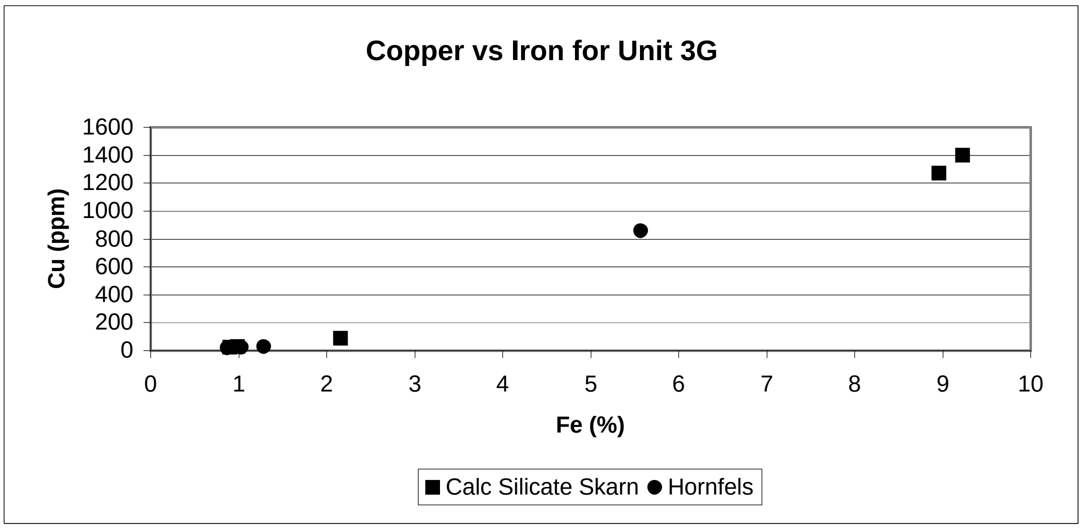
Proposed Mactung Mine

Copper versus Iron for Mactung Rock Units 3C, 3D, 3E

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 4b





NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

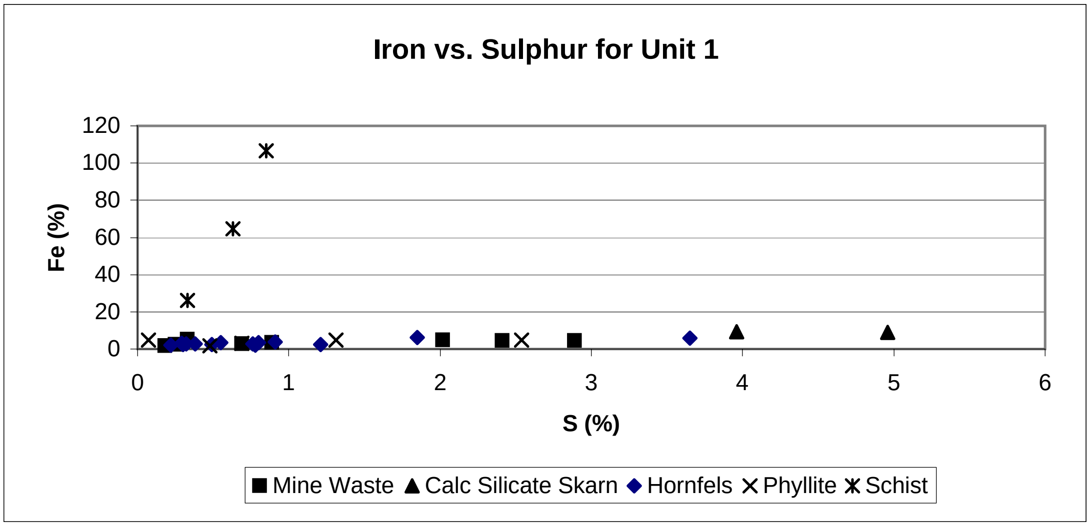
EBA Engineering Consultants Ltd.

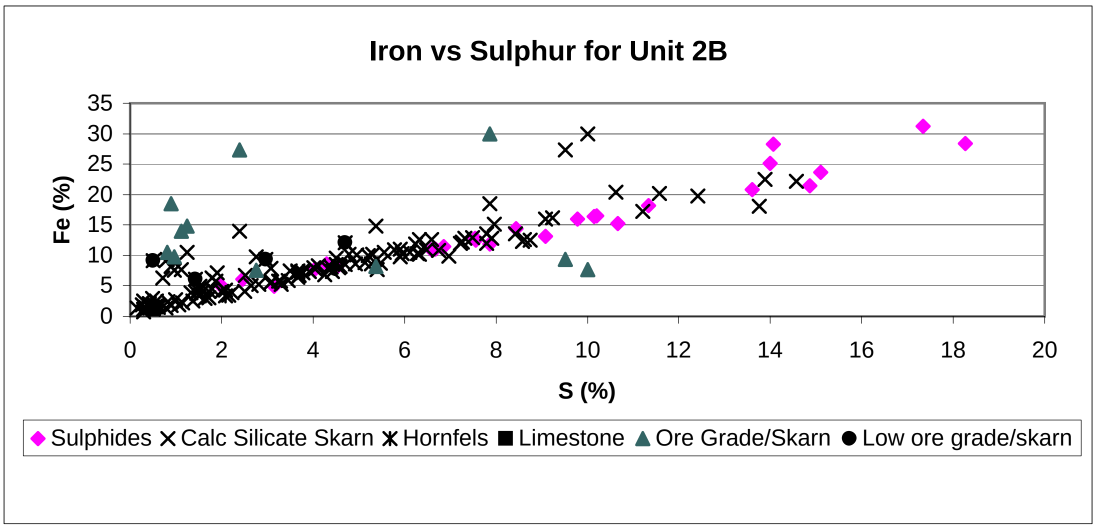
Proposed Mactung Mine

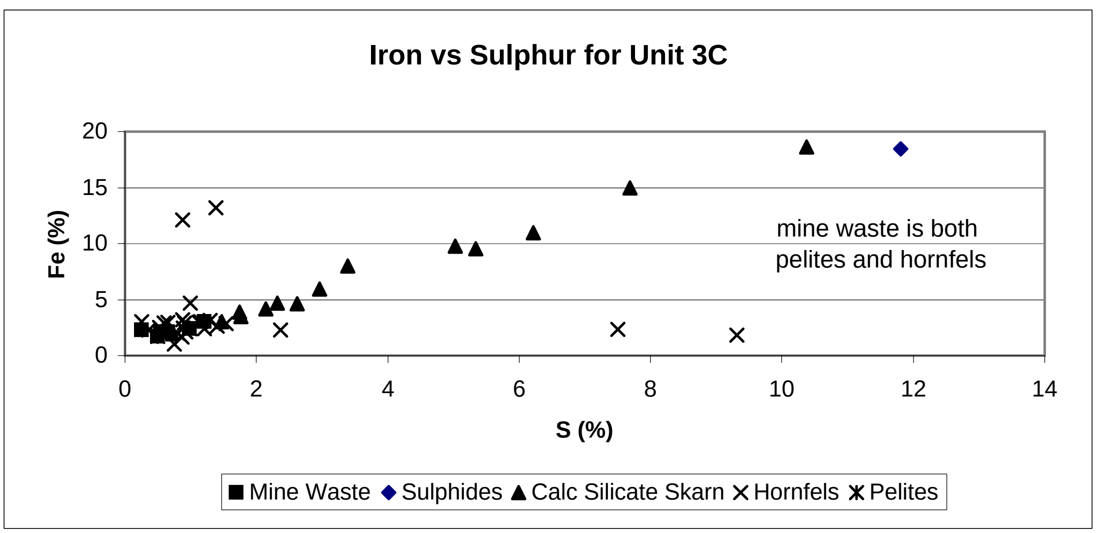
Copper versus Iron
for Mactung Rock Units 3F, 3G

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 4c







NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

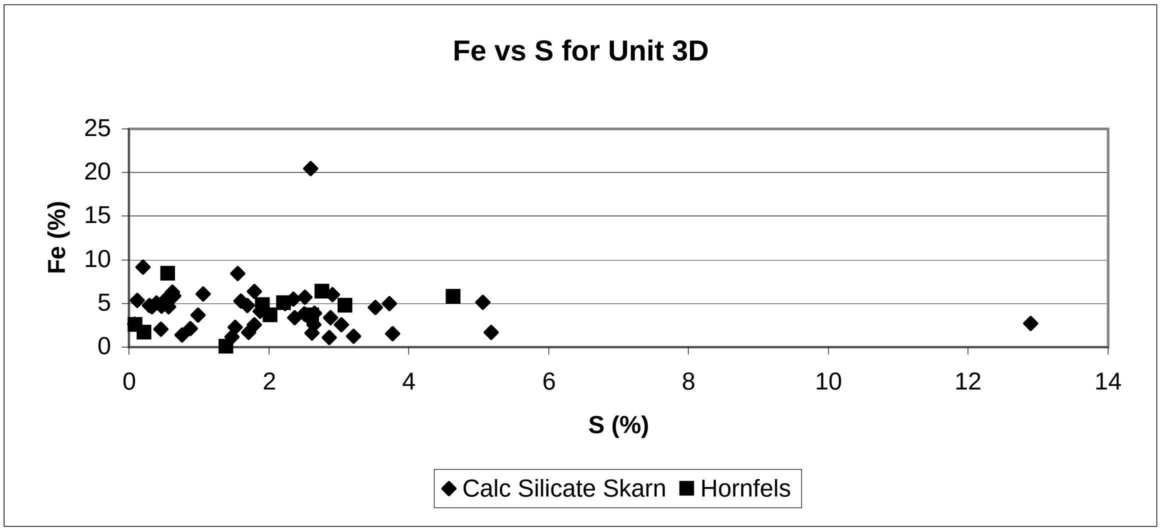
EBA Engineering Consultants Ltd.

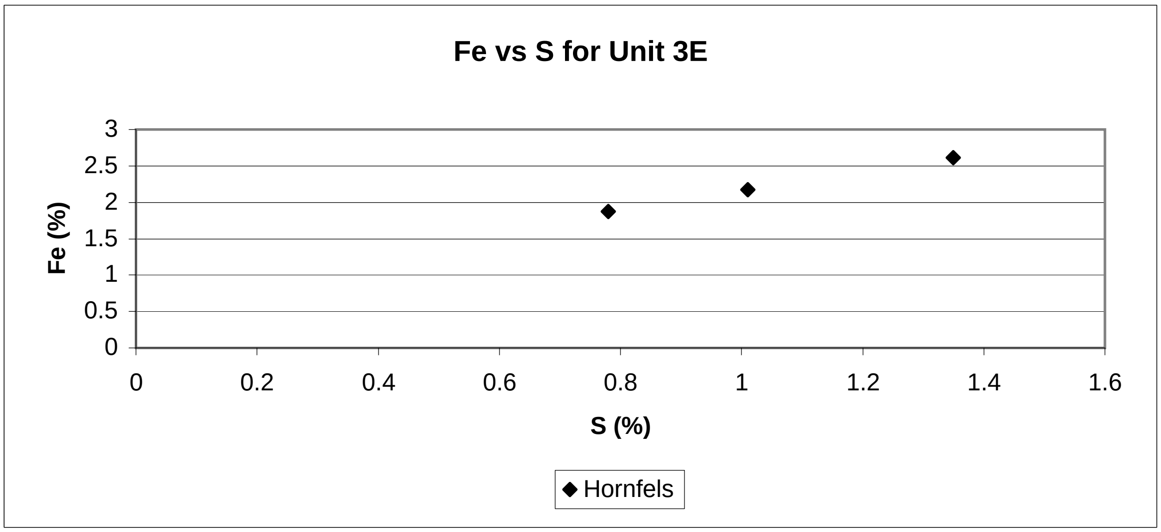
Proposed Mactung Mine

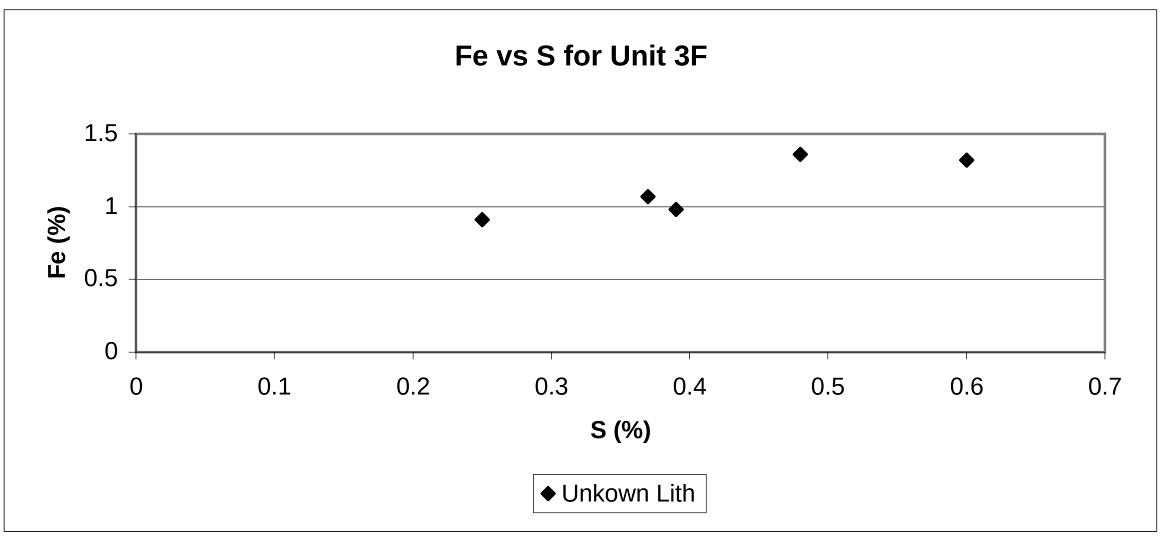
Iron versus Sulphur
for Mactung Rock Units 1, 2B, 3C

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 5a







NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

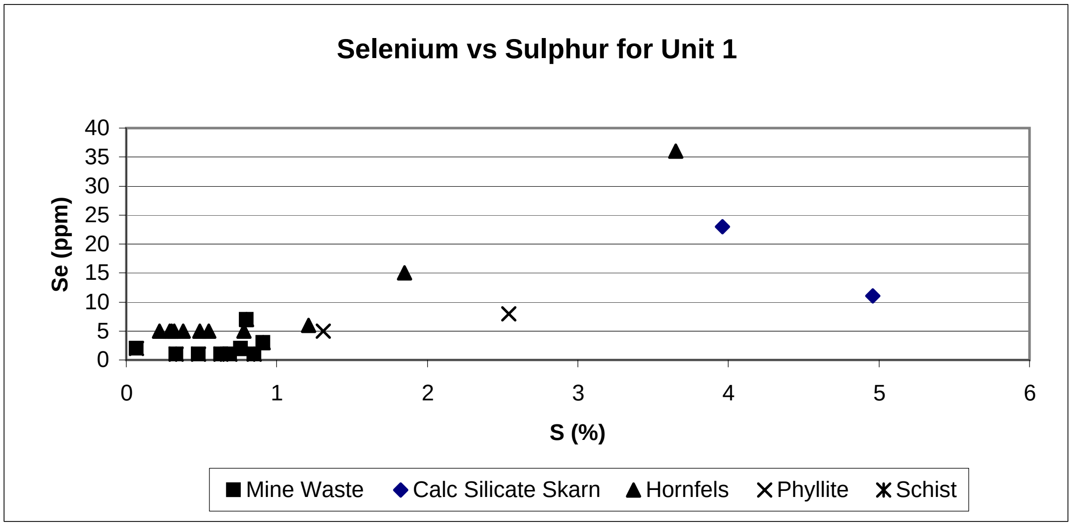
EBA Engineering Consultants Ltd.

Proposed Mactung Mine

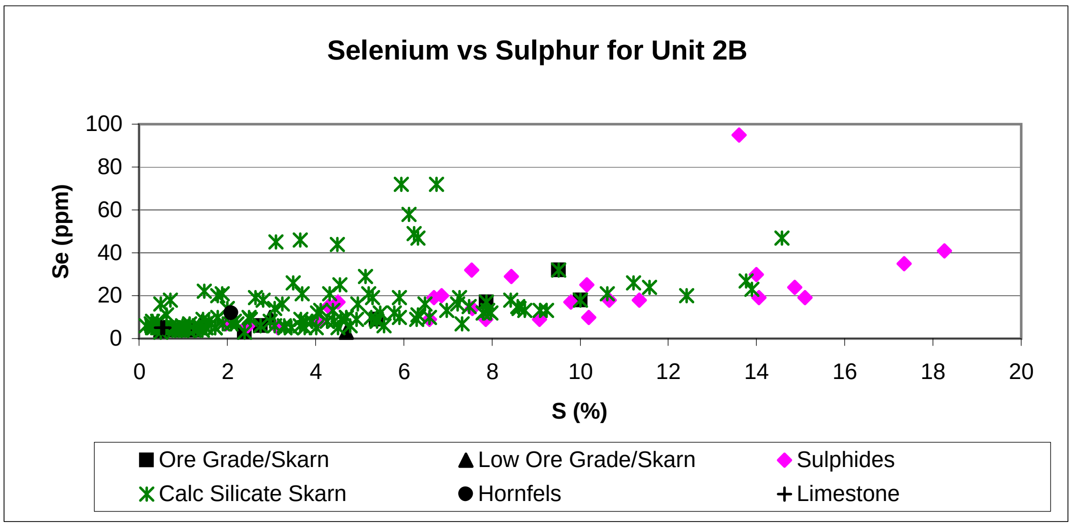
Iron versus Sulphur
for Mactung Rock Units 3D, 3E, 3F

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

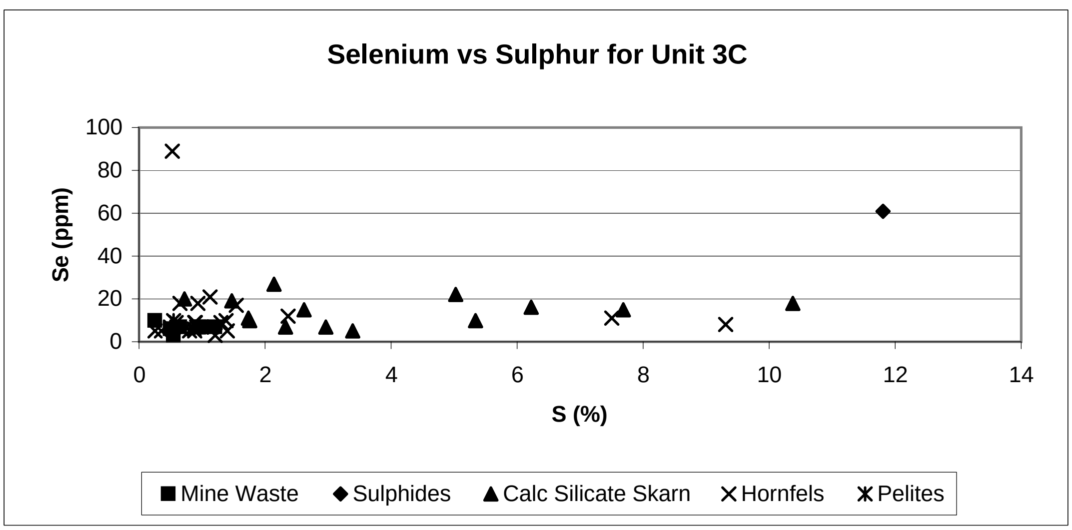
Figure 5b



Selenium vs Sulphur for Unit 1



Selenium vs Sulphur for Unit 2B



Selenium vs Sulphur for Unit 3C

NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

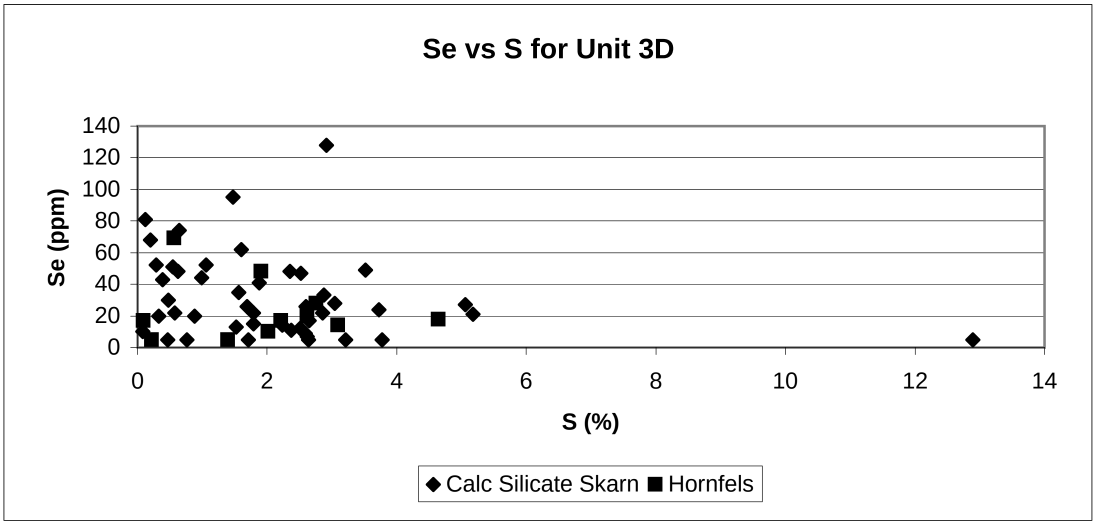
EBA Engineering Consultants Ltd.

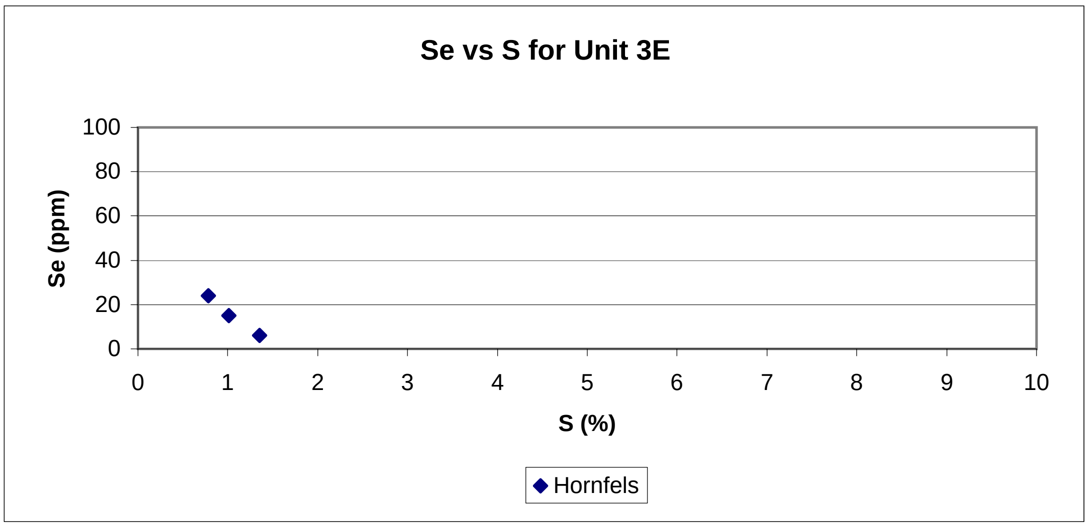
Proposed Mactung Mine

Selenium versus Sulphur for Mactung Rock Units

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 6a





NOTES

Blue Data from Exploration Program Assay Results
Other Data from Geochemical Program Assay Results

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Proposed Mactung Mine

Selenium versus Sulphur for Mactung Rock Units

PROJECT NO.	DWN	CHK	REV
W23101021.021	SCD	SCD	0
OFFICE	DATE		
EBA-WHSE	October 2008		

Figure 6b

APPENDIX

APPENDIX A ALS CHEMEX ABA AND ICP ANALYTICAL CERTIFICATES

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.

212 Brooksbank Avenue
North Vancouver BC V7J 2C1
Phone: 604 984 0221 Fax: 604 984 0218 www.alschemex.com

To: **NORTH AMERICAN TUNGSTEN CORP LTD.**
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE TR08024596

Project:
P.O. No.:
This report is for 41 Drill Core samples submitted to our lab in Terrace, BC, Canada on 17-MAR-2008.

The following have access to data associated with this certificate:

DAVE TENNEY

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
OA-VOL08	Basic Acid Base Accounting	
S-IR08	Total Sulphur (Leco)	LECO
OA-ELE07	Paste pH	
ME-MS61	48 element four acid ICP-MS	
S-CAL06	Sulfide Sulfur (calculated)	LECO
S-GRA06	Sulfate Sulfur-carbonate leach	LECO
C-GAS05	Inorganic Carbon (CO2)	
S-GRA06a	Sulfate Sulfur (HCl leachable)	

To: **NORTH AMERICAN TUNGSTEN CORP LTD.**
ATTN: DAVE TENNEY
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.

212 Brooksbank Avenue
North Vancouver BC V7J 2C1
Phone: 604 984 0221 Fax: 604 984 0218 www.alschemex.com

To: NORTH AMERICAN TUNGSTEN CORP LTD.
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	OA-VOL08 MPA tCaCO3/1000t 0.3	OA-VOL08 FIZZ RAT Unity 1	OA-VOL08 NNP tCaCO3/1000t 1	OA-VOL08 NP tCaCO3/1000t 1	OA-ELE07 pH Unity 0.1	OA-VOL08 Ratio (N Unity 0.01	S-IR08 S % 0.01	S-GRA06 S % 0.01	S-GRA06a S % 0.01	S-CAL06 S % 0.01	C-GAS05 C % 0.05	C-GAS05 CO2 % 0.2	ME-MS61 Ag ppm 0.01	ME-MS61 Al % 0.01
36001		1.30	29.4	1	-16	13	9.2	0.44	0.94	0.04	0.01	0.90	0.05	0.2	0.15	7.58
36002		1.93	23.8	1	-9	15	8.8	0.63	0.76	0.04	0.01	0.72	<0.05	<0.2	0.21	5.53
36003		1.76	23.8	1	-11	13	8.7	0.55	0.76	0.04	<0.01	0.72	<0.05	<0.2	0.12	8.12
36004		2.02	12.5	2	24	36	8.6	2.88	0.40	0.03	<0.01	0.37	<0.05	<0.2	0.11	9.97
36005		1.91	1.9	1	6	8	8.4	4.27	0.06	0.03	<0.01	0.03	<0.05	<0.2	0.04	8.78
36006		1.61	21.3	1	3	24	9.3	1.13	0.68	0.04	0.01	0.64	<0.05	<0.2	0.07	5.04
36007		1.05	17.5	2	40	57	7.7	3.26	0.56	0.06	<0.01	0.50	0.24	0.9	0.12	7.59
36008		1.91	28.4	2	-6	22	8.7	0.77	0.91	0.05	<0.01	0.86	0.10	0.4	0.13	9.38
36009		1.96	7.8	1	-1	7	7.0	0.90	0.25	0.03	<0.01	0.22	<0.05	<0.2	0.1	9.46
36010		1.44	209.4	2	-174	35	7.9	0.17	6.70	0.08	0.03	6.62	0.32	1.2	1.41	5.16
36011		0.89	528.1	1	-515	13	5.8	0.02	16.90	0.12	0.07	16.80	<0.05	0.2	2.41	3.86
36012		2.21	493.8	1	-476	18	7.3	0.04	15.80	0.06	0.02	15.75	<0.05	<0.2	3.56	4.67
36013		1.08	28.1	2	0	28	8.9	1.00	0.90	0.06	0.02	0.84	0.08	0.3	0.39	7.64
36014		0.77	35.3	2	0	35	8.4	0.99	1.13	0.08	0.01	1.05	0.06	0.2	1.25	5.88
36015		1.02	317.2	1	-303	14	7.3	0.04	10.15	0.07	0.01	10.10	<0.05	<0.2	1.53	6.72
36016		1.10	78.8	2	-18	61	8.2	0.77	2.52	0.06	0.02	2.46	<0.05	<0.2	0.61	2.41
36017		1.42	105.3	1	-86	19	8.8	0.18	3.37	0.06	0.01	3.31	<0.05	<0.2	0.76	6.06
36018		2.24	83.1	2	-48	35	7.7	0.42	2.66	0.07	0.04	2.59	<0.05	<0.2	0.85	4.05
36019		0.72	14.1	2	55	69	8.8	4.91	0.45	0.04	<0.01	0.41	<0.05	<0.2	0.45	7.31
36020		1.05	24.1	2	14	38	8.6	1.58	0.77	0.05	0.01	0.72	<0.05	0.2	0.46	5.47
36021		1.69	166.9	2	-141	26	8.1	0.16	5.34	0.04	0.01	5.30	0.12	0.4	1.73	5.43
36022		1.09	48.4	4	489	537	9.0	11.09	1.55	0.04	<0.01	1.51	3.17	11.6	0.54	2.51
36023		0.61	29.7	2	3	33	9.1	1.11	0.95	0.04	<0.01	0.91	0.23	0.9	0.43	6.22
36024		1.38	34.1	2	-12	22	8.8	0.65	1.09	0.04	<0.01	1.05	0.07	0.3	0.86	7.12
36025		2.04	44.4	1	-33	11	8.7	0.25	1.42	0.02	<0.01	1.40	<0.05	<0.2	0.21	4.51
36026		1.31	24.1	2	8	32	8.9	1.33	0.77	0.02	<0.01	0.75	<0.05	<0.2	0.24	4.48
36027		2.09	7.5	2	16	23	8.7	3.07	0.24	0.02	0.02	0.22	0.05	0.2	0.07	4.99
36028		1.16	16.9	2	6	23	9.0	1.36	0.54	0.02	0.01	0.52	0.05	0.2	0.16	4.28
36029		2.14	30.0	2	-5	25	9.3	0.83	0.96	0.01	<0.01	0.95	<0.05	<0.2	0.28	5.3
36030		1.95	15.9	1	12	28	7.6	1.76	0.51	0.02	0.01	0.49	<0.05	<0.2	0.49	4.52
36031		1.75	27.8	4	731	759	9.1	27.29	0.89	0.02	<0.01	0.87	8.32	30.5	0.09	2.01
36032		1.39	29.1	3	307	336	8.4	11.56	0.93	0.03	<0.01	0.90	3.87	14.2	0.48	4.84
36033		1.46	114.4	2	-84	30	8.2	0.26	3.66	0.07	0.01	3.59	0.24	0.9	0.76	7.32
36034		1.32	62.2	1	-42	20	6.9	0.32	1.99	0.04	0.05	1.95	0.05	0.2	0.5	6.34
36035		1.25	0.6	4	621	622	9.5	995.2	0.02	0.02	0.02	<0.01	2.09	7.7	0.1	2.06
36036		1.22	30.3	3	72	102	8.3	3.36	0.97	0.04	<0.01	0.93	1.22	4.5	1.38	2.1
36037		1.07	52.8	3	35	88	8.2	1.67	1.69	0.05	<0.01	1.64	1.00	3.7	1.23	2.76
36038		1.02	48.1	3	96	144	7.9	2.99	1.54	0.05	0.01	1.49	1.36	5.0	1.19	3.4
36039		1.41	36.6	3	69	106	8.5	2.90	1.17	0.04	<0.01	1.13	0.69	2.5	1.45	5.27
36040		1.07	31.9	3	84	116	9.3	3.64	1.02	0.02	<0.01	1.00	1.22	4.5	1.1	5.66

***** See Appendix Page for comments regarding this certificate *****

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.

212 Brooksbank Avenue
North Vancouver BC V7J 2C1
Phone: 604 984 0221 Fax: 604 984 0218 www.alschemex.com

To: NORTH AMERICAN TUNGSTEN CORP LTD.
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method / Analyte / Units / LOR	ME-MS61 As ppm 0.2	ME-MS61 Ba ppm 10	ME-MS61 Be ppm 0.05	ME-MS61 Bi ppm 0.01	ME-MS61 Ca % 0.01	ME-MS61 Cd ppm 0.02	ME-MS61 Ce ppm 0.01	ME-MS61 Co ppm 0.1	ME-MS61 Cr ppm 1	ME-MS61 Cs ppm 0.05	ME-MS61 Cu ppm 0.2	ME-MS61 Fe % 0.01	ME-MS61 Ga ppm 0.05	ME-MS61 Ge ppm 0.05	ME-MS61 Hf ppm 0.1
36001		0.7	1180	3.13	1.97	3.09	0.06	78	14.7	65	24.4	185	3.77	20.8	0.16	1.9
36002		1.8	730	4.97	33.3	4.7	2.37	49	9.8	84	11.55	214	3.41	21.5	0.17	2.7
36003		1.1	860	5.55	2.77	3.5	1.07	71.9	13.2	67	20.9	81.6	2.61	23.6	0.12	2.4
36004		5	890	15.85	0.87	3.27	0.05	85	14.9	66	25.9	56.8	1.71	27.6	0.15	2.6
36005		1.9	1110	3.54	0.44	0.61	0.03	99.4	16.5	73	32.3	19.2	4.85	24.8	0.15	2.4
36006		0.3	480	1.73	1.67	1.37	0.07	79.6	11.7	43	23.2	93.7	3.16	15.55	0.12	3.2
36007		3.9	1150	4.71	19.6	3.51	0.04	79.2	18.4	60	23.1	64.8	2.61	24.6	0.14	2.5
36008		1.3	1450	3.94	2.18	2.06	0.04	98.6	16.5	73	28.1	106.5	4.06	31.2	0.16	2.7
36009		39.9	910	3.31	0.39	0.3	0.21	96.4	26.8	74	20.5	26.2	5.1	26.5	0.15	2.2
36010		11	100	6.3	492	10.45	0.38	47.3	50.3	33	1.7	1100	14.85	21.3	0.59	1.3
36011		1	<10	15	3.26	5.91	0.55	9.15	81.3	5	1.38	4410	30	35.3	0.69	0.2
36012		<0.2	60	6.69	796	3.24	0.58	30.3	52.9	13	17.25	5210	27.3	43.8	0.64	0.6
36013		17	350	9.99	26.8	10.75	0.5	71.3	15.1	49	4.16	290	7.53	40.9	1	2
36014		20	100	29.7	91.1	14.1	0.25	43.2	22.7	27	4.29	129.5	10.55	35.8	0.7	1.2
36015		0.4	330	11.65	343	5.44	0.5	58.5	35.6	41	16.2	2450	18.55	44.8	0.86	1.4
36016		16	<10	14.45	6.3	16.05	0.47	8.59	43.5	5	0.09	691	13.95	25.2	0.54	0.3
36017		<5	260	8.74	23.2	10.4	0.26	62.2	30.3	36	5.3	907	9.31	29.8	0.73	1.5
36018		4.1	170	25.1	25.6	8.33	0.3	28.2	15.5	26	6.2	828	9.81	43.7	0.65	0.6
36019		20	340	21.9	31.1	16.75	0.28	56.7	13.2	36	1.2	49.4	9.12	34.1	0.56	1.4
36020		10	50	13.5	15.85	12.8	0.22	53	9.5	37	3.04	159	9.33	37.3	0.58	1.8
36021		1.5	30	16.95	420	8.23	0.45	42.9	38.1	39	1.82	2540	12.1	56.3	0.73	1.1
36022		10	270	13.65	6.74	28.4	0.47	25.6	11.6	21	1.34	170.5	6.11	16.6	0.52	0.6
36023		19	140	11.45	3.06	14.55	0.28	61.9	16.9	33	2.98	292	8.17	27.8	0.45	1.4
36024		14	20	20.8	111	13	0.29	67	9.8	36	1.56	960	7.69	46.9	0.62	1.2
36025		0.4	1080	1.72	2.21	1.3	0.06	42.7	10.7	39	9.12	170.5	3.04	13	0.28	2.3
36026		1.4	900	1.93	7.27	3.55	1.88	44.8	7.3	72	7.29	163	2.11	12.65	0.32	2.2
36027		<0.2	2340	2.07	0.26	1.84	0.1	35	9.3	61	8.04	60.5	2.3	13.1	0.29	2.6
36028		0.3	1010	4.38	0.82	2.54	1.72	44.1	7	71	9.27	124	1.74	13.5	0.33	2.8
36029		0.5	1320	2.38	1.15	3.39	1.79	51.9	8.9	67	7.47	106	2.39	15.55	0.38	2.8
36030		12.4	2570	3.16	0.66	2.74	1.14	56	8.5	60	9.17	88.1	2.09	12.7	0.39	2.5
36031		9	1200	1.52	2.26	32.7	0.18	18.55	5	14	0.87	25.2	2.02	5.45	0.2	0.5
36032		26	490	11	4.98	19.9	0.54	48.5	12.4	31	2.35	198	4.55	21.5	0.66	1.6
36033		6	740	6.97	21.7	5.72	0.16	66.2	43.2	46	16.9	1070	8.53	38.7	0.73	1.5
36034		0.9	690	2.53	0.59	2.43	0.21	42.2	18.2	47	7.52	48.3	3.08	18.45	0.34	4.2
36035		11	30	0.65	3.52	32.4	2.07	47.9	4	10	0.12	5.8	1.62	6.06	0.31	2
36036		18.5	1310	1.55	0.64	4.15	9.63	17.7	5	103	5.31	62.7	1.45	10.25	0.2	1.4
36037		35.5	860	1.66	0.21	3.38	8.67	27.8	6.1	94	4.7	98.5	1.64	9.59	0.26	1.7
36038		30.4	600	2.06	0.25	4.4	5.19	30.7	7	85	5.7	22.3	2.55	10.85	0.25	2.1
36039		7.5	930	2.05	0.2	4.55	3.94	48.7	9	69	10.05	165.5	2.42	14.5	0.32	3.1
36040		3	1820	2.05	0.16	4.14	3.46	31.3	9.3	50	10.2	103	2.57	15.05	0.32	2.9

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To: NORTH AMERICAN TUNGSTEN CORP LTD.
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
Analyte	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S
Units	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%
LOR	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01
36001	0.046	1.84	39.8	104.5	1.19	465	19.2	0.64	12.8	25.1	460	9.9	188.5	<0.002	0.91
36002	0.461	0.94	28.2	78	1.03	1270	46.6	0.28	16.2	84.3	710	4.3	98.7	0.079	0.8
36003	0.095	2.09	32	96	1.04	391	4.78	0.42	11.9	23.8	360	10.5	90.4	<0.002	0.76
36004	0.058	2.81	39.8	201	0.39	199	3.33	0.73	11	52.9	530	14.8	164	0.006	0.48
36005	0.087	2.64	48.1	141	1.11	342	0.54	0.2	18	38.5	390	11.8	166	<0.002	0.07
36006	0.052	1.61	39.1	107.5	0.86	432	1.1	0.4	11.8	18	930	6	173	<0.002	0.69
36007	0.08	2.44	39.9	111	1.18	476	2.08	0.27	14.6	28.7	490	18	155.5	0.005	0.63
36008	0.09	2.8	50.6	157	1.23	418	1.93	0.76	14.2	35.1	570	11.8	234	0.002	0.85
36009	0.066	2.68	51.5	114	0.48	548	16.75	0.18	13.2	47.9	510	16	187.5	<0.002	0.33
36010	0.949	0.15	25.3	18.1	1.51	3220	3.9	0.16	9.7	37.3	490	7	11.4	0.058	5.38
36011	0.281	0.1	4.3	14.3	0.81	1330	13.05	0.2	15.2	15.1	3530	5.6	14.8	0.054	>10.0
36012	0.231	1.11	14.5	92.3	1.09	905	6.1	0.36	11.9	21.5	4070	8.4	199.5	0.033	9.52
36013	0.796	0.8	38.4	31.5	1.15	4230	9.28	0.45	16.2	30.1	1730	8.9	48	0.055	0.97
36014	1.205	0.11	22.5	27.8	1.1	6080	15.85	0.15	24.3	16.7	980	8.8	10.6	0.08	1.25
36015	0.459	1.62	31.2	91.7	1.59	2100	3.99	0.37	13.5	22	1440	8.4	176	0.107	7.87
36016	0.839	0.01	3.6	10.6	1.16	9200	328	0.02	0.6	28.5	560	1.8	0.5	0.041	2.4
36017	0.566	0.57	30.8	32.2	3.53	3850	4.85	0.25	11.2	27.5	1990	5	57.1	0.041	2.97
36018	1.035	0.1	14.5	36.1	0.71	6340	9.41	0.16	4.3	12.5	1520	3.6	8.9	0.032	2.76
36019	1.195	0.32	31.1	26.2	0.91	5530	8.96	0.25	16.5	18.2	530	6.7	15.8	0.027	0.5
36020	0.831	0.08	29.8	18	1.49	5290	69	0.17	19.9	31.9	3980	3.1	4.6	0.069	0.81
36021	0.538	0.1	21.9	21.4	1.44	4500	4.47	0.15	11.1	35.9	1670	4	14.1	0.05	4.7
36022	0.529	0.15	12.9	17.1	1.18	3980	6.26	0.02	6.2	7.9	640	3.9	8.7	0.019	1.43
36023	0.724	0.17	32.3	29.4	4	4650	3.52	0.2	15.9	33.5	300	4.5	18.9	<0.002	0.9
36024	1.395	0.07	37.1	14.6	2.87	5750	2.09	0.16	15.5	10.4	450	3.7	9.5	0.03	1.12
36025	0.026	1.77	23.8	71.1	0.77	155	24.3	0.28	7.1	51.2	250	5.8	112.5	0.012	1.21
36026	0.032	2.03	25.3	48.6	1.08	207	19.2	0.19	12	49.2	6120	6.6	107.5	0.036	0.65
36027	0.019	2.39	19.5	79	1	220	22.2	0.19	10.6	51.5	470	7.6	139.5	0.041	0.25
36028	0.051	1.74	24.6	52.4	0.79	169	15.8	0.23	18	51.2	1650	7	104	0.04	0.5
36029	0.043	1.58	29.2	48.7	1.19	161	18.35	0.14	9.5	49.5	3970	4.1	93.1	0.035	0.98
36030	0.017	1.9	30.2	46.9	1.33	203	15.9	0.1	14.6	66.3	4030	4.9	103.5	0.031	0.55
36031	0.075	0.29	9.7	13.5	0.69	764	1.75	0.05	3.6	8.7	2020	4.1	12.1	0.002	0.83
36032	0.373	0.65	25.5	20.1	1.65	2750	3.48	0.1	13.5	18.3	1370	6.8	31.5	0.012	1.01
36033	0.201	1.76	35.6	82.9	1.81	1225	59.5	0.3	17.8	37.8	1290	10.3	176.5	0.036	3.52
36034	0.033	3.56	24.4	89.5	0.9	153	11.7	0.57	30.9	35.7	830	16.2	120.5	0.009	1.87
36035	0.3	0.04	29.1	6.5	0.69	1295	0.35	0.01	18.4	2.6	3280	3.6	1.9	<0.002	0.02
36036	0.048	0.92	13.1	22.9	0.24	161	40.8	0.03	13.6	147	730	16	49.2	0.024	0.95
36037	0.034	1.26	21	51.1	0.33	159	45.3	0.03	15.8	154	900	8.3	54.1	0.02	1.57
36038	0.029	1.18	22.3	123.5	1.28	475	40.8	0.06	16.6	146.5	1050	9.1	49.7	0.013	1.55
36039	0.025	3.1	31	89	1.93	141	10.55	0.07	19.1	65.7	>10000	12.2	128.5	0.037	1.11
36040	0.035	3.26	19.1	101.5	2.54	227	22.5	0.17	9.2	57.5	1220	14.5	135	0.033	1

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Sample Description	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn
Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
LOR	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1	0.1	0.1	2
36001	0.07	12.8	3	8.6	136.5	0.88	0.06	15	0.403	1.36	1.7	76	66.9	16.4	57
36002	0.13	10.8	7	14.6	106	1	0.34	9.2	0.418	0.95	16.8	1215	351	22	279
36003	0.06	15.6	2	15.3	203	0.9	0.06	13.1	0.413	1.2	2.2	91	20.4	17.1	106
36004	0.41	13.2	1	8	421	0.76	0.05	15.9	0.333	1.47	3.9	71	880	14	32
36005	0.05	17.4	2	6.2	51.4	1.35	0.07	18.1	0.505	1.59	2.6	92	3.9	18.5	73
36006	0.06	9.3	1	6.3	51.8	1	<0.05	15.3	0.339	1.27	3.5	42	80.1	18.1	48
36007	0.29	16.3	<1	15.2	165	1.09	0.36	15.6	0.34	1.51	2	81	780	19.1	64
36008	0.15	19.2	<1	16.7	79.5	1.15	0.06	19.5	0.466	1.93	2.3	92	214	20.4	68
36009	12.65	15.1	<1	3.7	50.5	1	<0.05	18.6	0.35	2.03	2.7	66	19.1	13.2	448
36010	1.44	6.4	9	67.6	134	0.56	8.5	8.8	0.242	0.47	2.3	37	6290	13.9	218
36011	0.16	2.4	18	3.4	35.4	0.3	0.6	1.2	0.039	0.43	2.1	25	9350	4.6	48
36012	0.41	5.9	32	4.9	74.4	0.06	11.1	3.6	0.091	1.46	2.9	30	6180	10.6	77
36013	0.17	14.5	4	26.6	122	0.82	0.84	11.8	0.298	0.73	5.8	164	4520	17.8	206
36014	2.61	11.2	4	51.1	134.5	0.67	2.45	10.7	0.276	0.79	3.3	44	8920	12.4	327
36015	0.26	10.1	17	11.1	100.5	0.61	4.9	10.3	0.254	1.99	3.1	36	9230	12.6	110
36016	0.48	4	3	76.7	32.1	<0.05	0.13	0.6	0.039	0.26	0.7	33	2440	10.1	395
36017	0.14	11.5	8	39.7	124.5	0.62	0.61	8.9	0.227	0.66	3.2	64	3990	21	153
36018	0.6	8.2	6	30	45.1	<0.05	0.65	4.5	0.117	0.36	2.8	32	7710	12.9	188
36019	1.61	12.5	3	51.7	189.5	0.75	0.88	10.6	0.319	0.3	3.1	70	2500	13.3	278
36020	0.35	12.6	4	24.3	169	0.79	0.55	8.5	0.312	0.54	7	295	6460	24.5	252
36021	0.3	12.4	10	17.9	80.9	0.45	4.29	6.7	0.193	0.51	3.6	110	4750	16.9	126
36022	1.93	7.1	4	52.8	345	0.24	0.14	3.5	0.106	0.23	2.1	27	1770	8.6	172
36023	0.88	9.2	4	54.8	170	1.03	0.18	11.2	0.29	0.02	2.1	58	590	16.9	290
36024	0.24	12.8	4	52.8	140	0.75	1.6	10.5	0.275	0.31	1.5	40	2690	12.1	265
36025	0.12	9.5	6	2.9	62.7	0.45	0.06	7.3	0.222	0.95	6.1	274	14.6	10.6	42
36026	0.16	9.1	7	6.2	149	0.75	0.28	7.2	0.292	0.73	8.3	633	32.3	26.4	207
36027	0.06	10.2	3	0.9	84.1	0.71	<0.05	8.3	0.325	1.02	8	537	4.2	16.3	83
36028	0.1	8	7	4	106	1.12	0.06	7.4	0.368	0.83	12.4	505	10.1	28	186
36029	0.16	10.7	7	1	107	0.64	0.07	8.9	0.278	0.77	8.8	421	11.4	27.6	208
36030	1.59	9.2	10	2.5	85	0.88	0.06	8.7	0.308	0.68	8.8	577	10.3	32	133
36031	1.17	4.4	2	7.2	676	0.2	<0.05	3.2	0.102	0.11	2.4	28	41.9	6.9	52
36032	1.88	11.6	5	35.1	378	0.7	0.16	8.4	0.283	0.29	3.3	60	1130	14.9	174
36033	0.77	14.7	6	10.2	199	0.85	0.71	10.5	0.272	1.23	2.8	72	3130	15.5	97
36034	1.71	14.6	5	2.8	137	1.87	0.08	9.7	0.501	0.64	7.6	158	32.1	22.4	59
36035	0.38	4.2	3	226	251	0.64	0.06	4.7	0.237	<0.02	2.7	33	34	25.8	86
36036	2.58	5	8	3.1	102	0.6	0.08	2.9	0.172	1.05	12.1	693	4.8	7.6	630
36037	2.33	6.8	11	1.2	111.5	0.8	0.06	3.7	0.209	1.17	17	814	3.3	14.8	484
36038	5.89	11.4	7	0.8	75.2	0.88	0.15	4.2	0.226	1.41	13.5	818	3.3	24.8	380
36039	5.12	9.5	10	1.4	121	1.11	0.1	8.1	0.312	0.88	12.9	518	3.3	32.9	332
36040	6.73	9.1	7	1.3	127	0.58	0.08	9.4	0.253	0.87	10.9	417	1.8	17	318

***** See Appendix Page for comments regarding this certificate *****

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ALS Canada Ltd.

212 Brooksbank Avenue
North Vancouver BC V7J 2C1
Phone: 604 984 0221 Fax: 604 984 0218 www.alschemex.com

To: NORTH AMERICAN TUNGSTEN CORP LTD.
128D COPPER ROAD
WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method / Analyte / Units / LOR	ME-MS61 Zr ppm 0.5
36001		64.2
36002		92.1
36003		76.1
36004		88.2
36005		78.8
36006		96.5
36007		80.6
36008		86.4
36009		72
36010		35.7
36011		7.4
36012		22.8
36013		69.5
36014		35.7
36015		49.2
36016		10.2
36017		53
36018		18.9
36019		41.9
36020		71.1
36021		35.7
36022		16.1
36023		43.3
36024		43.8
36025		90.3
36026		85
36027		102
36028		115
36029		109
36030		99.8
36031		17.1
36032		54.5
36033		50.9
36034		168.5
36035		77.6
36036		68.2
36037		71.8
36038		82.4
36039		126.5
36040		111

***** See Appendix Page for comments regarding this certificate *****

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Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	OA-VOL08 MPA tCaCO3/1000t 0.3	OA-VOL08 FIZZ RAT Unity 1	OA-VOL08 NNP tCaCO3/1000t 1	OA-VOL08 NP tCaCO3/1000t 1	OA-ELE07 pH Unity 0.1	OA-VOL08 Ratio (N Unity 0.01	S-IR08 S % 0.01	S-GRA06 S % 0.01	S-GRA06a S % 0.01	S-CAL06 S % 0.01	C-GAS05 C % 0.05	C-GAS05 CO2 % 0.2	ME-MS61 Ag ppm 0.01	ME-MS61 Al % 0.01
36041		1.69	45.3	2	-12	33	8.9	0.73	1.45	0.02	0.01	1.43	0.11	0.4	1.01	6.22

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Finalized Date: 10-APR-2008
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CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf
	Units	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
	LOR	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2	0.01	0.05	0.05	0.1
36041		18.8	930	2.29	0.2	2.7	4.66	53.5	14.6	63	7.97	121	2.96	16.7	0.44	2.9

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CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S
	Units	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%
	LOR	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01
36041		0.065	3.69	29.6	70.1	1.85	154	11.55	0.21	10.5	61.1	3960	17.7	140.5	0.031	1.28

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CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.05	0.1	1	0.2	0.2	0.05	0.05	0.2	0.005	0.02	0.1	1	0.1	0.1	2
36041		5.55	10	8	1.4	224	0.62	0.1	10.8	0.272	0.84	9.9	280	2.2	25.9	471

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WHITEHORSE YT Y1A 2Z6

Finalized Date: 10-APR-2008
Account: NORTUN

CERTIFICATE OF ANALYSIS TR08024596

Sample Description	Method / Analyte / Units / LOR	ME-MS61 / Zr / ppm / 0.5
36041		113

***** See Appendix Page for comments regarding this certificate *****

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CERTIFICATE OF ANALYSIS TR08024596

Method	CERTIFICATE COMMENTS
ME-MS61	Interference: Ca>10% on ICP-MS As,ICP-AES results shown.
ME-MS61	REE's may not be totally soluble in this method.

APPENDIX

APPENDIX B ALS ENVIRONMENTAL SHAKE FLASK ANALYTICAL CERTIFICATE

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ANALYTICAL REPORT

EBA ENGINEERING CONSULTANTS LTD.

ATTN: SCOTT DAVIDSON

CALCITE BUSINESS CENTRE
UNIT 6 - 151 INDUSTRIAL ROAD
WHITEHORSE YT Y1A 2V3

Reported On: 03-JUN-08 05:47 PM
Revision: 3

Lab Work Order #: **L629653** **Date Received:** **14-MAY-08**

Project P.O. #: NOT SUBMITTED
Job Reference: W23101021.015
Legal Site Desc:
CofC Numbers: C006544

Other Information:

Comments:

Joyce Chow
General Manager, Vancouver

For any questions about this report please contact your Account Manager:

Andre Langlais

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L629653-1	L629653-2	L629653-3	L629653-4	L629653-5
	Sample ID	L629653-1	L629653-2	L629653-3	L629653-4	L629653-5
	Description					
	Sampled Date	09-MAY-08	09-MAY-08	09-MAY-08	09-MAY-08	09-MAY-08
	Sampled Time	12:35	11:30	11:05	13:25	10:50
	Client ID	WQ-1	WQ-1A	WQ-2	WQ-2A	WQ-3
WATER						
Physical Tests	Anion Sum (meq/L)	3.9	6.2	2.8	2.4	1.4
	Cation Sum (meq/L)	3.9	6.3	2.6	2.5	1.4
	Cation - Anion Balance (%)	0.1	0.1	-3.4	1.3	2.2
	Hardness (as CaCO3) (mg/L)	178	308	128	123	70.5
	Conductivity (uS/cm)	395	606	302	275	150
	pH (pH)	7.86	7.87	7.37	6.11	7.32
	Total Dissolved Solids (mg/L)	251	435	185	177	104
	Total Suspended Solids (mg/L)	<3.0	8.9	23.9	20.4	6.4
	Turbidity (NTU)	0.14	0.10	15.0	16.9	2.31
Anions and Nutrients	Ammonia as N (mg/L)	<0.0050	0.0052	<0.0050	<0.0050	0.0105
	Alkalinity, Total (as CaCO3) (mg/L)	64.2	73.7	19.2	2.9	27.5
	Chloride (Cl) (mg/L)	1.08	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.433	0.207	0.190	0.152	0.081
	Sulfate (SO4) (mg/L)	121	228	113	114	39.4
	Nitrate (as N) (mg/L)	0.0218	0.0658	0.0555	0.0560	0.0087
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0039	<0.0010	<0.0010
	Total Phosphate as P (mg/L)	0.0091	0.0034	0.0290	0.0246	0.026
Cyanides	Cyanide, Total (mg/L)	<0.0050	<0.0050	0.0077	<0.0050	0.0110
Total Metals	Aluminum (Al)-Total (mg/L)	0.0187	0.014	4.06	3.50	0.232
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	0.00061	<0.0010	0.00060	<0.00050	0.00068
	Barium (Ba)-Total (mg/L)	0.065	0.042	0.051	0.055	0.037
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	0.000735	0.00109	0.00500	0.00550	0.000084
	Calcium (Ca)-Total (mg/L)	64.7	109	35.9	30.6	15.8
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Cobalt (Co)-Total (mg/L)	<0.00030	<0.00060	0.00976	0.0109	0.00080
	Copper (Cu)-Total (mg/L)	0.0014	<0.0020	0.0164	0.0079	0.0022
	Iron (Fe)-Total (mg/L)	0.097	0.062	1.23	1.54	0.608
	Lead (Pb)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.010	0.0084	0.0076	<0.0050
	Magnesium (Mg)-Total (mg/L)	4.51	9.00	9.11	11.0	6.88
	Manganese (Mn)-Total (mg/L)	0.00184	0.00116	0.153	0.132	0.0514
	Mercury (Hg)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Total (mg/L)	0.0036	0.0055	0.0013	<0.0010	<0.0010
	Nickel (Ni)-Total (mg/L)	0.0074	0.0106	0.107	0.132	0.0055
	Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte					
	Sample ID	L629653-6				
	Description					
	Sampled Date	09-MAY-08				
	Sampled Time	10:20				
	Client ID	WQ-4				
WATER						
Physical Tests	Anion Sum (meq/L)	1.5				
	Cation Sum (meq/L)	1.6				
	Cation - Anion Balance (%)	2.0				
	Hardness (as CaCO3) (mg/L)	76.9				
	Conductivity (uS/cm)	165				
	pH (pH)	7.36				
	Total Dissolved Solids (mg/L)	113				
	Total Suspended Solids (mg/L)	29.9				
	Turbidity (NTU)	7.92				
Anions and Nutrients	Ammonia as N (mg/L)	0.0085				
	Alkalinity, Total (as CaCO3) (mg/L)	24.0				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.178				
	Sulfate (SO4) (mg/L)	48.7				
	Nitrate (as N) (mg/L)	0.0135				
	Nitrite (as N) (mg/L)	<0.0010				
	Total Phosphate as P (mg/L)	0.029				
Cyanides	Cyanide, Total (mg/L)	0.0144				
Total Metals	Aluminum (Al)-Total (mg/L)	1.01				
	Antimony (Sb)-Total (mg/L)	<0.00050				
	Arsenic (As)-Total (mg/L)	0.00058				
	Barium (Ba)-Total (mg/L)	0.042				
	Beryllium (Be)-Total (mg/L)	<0.0010				
	Boron (B)-Total (mg/L)	<0.10				
	Cadmium (Cd)-Total (mg/L)	0.000824				
	Calcium (Ca)-Total (mg/L)	18.2				
	Chromium (Cr)-Total (mg/L)	<0.0010				
	Cobalt (Co)-Total (mg/L)	0.00201				
	Copper (Cu)-Total (mg/L)	0.0052				
	Iron (Fe)-Total (mg/L)	0.654				
	Lead (Pb)-Total (mg/L)	<0.00050				
	Lithium (Li)-Total (mg/L)	<0.0050				
	Magnesium (Mg)-Total (mg/L)	6.95				
	Manganese (Mn)-Total (mg/L)	0.0553				
	Mercury (Hg)-Total (mg/L)	<0.000020				
	Molybdenum (Mo)-Total (mg/L)	<0.0010				
	Nickel (Ni)-Total (mg/L)	0.0206				
	Potassium (K)-Total (mg/L)	<2.0				

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L629653-1	L629653-2	L629653-3	L629653-4	L629653-5
	Description					
	Sampled Date	09-MAY-08	09-MAY-08	09-MAY-08	09-MAY-08	09-MAY-08
	Sampled Time	12:35	11:30	11:05	13:25	10:50
	Client ID	WQ-1	WQ-1A	WQ-2	WQ-2A	WQ-3
WATER						
Total Metals	Selenium (Se)-Total (mg/L)	0.0031	0.0037	0.0026	0.0025	<0.0010
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000040	<0.000020	<0.000020	<0.000020
	Sodium (Na)-Total (mg/L)	7.2	2.3	<2.0	<2.0	<2.0
	Thallium (Tl)-Total (mg/L)	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.011
	Uranium (U)-Total (mg/L)	0.00430	0.0193	0.00168	0.00082	0.00053
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0020	0.0012	0.0011	<0.0010
	Zinc (Zn)-Total (mg/L)	0.0254	0.0371	0.350	0.441	0.0079
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0204	0.010	0.0413	0.272	0.117
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.00057	<0.0010	<0.00050	<0.00050	0.00060
	Barium (Ba)-Dissolved (mg/L)	0.062	0.043	0.049	0.056	0.035
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Boron (B)-Dissolved (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	0.000721	0.000385	0.00433	0.00538	0.000095
	Calcium (Ca)-Dissolved (mg/L)	63.7	108	36.2	30.8	16.4
	Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Cobalt (Co)-Dissolved (mg/L)	<0.00030	<0.00060	0.00918	0.0109	0.00071
	Copper (Cu)-Dissolved (mg/L)	0.0016	<0.0020	0.0041	0.0050	0.0022
	Iron (Fe)-Dissolved (mg/L)	0.056	0.050	<0.030	0.068	0.361
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.010	0.0081	0.0077	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	4.53	9.19	9.08	11.2	7.14
	Manganese (Mn)-Dissolved (mg/L)	0.00228	0.00116	0.148	0.131	0.0480
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Molybdenum (Mo)-Dissolved (mg/L)	0.0037	0.0055	0.0010	<0.0010	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	0.0076	0.0109	0.101	0.132	0.0053
	Potassium (K)-Dissolved (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Selenium (Se)-Dissolved (mg/L)	0.0032	0.0035	0.0023	0.0024	<0.0010
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.000040	<0.000020	<0.000020	<0.000020
	Sodium (Na)-Dissolved (mg/L)	7.0	2.3	<2.0	<2.0	<2.0
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.00040	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00416	0.0184	<0.00020	<0.00020	0.00044
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0237	0.0309	0.281	0.441	0.0099

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L629653-6				
	Description					
	Sampled Date	09-MAY-08				
	Sampled Time	10:20				
	Client ID	WQ-4				
Grouping	**Analyte**					
WATER						
Total Metals	Selenium (Se)-Total (mg/L)	<0.0010				
	Silver (Ag)-Total (mg/L)	<0.000020				
	Sodium (Na)-Total (mg/L)	<2.0				
	Thallium (Tl)-Total (mg/L)	<0.00020				
	Tin (Sn)-Total (mg/L)	<0.00050				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00079				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	0.0616				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.142				
	Antimony (Sb)-Dissolved (mg/L)	<0.00050				
	Arsenic (As)-Dissolved (mg/L)	<0.00050				
	Barium (Ba)-Dissolved (mg/L)	0.041				
	Beryllium (Be)-Dissolved (mg/L)	<0.0010				
	Boron (B)-Dissolved (mg/L)	<0.10				
	Cadmium (Cd)-Dissolved (mg/L)	0.000770				
	Calcium (Ca)-Dissolved (mg/L)	19.0				
	Chromium (Cr)-Dissolved (mg/L)	<0.0010				
	Cobalt (Co)-Dissolved (mg/L)	0.00178				
	Copper (Cu)-Dissolved (mg/L)	0.0042				
	Iron (Fe)-Dissolved (mg/L)	0.169				
	Lead (Pb)-Dissolved (mg/L)	<0.00050				
	Lithium (Li)-Dissolved (mg/L)	<0.0050				
	Magnesium (Mg)-Dissolved (mg/L)	7.18				
	Manganese (Mn)-Dissolved (mg/L)	0.0508				
	Mercury (Hg)-Dissolved (mg/L)	<0.000020				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0010				
	Nickel (Ni)-Dissolved (mg/L)	0.0197				
	Potassium (K)-Dissolved (mg/L)	<2.0				
	Selenium (Se)-Dissolved (mg/L)	<0.0010				
	Silver (Ag)-Dissolved (mg/L)	<0.000020				
	Sodium (Na)-Dissolved (mg/L)	<2.0				
	Thallium (Tl)-Dissolved (mg/L)	<0.00020				
	Tin (Sn)-Dissolved (mg/L)	<0.00050				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00030				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	0.0479				

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-CCME-CVAFS-VA	Water	Diss. Mercury in Water by CVAFS (CCME)	EPA 3005A/245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-CCME-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CCME)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
IONBALANCE-VA	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-DIS-CCME-ICP-VA	Water	Diss. Metals in Water by ICPOES (CCME)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-CCME-MS-VA	Water	Diss. Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-CCME-ICP-VA	Water	Total Metals in Water by ICPOES (CCME)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-CCME-MS-VA	Water	Total Metals in Water by ICPMS (CCME)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-VA	Water	Ammonia by Color	APHA 4500-NH3 "Nitrogen (Ammonia)"

This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

PO4-T-COL-VA	Water	Total Phosphate P by Color	APHA 4500-P "Phosphorous"

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TSS-VA	Water	Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

COC # C006544

Page 1 of 1

REPORT TO:
COMPANY: EBA Engineering
CONTACT: Scott Davidson
ADDRESS: Unit 6 151 Industrial Rd
Whitehorse, YT Y1A 2V3
PHONE: 867 668-3068 FAX: 867 668 4349

INVOICE TO: SAME AS REPORT ? YES / NO (circled: NO)
COMPANY: North American Tungsten
CONTACT: Wade Stogran / Dave Tenney
ADDRESS: #1640, 1188 West Georgia
Vancouver BC V6E 4A2
PHONE: 604-684-5300 FAX:

REPORT FORMAT / DISTRIBUTION
STANDARD ✓ OTHER ___
PDF ✓ EXCEL ✓ CUSTOM ___ FAX ___
EMAIL 1: sdavidson@eba.ca
EMAIL 2: wstogran@natungsten.com

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: W23101021.015
PO /AFE:
Legal Site Description:
QUOTE #:

SERVICE REQUESTED
X REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS)
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

Lab Work Order # (lab use only): L629653

SAMPLER (Initials): DSM/SCD

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Total Metals (P)	Dissolved Metals (F/P)	Routine (General Param.)	Cyanide (P)								HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
	WQ-1	May 9/2008	12:35	Water												N	N	4
	WQ-1A	↓	11:30	↓												N	N	4
	WQ-2	↓	11:05	↓												N	N	4
	WQ-2A	↓	13:25	↓												N	N	4
	WQ-3	↓	10:50	↓												N	N	4
	WQ-4	↓	10:20	↓												N	N	4

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS
Anions & Nutrients for Routine if questions please contact.

Failure to complete all portions of this form may delay analysis. Please fill in this form *LEGIBLY*.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:
		GMM	May 14/08 13:45

SAMPLE CONDITION (lab use only)
TEMPERATURE: 6°C
SAMPLES RECEIVED IN GOOD CONDITION ? YES (circled) / NO
(If no provide details)

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION
WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY
GENF14.00

APPENDIX

APPENDIX C VANCOUVER PETROGRAPHICS MINERALOGICAL ASSESSMENT REPORT

C1. Reconstructed Percent Distribution of Minerals in Ore. Dave Tenney NATCL 2008.

C2. 2008 Vancouver Petrographics Mineralogical Thin Section Report

RECONSTRUCTED % DISRIBUTION OF MINERALS IN ORE

PETROGRAPHIC DESCRIPTIONS BY VANCOUVER PETROGRAPHICS (2008) AND FINDLAY (1969)

(ASSUMED TO BE 5% DILUTION FROM BOTH UNITS 1 AND 3C)

UNIT	1	1	1	2B	2B	2B	2B	2B	3C	3C	
ROCK TYPE	3**	4**	5**	1**	1/**	**/1	2**	7**	3**	6**	TOTAL
% CONTENT IN ORE	0.76	3.06	1.18	14.08	15.65	23.55	31.71	5.02	3.63	1.37	100.01
MINERAL											
PLAGIOCLASE	0.44	1.07	0.65	1.69	8.22	0.35	8.24		2.15	1.02	23.83
QUARTZ	0.09	0.75	0.02	5.28	0.70	11.19	5.95	0.10	0.86	0.09	25.03
BIOTITE	0.16	0.22	0.13						0.18	0.01	0.71
PHLOGOPITE				0.63	3.52						4.15
SERICITE		0.82	0.30						0.07	0.10	1.29
DIOPSIDE						7.65	14.46	0.08			22.19
TREMOLITE/ACTINOLITE							0.55	0.03	0.00		0.58
PYRITE	0.01					2.00					2.01
PYRRHOTITE	0.02	0.04	0.02	4.29	2.11		1.68		0.07	0.09	8.34
CHLORITE/BIOTITE	0.00			0.21	0.05	0.47	0.05				0.78
CHALCOPYRITE	0.01			0.21	0.11	0.35	0.05				0.73
MUSCOVITE	0.02	0.00		0.56					0.05		0.64
CALCITE						0.31	0.02	4.74	0.01		5.07
SPAHALERITE	0.00								0.00		0.00
ILMENITE		0.00									0.00
		0.04	0.02						0.09		0.15
ZIRCON											0.00
TOURMALINE											0.00
ANKERITE			0.00								0.00
SCHEELITE				0.35	0.11	0.35	0.05				0.86
APATITE				0.10		0.02	0.40				0.52
EPIDOTE						0.07	0.03				0.10
LIMONITE						0.07				0.00	0.07
SCAPOLITE(?)							0.02				0.02
FLUORITE(?)									0.03		0.03
ZEOLITE									0.00		0.00
SPHENE											0.00
CARBONACEOUS										0.05	0.05
TOTAL	0.75	2.94	1.15	13.33	14.82	22.84	31.49	4.94	3.52	1.37	97.17

n.b. Mineral percentages in petrographic descriptions do not add up to 100%.

Report 080418 for:
David Tenney,
Northern American Tungsten Exploration, Ltd.,
128D Copper Road,
Whitehorse, YT, Y1A 2Z6 **April 2008**

Project: Mactung (Acid Base Accounting)

Samples: **36002, 36003, 36005, 36006, 36007, 36008, 36012, 36015, 36018, 36021, 36024, 36025, 36026, 36027, 36029, 36034, 36035, 36037, 36038, 36040**

Summary:

Sample 36002 MT79130 30.78-31.70 m is of hornfels dominated by plagioclase with lesser quartz and biotite and with minor pyrite. At one end is a patch a few mm across of pyrrhotite with moderately abundant quartz, much less abundant chlorite and pyrite, and minor chalcopyrite. A vein is of quartz-(pyrite). A veinlet is of quartz.

Sample 36003 MT79117 160.32-161.24 m is of weakly to moderately foliated hornfels, much of which is dominated by an intergrowth of plagioclase, biotite, and much less abundant quartz, with minor disseminated pyrrhotite. Colourless lensy mottles and veinlike patches consist of intergrowths of plagioclase and sericite/muscovite with much less abundant quartz and minor pyrrhotite. A few veinlike zones of coarser grained plagioclase-pyrrhotite are rimmed by envelopes enriched moderately in biotite. Several subparallel wispy skeletal veinlets are of pyrrhotite with minor patches of sphalerite and chalcopyrite. A veinlet is of quartz with lenses of pyrrhotite.

Sample 36005 MT72051 101.50-102.41 is of weakly foliated, slightly mottled phyllite dominated by plagioclase and sericite with much less abundant biotite, and Mineral X, and minor quartz and ilmenite. A slightly branching banded veinlet is of opal(?). A much narrower veinlet is of calcite.

Sample 36006 MT79129 39.01-39.62 m is of mottled metamorphosed siltstone/mudstone that contains two main assemblages; a finer grained one dominated by plagioclase with lesser sericite and much less abundant quartz and biotite and minor ilmenite/Ti-oxide, and a coarser grained one dominated by quartz with lesser biotite and pyrrhotite. The second one may be in part at least of replacement origin. A few seams are rich in biotite. A veinlet is of calcite.

Sample 36007 MT72053 78.94-79.55 m is of very weakly foliated metamorphosed mudstone that is dominated by plagioclase with lesser sericite and biotite, much less abundant clinozoisite, and minor disseminated pyrrhotite and quartz. A veinlet is of quartz-biotite-pyrrhotite.

Sample 36008 MT79129 26.82-27.74 m is of slightly banded hornfelsed mudstone and is dominated by sericite with lesser plagioclase and biotite, with minor pyrrhotite, quartz and ankerite. Darker bands contain more abundant biotite, plagioclase, and pyrrhotite, whereas lighter bands contain more sericite. A veinlet is of quartz with patches of scheelite and minor ones of chalcopyrite. A few wispy veinlets parallel to compositional banding are of quartz, pyrrhotite, and biotite.

Sample 36012 M72040 107.90-108.81 m contains three main types of zones, labelled A, B, and C on the scanned section. Zone A consists of a well foliated intergrowth of phlogopite, plagioclase, and pyrrhotite, with disseminated grains of scheelite and one lens dominated by chlorite. Zone B consists of an intergrowth of quartz and pyrrhotite with lesser muscovite, apatite, and scheelite. Zone C is dominated by plagioclase.

Sample 36015 MT72057 100.58-102.11 is of skarn that contains various zones with different textures and mineralogies. Some patches are relatively uniform in texture and are dominated by plagioclase and lesser phlogopite/biotite with disseminated pyrrhotite and minor patches of quartz and scheelite. Some patches are dominated by pyrrhotite with lesser biotite and plagioclase. Scheelite forms disseminated grains. A delicately banded veinlet is of chlorite.

Sample 36018 MT72057 80.77-82.30 m is of patchy zoned skarn dominated by diopside (altered slightly to completely to limonite-chlorite/smectite), plagioclase, and quartz, with patches of pyrite (probably after pyrrhotite) and much less abundant chalcopyrite, and disseminated grains of scheelite and patches of ankerite. A few veinlets are of calcite-pyrite-chlorite/smectite.

Sample 36021 M72059 189.92-90.53 m is of metamorphosed latite that contains patches of variable host rock dominated by plagioclase with much less abundant pyrrhotite and tremolite/actinolite, and replacement patches dominated by quartz and pyrrhotite with disseminated grains of apatite and minor scheelite, and patches of chlorite. Apatite, pyrrhotite, and scheelite are concentrated along the margins of the host rock and replacement patches.

Sample 36024 MT79129 90.83-91.44 m is of massive skarn dominated by diopside with much less abundant plagioclase and pyrrhotite. Pyrrhotite is concentrated in bands and patches. A coarser grained veinlet at one end is dominated by plagioclase. A veinlet is of slightly coarser grained diopside and pyrrhotite. A veinlet is of calcite with lesser epidote and minor tremolite. A few veinlets of epidote contain minor chalcopyrite and pyrite.

Sample 36025 MT72027 93.27-93.88 m is of slightly foliated hornfelsed siltstone dominated by plagioclase and quartz, with much less abundant sericite/muscovite, Mineral X, biotite, and pyrrhotite. A veinlet is of quartz-pyrrhotite-(chalcopyrite) and a smaller veinlet is of quartz. An irregular veinlet is of fluorite(?) with a vuggy centreline containing minor patches of calcite.

Sample 36026 MT71022 25.60-26.21 m is of slightly banded hornfels that is dominated by plagioclase and lesser quartz, with much less abundant sericite/muscovite, minor pyrrhotite and biotite, and trace epidote. A few veinlets are of quartz with lenses of pyrrhotite; some of these contain patches of sphalerite and of chalcopyrite. A quartz-rich veinlet has an envelope containing moderately abundant K-feldspar. A few late braided veinlets are of zeolite. A few veinlets are of fluorite.

Sample 36027 MT71022 52.43-53.34 m is of slightly banded hornfels composed of plagioclase with much less abundant biotite and quartz. Mineral X is concentrated strongly in a band 3.5 mm wide that cuts across compositional banding. A coarser grained lens consists of quartz with scattered grains of allanite.

Sample 36029 MT71022 48.46-49.38is of pelite that contains abundant dusty carbonaceous opaque that obscures the optical properties of the silicates. Silicates are dominated by plagioclase with much less abundant sericite and minor quartz. No other transparent minerals could be recognized. Pyrrhotite forms abundant disseminated patches and lenses. A few lenses parallel to foliation are of pyrrhotite-quartz. A large veinlet is of quartz and pyrrhotite with lesser biotite-(sericite) and much less chalcopyrite. A veinlet is of limonite.

Sample 36034 2007-BH4 4.00-4.40 m is of well foliated metamorphosed carbonaceous pelite that contains minor coarser, possibly detrital grains of quartz and plagioclase in a groundmass of cryptocrystalline material, probably dominated by plagioclase with moderately abundant dusty carbonaceous opaque and disseminated patches of pyrrhotite (altered moderately to secondary Fe-minerals) and minor patches of Ti-oxide. One ragged porphyroblastic patch contains abundant elongate grains of orthoamphibole(?) in subparallel orientation. Some larger patches consist of cores of pyrrhotite partly surrounded by Ti-oxide and rimmed by quartz. A few lenses, in part elongated parallel to foliation, are of quartz, pyrrhotite, and pyrite, with minor to moderately abundant chlorite and minor chalcopyrite.

Sample 36035 2007-BH4 4.97-5.07 m is of slightly banded skarn that contains disseminated equant garnet grains in a matrix of extremely fine grained tremolite with ragged, slightly coarser grains of diopside. Minor minerals include ankerite and quartz. A veinlet on one side of the section is of Mineral Y. Veinlets on fractures in the core sample are of calcite.

Sample 38037 2007-BH21 8.55-8.82 m is of metamorphosed shale that contains disseminated, subrounded to lensy patches of calcite and minor ones of quartz in a moderately foliated matrix that contains very abundant carbonaceous opaque that obscures the optical properties of the other matrix minerals (probably plagioclase with lesser calcite and sericite). A braided veinlet is of quartz with lesser calcite and much less pyrite and sericite.

Sample 36038 2007-BH21 11.68-11.93 m is of slightly foliated carbonaceous limestone dominated by calcite with moderately abundant disseminated dusty carbonaceous opaque. A network of irregular veinlets consists of calcite, chlorite/biotite, minor pyrite and quartz, and trace chalcopyrite.

Sample 36040 2007-BH22 8.48-8.79 m is of slightly to locally moderately contorted metamorphosed ankeritic mudstone dominated by plagioclase with abundant carbonaceous opaque and moderately abundant ankerite, and minor grains of quartz, some of which may be of detrital origin. A few strongly contorted veinlets are of calcite and pyrrhotite, with much less abundant quartz and sericite/muscovite.

Mineralogy Notes

Mineral X occurs in several samples of hornfels. It forms patches, mainly less than 0.1 mm in size of cryptocrystalline grains. It has a moderate to high relief with a R.I. less than that of plagioclase and quartz. It is isotropic or nearly so. It is soft.

Mineral Y forms one vein. It is moderately hard (4-5), has a low relief and is colourless with very low birefringence (0.002).

One complex porphyroblast was tentatively identified as orthoamphibole. It has parallel extinction and otherwise fits the properties of tremolite.

The presence of abundant carbonaceous opaque in the black and dark grey samples obscures the optical properties of the translucent minerals in transmitted light. Thus, identification of these minerals, mainly plagioclase, with lesser sericite, and carbonates is tentative.

Photographic Notes:

The scanned section shows the gross textural features of the sections; these features are seen much better on the digital image than on the printed image. Photo numbers are shown in the lower left corner of the photographs. The letter in the lower right-hand corner indicates the lighting conditions: P = plane light, X = plane light in crossed nicols, R = reflected light, RP = reflected light and plane light, RX = reflected light and plane light in almost crossed nicols, and XR = reflected light in crossed nicols. Locations of photographs are shown on the scanned sections. Descriptions of the photographs are at the end of the report.

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

Sample 36002 MT79130 30.78-31.70 m Hornfels
Replacement: Pyrrhotite/Pyrite-Quartz-(Chlorite-Chalcopyrite)
Veinlets: Quartz-Pyrite-(Chalcopyrite); Quartz

The sample is of hornfels dominated by plagioclase with lesser quartz and biotite and with minor pyrite. At one end is a patch a few mm across of pyrrhotite with moderately abundant quartz, much less abundant chlorite and pyrite, and minor chalcopyrite. A vein is of quartz-(pyrite). A veinlet is of quartz.

mineral	**percentage**	**main grain size range (mm)**	
plagioclase	60-65%	0.01-0.03	(a few up to 0.05 mm)
quartz	12-15	0.01-0.03	(a few up to 0.05 mm)
biotite	12-15	0.02-0.03	
pyrite	1- 2	0.02-0.05	
replacement			
pyrrhotite	3- 4	0.1-0.7	
quartz	2- 3	0.07-0.2	
biotite/chlorite	0.5	0.01-0.02	
pyrite	0.2	0.2-0.7	
chalcopyrite	0.1	0.1-0.5	
veinlets			
1) quartz-pyrite-(chalcopyrite)	2- 3	0.07-0.15	
[chlorite-muscovite-calcite]	0.3	(0.02-0.05) in envelope about veinlet	
2) quartz	minor	0.02-0.03	

Plagioclase and lesser quartz form anhedral, equant grains.

Biotite forms disseminated stubby flakes that show a weakly preferred orientation that defines a weak foliation.

Pyrite forms disseminated anhedral grains and trains of a few grains.

A replacement patch at one end of the section consists of pyrrhotite and lesser submosaic quartz, with scattered patches of biotite/chlorite and chalcopyrite. Locally, pyrrhotite was altered to pyrite. Chalcopyrite is most common in quartz-rich patches. Hematite forms selvages between quartz grains.

A veinlet up to 0.5 mm wide is dominated by submosaic quartz with scattered anhedral grains of pyrite, in part along selvages between quartz grains. Some patches of pyrite are intergrown with non-reflective material in textures that suggest that the intergrowths are secondary after pyrrhotite. Chalcopyrite forms scattered grains in quartz. In an envelope up to 0.25 mm wide about the veinlet, biotite was altered to chlorite and/or muscovite and calcite forms scattered patches.

A diffuse veinlet up to 0.05 mm wide is dominated by submosaic quartz.

Sample 36003 MT79117 160.32-161.24 m Mottled Hornfels
Veinlets: Quartz-Pyrrhotite; Plagioclase-Pyrrhotite-[Biotite]; Pyrrhotite

The sample is of weakly to moderately foliated hornfels, much of which is dominated by an intergrowth of plagioclase, biotite, and much less abundant quartz, with minor disseminated pyrrhotite. Colourless lensy mottles and veinlike patches consist of intergrowths of plagioclase and sericite/muscovite with much less abundant quartz and minor pyrrhotite. A few veinlike zones of coarser grained plagioclase-pyrrhotite are rimmed by envelopes enriched moderately in biotite. Several subparallel wispy skeletal veinlets are of pyrrhotite with minor patches of sphalerite and chalcopyrite. A veinlet is of quartz with lenses of pyrrhotite.

mineral	**percentage**	**main grain size range (mm)**
plagioclase	50-55%	0.02-0.05
biotite	25-30	0.02-0.05
quartz	7- 8	0.02-0.05
muscovite	5- 7	0.02-0.04
pyrrhotite	1- 2	0.02-0.07
veinlets		
1) plagioclase-pyrrhotite	1- 2	0.03-0.06
2) quartz-pyrrhotite	0.5	0.03-0.07
3) pyrrhotite-(sphalerite-chalcopyrite)	1- 2	0.01-0.03

The host rock consists of an intimate intergrowth of plagioclase, biotite, and lesser quartz. Plagioclase is altered slightly to sericite. Biotite is pleochroic from pale to light/medium reddish brown.

Interconnected irregular colourless lenses up to several mm long that are elongated parallel to foliation consist of plagioclase and sericite/muscovite (probably after biotite).

Pyrrhotite forms disseminated lenses that are elongated parallel to foliation. A few patches up to 1 mm in size of pyrrhotite were altered completely to intimate intergrowths of pyrite and non-reflective material.

A few diffuse veinlets are of slightly coarser grained plagioclase with disseminated patches of pyrrhotite. These are bordered by envelopes up to a few mm wide with diffuse margins that contain more abundant biotite than normal.

A veinlet up to 0.1 mm wide is of submosaic quartz with a few lenses of pyrrhotite and minor patches of chalcopyrite and sphalerite.

A few wispy subparallel discontinuous strongly braided veinlets up to 0.15 mm wide are of pyrrhotite that is intergrown with host-rock minerals. Associated with one of these veinlets is a lens of coarser grained sulphides dominated by pyrite (after pyrrhotite) with a lens containing abundant sphalerite and lesser chalcopyrite.

Sample 36005 MT72051 101.50-102.41 Phyllite
Veinlets: Opal(?); Calcite

The sample is of weakly foliated, slightly mottled phyllite dominated by plagioclase and sericite with much less abundant biotite, and Mineral X, and minor quartz and ilmenite. A slightly branching banded veinlet is of opal(?). A much narrower veinlet is of calcite.

mineral	percentage	main grain size range (mm)
plagioclase	40-45%	0.005-0.015
sericite	40-45	0.01-0.02
biotite	5- 7	0.01-0.02
Mineral X	2- 3	cryptocrystalline-0.015
quartz	1	0.03-0.05
ilmenite	0.2	0.02-0.05
muscovite	trace	0.1-0.2
veinlets		
1) opal(?)	0.3	amorphous
2) calcite	minor	0.02-0.07

Much of the rock is dominated by an intimate intergrowth of plagioclase and sericite, with lesser biotite and Mineral X, and minor disseminated ilmenite. Sericite is concentrated slightly to moderately in patches up to 0.5 mm in size, giving the rock a weakly mottled texture.

Mineral X has moderate to high relief and low birefringence and is soft; it forms aggregates of anhedral grains mainly intergrown with biotite. .

In a few places the rock has a more strongly mottled texture produced by oval-shaped to irregular patches up to 0.7 mm in size of sericite-biotite-(plagioclase-ilmenite) that are set in a matrix dominated by sericite with only minor plagioclase, biotite, and ilmenite. In the biotite-rich envelopes of the veinlets, sericite-rich mottles up to 0.7 mm in size that are free of ilmenite and relatively free of biotite are surrounded by a matrix of plagioclase-sericite with 3-5% disseminated biotite flakes and 0.5% disseminated ilmenite grains.

Quartz forms scattered equant grains that may be of detrital origin.

Ilmenite forms disseminated equant to tabular grains.

Muscovite forms a few very slender flakes.

One lensy patch up to a few mm long consists of submosaic quartz (0.03-0.05 mm) with abundant disseminated patches (0.03-0.05 mm) of pyrrhotite, a few of which also contain chalcopyrite, and less abundant interstitial flakes of biotite. A few patches up to 1.5 mm in size consist of aggregates of submosaic quartz (0.03-0.07 mm) with disseminated flakes of biotite (0.015-0.02 mm); one of these also contains disseminated pyrrhotite as in the largest patch described earlier in the paragraph.

A delicately banded, slightly branching veinlet up to 0.2 mm wide is of a hard, colourless isotropic mineral with negative relief; it may be opal.

An irregular veinlet 0.015-0.02 mm wide is of calcite.

Sample 36006 MT79129 39.01-39.62 m **Metamorphosed Siltstone/Mudstone**
Veinlet: Calcite

The sample is of mottled metamorphosed siltstone/mudstone that contains two main assemblages; a finer grained one dominated by plagioclase with lesser sericite and much less abundant quartz and biotite and minor ilmenite/Ti-oxide, and a coarser grained one dominated by quartz with lesser biotite and pyrrhotite. The second one may be in part at least of replacement origin. A few seams are rich in biotite. A veinlet is of calcite.

mineral	**percentage**	**main grain size range (mm)**	
detrital grains			
quartz	trace	0.2-0.4	
groundmass			
quartz	45-50%	0.03-0.07	
plagioclase	25-30	0.01-0.02	
sericite	10-12	0.01-0.03	
biotite	5- 7	0.03-0.07	
pyrrhotite	2- 3	0.05-0.1	
muscovite	0.2	0.05-0.15	
Ti-oxide	0.1	cryptocrystalline-0.03	
zircon	minor	0.03-0.05	(a few grains up to 0.08 mm long)
tourmaline	minor	0.05-0.08	
chalcopyrite	trace	0.02-0.04	
veinlets, seams			
1) biotite-rich	2- 3	0.03-0.07	
1) calcite	minor	0.02-0.05	

A few rounded quartz grains from 0.2-0.4 mm in size probably are detrital in origin.

Finer grained zones and bands are dominated by slightly interlocking plagioclase with much less abundant sericite and scattered to moderately abundant, coarser equant grains of quartz (0.05-0.07 mm). Some bands contain disseminated grains and wispy seams of Ti-oxide; trains of these grains define a weak foliation which may be primary. In places these zones have sharp contacts with coarser grained zones, and in places the boundaries are gradational.

The coarser grained zones are up to 1.5 cm in size and are generally oval in outline. They are dominated by equant quartz grains with disseminated patches of biotite and patches of pyrrhotite, mainly less than 0.2 mm in size, with a few up to 0.3 mm across. Biotite is pleochroic from light to medium orangish brown. Chalcopyrite forms a few patches, mainly associated with pyrrhotite.

Tourmaline also forms disseminated grains, some of which are colour-zoned concentrically from light to medium green cores to paler yellowish green rims.

Zircon forms disseminated anhedral equant grains and a few subhedral prismatic grains.

A few seams up to 0.5 mm wide are dominated by biotite. These contain scattered anhedral to subhedral prismatic grains of tourmaline with pleochroism from neutral to light orange-brown. They are mainly subparallel to trains of Ti-oxide in the finer grained parts of the section.

A slightly irregular veinlet up to 0.03 mm wide is of calcite.

Sample 36007 MT72053 78.94-79.55 m Metamorphosed Mudstone
Veinlet: Quartz-Biotite-Pyrrhotite

The sample is very weakly foliated and is dominated by plagioclase with lesser sericite and biotite, much less abundant clinozoisite, and minor disseminated pyrrhotite and quartz. A veinlet is of quartz-biotite-pyrrhotite.

mineral	**percentage**	**main grain size range (mm)**
plagioclase	65-70%	0.01-0.03
sericite	17-20	0.01-0.03
biotite	7- 8	0.01-0.03
Mineral X	3- 4	0.005-0.01
pyrrhotite	0.5	0.02-0.07
quartz	0.2	0.03-0.05
veinlet		
1) quartz-biotite-pyrrhotite	2- 3	0.03-0.05

Plagioclase forms equant, slightly to moderately interlocking grains. It commonly contains dusty opaque inclusions that give the grains a light grey colour.

Sericite and lesser biotite form equant unoriented flakes. Biotite is pleochroic from pale to light brown. In the central band of the section, sericite and minor biotite are concentrated moderately to strongly in disseminated mottles up to 1 mm in size. A weak yellow stain in this party of the rock may be due to minor K-feldspar intergrown with plagioclase between the mottles.

Mineral X forms disseminated patches mainly from 0.05-0.1 mm in size of cryptocrystalline aggregates. It has moderate relief, low birefringence, and is soft. It is concentrated in the paler coloured, central band of the section between the mottles.

Pyrrhotite forms disseminated grains and patches up to 0.1 mm in size.

Quartz forms disseminated, equant grains.

A veinlet up to 1 mm wide consists of an intimate intergrowth of quartz, biotite, and pyrrhotite. A much smaller subparallel lens is of quartz and pyrrhotite.

Sample 36008 MT79129 26.82-27.74 m Hornfelsed Meta-mudstone
Veinlets: Quartz-Scheelite-(Chalcopyrite); Quartz-Biotite-Pyrrhotite

The sample is slightly banded and is dominated by sericite with lesser plagioclase and biotite, with minor pyrrhotite, quartz and ankerite. Darker bands contain more abundant biotite, plagioclase, and pyrrhotite, whereas lighter bands contain more sericite. A veinlet is of quartz with patches of scheelite and minor ones of chalcopyrite. A few wispy veinlets parallel to compositional banding are of quartz, pyrrhotite, and biotite.

mineral	**percentage**	**main grain size range (mm)**
plagioclase	40-45%	0.01-0.02
sericite	30-35	0.02-0.04
biotite	12-15	0.02-0.04
pyrrhotite	2	0.02-0.05
ankerite	0.5	0.07-0.2
quartz	0.2	0.02-0.05
veinlet		
1) quartz-scheelite-(chalcopyrite) envelope sericite	2- 3	0.1-0.15 (qz, sc); 0.03-0.1 (cp); 0.03-0.05 (sl)
2) quartz-biotite-pyrrhotite-(ankerite)	2	0.03-0.05

Much of the rock is dominated by an intergrowth of plagioclase and biotite with much less abundant sericite. The thick band at one end of the section is dominated by sericite with lesser biotite and much less abundant plagioclase. Banding is defined by variations in the abundances of sericite and biotite. The rock was folded tightly about axial planes at a high angle to compositional banding, but contacts of compositional layers cut across the foliation.

Pyrrhotite forms disseminated anhedral patches. It is concentrated moderately in wispy seams parallel to compositional banding. A few pyrrhotite patches contain a patch up to 0.03 mm in size of chalcopyrite.

Ankerite forms disseminated porphyroblastic grains.

Quartz forms disseminated, equant grains.

A veinlet up to 0.5 mm wide is dominated by equant grains of quartz and lesser ones of scheelite. Chalcopyrite forms minor grains along the margin of the veinlet. Sphalerite forms minor red-brown grains, in part associated with chalcopyrite. Bordering the veinlet is a zone up to 0.7 mm wide dominated by tightly contorted sericite/muscovite with much less abundant biotite and trace tourmaline. Outwards from this is a second alteration envelope dominated by biotite with lesser plagioclase and clinozoisite(?), and minor sericite and pyrrhotite.

A few partly contorted veinlets mainly less than 0.4 mm wide and locally up to 0.7 mm wide are dominated by quartz with generally lesser biotite and pyrrhotite. Some contain patches of ankerite. The largest contains minor chalcopyrite associated with a few patches of pyrrhotite.

Sample 36012 M72040 107.90-108.81 m

Plagioclase-Plagioclase-Chlorite-Pyrrhotite-Scheelite Schist
Replacement 1: Quartz-Pyrrhotite-Apatite-Scheelite-(Chalcopyrite)
Replacement 2: Plagioclase

The sample contains three main types of zones, labelled A, B, and C on the scanned section. Zone A consists of a well foliated intergrowth of phlogopite, plagioclase, and pyrrhotite, with disseminated grains of scheelite and one lens dominated by chlorite. Zone B consists of an intergrowth of quartz and pyrrhotite with lesser muscovite, apatite, and scheelite. Zone C is dominated by plagioclase.

mineral	percentage	main grain size range (mm)	
Zone A	**(15-17% of section)**		
plagioclase	5- 7%	0.03-0.07	
phlogopite	4- 5	0.05-0.2	(a few up to 0.4 mm long)
chlorite	1- 2	0.03-0.05	
pyrrhotite	1- 2	0.05-0.2	
scheelite	1- 2	0.05-0.2	(a few grains up to 1 mm)
Zone B	**(70-75% of section)**		
quartz	35-40%	1- 2	
pyrrhotite	25-30	0.05-0.2	
muscovite	2- 3	0.05-0.2	
scheelite	1	0.1-0.3	(a few up to 1 mm, one grain 1.7 mm across)
apatite	0.5	0.05-0.7	
chalcopyrite	1- 2	0.07-0.5	(a few patches up to 1 mm long)
Zone C	**(7- 8% of section)**		
plagioclase	5- 7	0.03-0.07	
sericite/muscovite	1- 2	0.03-0.3	
pyrrhotite	1- 2	0.03-0.07	
apatite	0.2	0.05-0.2	

In Zone A, phlogopite forms elongate flakes oriented parallel to foliation; pleochroism is from pale to light brown. Plagioclase forms anhedral grains intergrown with phlogopite; grain size varies moderately between lenses. Pyrrhotite forms elongated patches intergrown finely with phlogopite and plagioclase. Scheelite forms disseminated anhedral equant grains. Chlorite is concentrated strongly in several lenses up to 1 mm wide parallel to foliation, in which it forms elongate colourless to pale green flakes parallel to foliation.

In Zone B, quartz forms anhedral, equant grains, some of which contain minor to abundant inclusions of phlogopite and lesser ones of chlorite. Pyrrhotite and lesser chalcopyrite form irregular patches up to a few mm across that are intergrown coarsely to moderately with quartz and phlogopite. Scheelite forms disseminated anhedral equant grains and clusters of grains; a few coarser grains are skeletal in outline and appear to have been corroded by quartz and phlogopite. Apatite forms subhedral to euhedral prismatic grains from 0.2-0.8 mm long; some of which are included in quartz and some of which are included in pyrrhotite. Apatite also forms clusters of subhedral to euhedral prismatic grains (0.05-0.15 mm long) that are included in coarser quartz grains.

(continued)

Zone C is dominated by strongly interlocking, unoriented plagioclase grains. In places, plagioclase is intergrown intimately with patches of pyrrhotite and elsewhere with phlogopite, mainly along its margins against Zone B. Apatite forms disseminated grains that are concentrated in a few parts of the zone, and commonly occur in pyrrhotite of Zone B adjacent to plagioclase of Zone C. Sericite/muscovite forms ragged, in part subradiating patches up to 1 mm in size. Along the margin with Zone B some large quartz grains contain abundant inclusions of plagioclase similar to that in Zone C.

Sample 36015 MT72057 100.58-102.11
Skarn: Plagioclase-Phlogopite/Biotite-Pyrrhotite-Quartz-(Chalcopyrite-Scheelite)
Veinlets: Chlorite

The sample contains various zones with different textures and mineralogies. Some patches are relatively uniform in texture and are dominated by plagioclase and lesser phlogopite/biotite with disseminated pyrrhotite and minor patches of quartz and scheelite. Some patches are dominated by pyrrhotite with lesser biotite and plagioclase. Scheelite forms disseminated grains. A delicately banded veinlet is of chlorite.

mineral	**percentage**	**main grain size range (mm)**
plagioclase	50-55	0.03-0.5 (a few up to 1 mm)
phlogopite/biotite	20-25	0.05-0.1
pyrrhotite	12-15	0.05-0.2
quartz	4- 5	0.3-0.8
chalcopyrite	0.7	0.05-0.2
scheelite	0.7	0.07-0.3
veinlets		
1) chlorite	0.3	cryptocrystalline

Plagioclase forms anhedral to locally subhedral grains that vary widely in grain size from patch to patch. It generally is intergrown slightly to moderately with phlogopite/biotite and pyrrhotite.

Phlogopite/biotite forms clusters of flakes with pleochroism from pale to light/medium brown. It is concentrated moderately to strongly in some patches where it is intergrown with lesser pyrrhotite and plagioclase.

Pyrrhotite is concentrated strongly in pyrrhotite-rich patches that are intergrown moderately along their margins with phlogopite/biotite and lesser plagioclase. In places, pyrrhotite forms sieve-textured interstitial patches enclosing subhedral plagioclase grains.

Scheelite forms anhedral, commonly irregular grains, mainly included in patches of phlogopite/biotite. Some grains have skeletal outlines.

Quartz is concentrated in one patch several mm across that contains much less abundant patches of pyrrhotite, plagioclase, and phlogopite/biotite. Quartz also forms scattered patches up to a few mm in size intergrown mainly with coarser grained plagioclase and minor pyrrhotite and phlogopite/biotite. Some small patches contain an equant grain of scheelite.

A delicately banded veinlet 0.25 mm wide and a few smaller veinlets are of pale yellow to light olive green chlorite. Near the main veinlet are a few smaller veinlets and a few patches where chlorite replaced phlogopite.

Sample 36018 MT72057 80.77-82.30 m

Skarn: Quartz-Diopside-Pyrite-Scheelite-Chalcopyrite-Plagioclase-Epidote
Alteration: Chlorite/Smectite, Limonite
Veinlets: Calcite-Pyrite-Chlorite/Smectite

The sample is of patchy zoned skarn dominated by diopside (altered slightly to completely to limonite-chlorite/smectite), plagioclase, and quartz, with patches of pyrite (probably after pyrrhotite) and much less abundant chalcopyrite, and disseminated grains of scheelite and patches of ankerite. A few veinlets are of calcite-pyrite-chlorite/smectite.

mineral	percentage	main grain size range (mm)	
quartz	45-50%	0.5-1.5	a few up to 2 mm long)
diopside	30-35	0.05-0.2	(a few up to 1 mm across)
pyrite	7- 8	0.2-1	
chalcopyrite	1- 2	0.05-0.3	
scheelite	1- 2	0.1-0.7	
chlorite/smectite	1- 2	cryptocrystalline	
plagioclase	1- 2	0.05-0.3	(a few up to 1 mm across)
epidote	0.3	0.2-0.7	
calcite	0.3	0.05-0.3	
limonite	0.3	cryptocrystalline/amorphous	
apatite	0.1	0.1-0.2	
veinlet			
1) calcite-pyrite-chlorite/smectite	2- 3	0.05-0.2 (ct, py); 0.02-0.03 (cl/sm)	

Quartz forms anhedral grains, most of which contain minor to moderately abundant ragged equant inclusions of diopside (0.05-0.15 mm).

Diopside forms anhedral, mainly equant submosaic grains, in part intergrowth coarsely with plagioclase. In places it is fresh and in others it was altered moderately to completely to chlorite/smectite and limonite.

Pyrite forms mainly anhedral patches that contain dusty non-reflective inclusions; textures suggest that pyrite was formed by replacement of pyrrhotite. Some pyrite patches are surrounded by zones of dark brown limonite.

Chalcopyrite forms anhedral patches up to 0.5 mm in size, in part associated with pyrite.

Pyrrhotite forms scattered anhedral grains that were replaced moderately inwards from their margins by limonite. Pyrrhotite commonly is associated with pyrite.

Chlorite/smectite forms patches up to 0.5 mm in size adjacent to and interstitial to large patches of pyrite. Chlorite/smectite is light to medium greenish brown.

Scheelite forms anhedral, in part irregular grains mainly intergrown with diopside and pyrite. One scheelite cluster is 2.5 mm across.

Plagioclase is concentrated strongly in a few patches up to 2 mm across in which it forms anhedral equant grains intergrown coarsely with diopside.

Epidote is concentrated in a few patches of anhedral grains commonly bordering chalcopyrite, which is in part altered to limonite along its margins.

Ankerite/calcite forms anhedral grains intergrown with a few patches of pyrite and altered diopside.

(continued)

Limonite forms patches up to 0.5 mm in size adjacent to and interstitial to pyrite.
A patch 1 mm across consists of an aggregate of anhedral to subhedral prismatic apatite grains.

Several slightly braided veinlets up to 0.5 mm wide are mainly of calcite and pyrite, with much less abundant patches of chlorite/smectite.

Sample 36021 M72059 189.92-90.53 m Metamorphosed Latite
Replacement: Quartz-Pyrrhotite-Apatite

The sample contains patches of variable host rock dominated by plagioclase with much less abundant pyrrhotite and tremolite/actinolite, and replacement patches dominated by quartz and pyrrhotite with disseminated grains of apatite and minor scheelite, and patches of chlorite. Apatite, pyrrhotite, and scheelite are concentrated along the margins of the host rock and replacement patches.

mineral	percentage	main grain size range (mm)	
host rock			
plagioclase	40-45%	0.05-0.1	(some patches from 0.5-1 mm)
pyrrhotite	4- 5	0.1-1	
tremolite/actinolite	3- 4	0.05-0.15	
chalcopyrite	0.3	0.05-0.2	
scheelite	0.3	0.1-0.3	
epidote	0.1	0.2-0.5	
scapolite(?)	0.1	0.1-0.2	
pyrite	minor	0.1	
replacement			
quartz	35-40	0.3-1	(a few up to 2 mm)
plagioclase	4- 5	0.2-0.5	
pyrrhotite	2- 3	0.1-0.2	
apatite	2- 3	0.2-1	

The host rock is dominated by aggregates of plagioclase grains that are mainly in the range from 0.05-0.15 mm, with a few patches up to a few mm across with grains in the range from 0.5-1.2 mm. One patch 2 mm long contains abundant subhedral wedge-shaped grains of sphene with lesser interstitial plagioclase and pyrrhotite.

Pyrrhotite forms disseminated patches of anhedral grains.

Tremolite/actinolite is concentrated in a few bands and patches that range from anhedral to fan textured. Pleochroism ranges from colourless to pale green to pale green to light green.

Along the margin of patches of host rock are coarser grained aggregates that contain clusters of apatite, pyrrhotite, and scheelite.

Epidote forms a few anhedral grains associated with patches of chalcopyrite.

Scheelite forms disseminated equant grains.

Scapolite(?) forms a few grains associated with a patch of chalcopyrite and epidote.

Pyrite forms a few anhedral equant grains associated with larger patches of chalcopyrite and pyrrhotite.

A replacement patch up to 20 mm long and a few much smaller ones are dominated by aggregates of anhedral, slightly recrystallized quartz, some grains of which have slightly sutured borders.

Plagioclase forms subhedral to euhedral grains that were altered slightly to sericite.

Pyrrhotite forms irregular patches and a few seams, some of which are concentrated on the border of the replacement patch.

Apatite forms disseminated subhedral to euhedral grains and clusters of a few anhedral to subhedral grains. It is very abundant along the margin of the replacement zones with the host rock.

Sample 36024MT79129 90.83-91.44 m Diopside-(Plagioclase-Pyrrhotite) Skarn
Veinlets: Plagioclase; Diopside-Pyrrhotite; Calcite-Epidote(?); Epidote(?)

The sample is of massive skarn dominated by diopside with much less abundant plagioclase and pyrrhotite. Pyrrhotite is concentrated in bands and patches. A coarser grained veinlet at one end is dominated by plagioclase. A veinlet is of slightly coarser grained diopside and pyrrhotite. A veinlet is of calcite with lesser epidote and minor tremolite. A few veinlets of epidote contain minor chalcopyrite and pyrite.

mineral	percentage	main grain size range (mm)
diopside	90-92%	0.015-0.02; 0.05-0.08
plagioclase	4- 5	0.015-0.02
pyrrhotite	3- 4	0.03-0.05
veinlets		
1) plagioclase	0.5	0.1-0.3
2) diopside-pyrrhotite	0.3	0.07-0.15
3) calcite-epidote(?)-(tremolite[?])	0.3	0.05-0.08
4) epidote(?)-(chalcopyrite-pyrite)	0.1	0.02-0.05

Diopside forms a granular aggregate of equant grains.

Plagioclase is concentrated slightly to moderately in certain layers parallel to banding outlined by pyrrhotite-rich bands.

Pyrrhotite is concentrated moderately to strongly in parallel bands that may define original bedding. Many grains are surrounded by pyrite, suggesting that pyrite formed by replacement of pyrrhotite.

Chalcopyrite forms disseminated anhedral grains, mainly associated with pyrite.

Two veinlets up to 0.1 mm wide are dominated by pyrrhotite-pyrite with lesser chalcopyrite.

A veinlet up to 0.1 mm wide is of slightly coarser grained diopside (0.5-0.008 mm) and patches of pyrrhotite.

A veinlet 0.07 mm wide is of calcite and lesser epidote(?), with scattered acicular grains of tremolite(?).

A few discontinuous veinlets up to 0.3 mm wide are of epidote(?) with minor disseminated chalcopyrite and pyrite (0.01-0.03 mm).

Sample 36025 MT72027 93.27-93.88 m Hornfels
Veinlets: Quartz, Quartz-Pyrrhotite, Fluorite(?)-(Calcite)

The sample is of slightly foliated hornfelsed siltstone dominated by plagioclase and quartz, with much less abundant sericite/muscovite, Mineral X, biotite, and pyrrhotite. A veinlet is of quartz-pyrrhotite-(chalcopyrite) and a smaller veinlet is of quartz. An irregular veinlet is of fluorite(?) with a vuggy centreline containing minor patches of calcite.

mineral	percentage	main grain size range (mm)
plagioclase	55-60%	0.01-0.03
quartz	17-20	0.02-0.03
sericite/muscovite	5- 7	0.01-0.03
Mineral X	3- 4	cryptocrystalline
pyrrhotite	2- 3	0.03-0.05
biotite	1	0.02-0.04
chalcopyrite	trace	0.02-0.04
veins, veinlets		
1) quartz-pyrrhotite-(chalcopyrite)	4- 5	0.1-0.5
2) fluorite(?)-(calcite)	2- 3	0.2-0.5

The hornfels is dominated by a uniform intergrowth of equant plagioclase and less abundant quartz.

Sericite/muscovite and lesser biotite form disseminated flakes, most of which are oriented parallel to foliation. Biotite is pleochroic from pale to light brown.

Mineral X has moderate relief is colourless and moderately soft with very low birefringence. It forms patches up to 0.1 mm in size of cryptocrystalline grains.

Pyrrhotite forms disseminated lenses that show a slightly preferred elongation parallel to foliation. It is concentrated slightly to strongly in wispy lenses parallel to foliation

Chalcopyrite forms scattered patches associated with pyrrhotite.

A vein from 1.5-2 mm wide with slightly irregular borders is dominated by coarse patches of pyrrhotite and of quartz. Chalcopyrite forms scattered patches up to 0.1 mm in size within patches of quartz. A second veinlet 0.6 mm wide is of quartz; it has sharp planar borders.

An irregular, warped veinlet up to 0.8 mm wide is dominated by fluorite(?) with minor calcite along its vuggy centreline.

Sample 36026 MT71022 25.60-26.21 m Hornfels
Veinlets: Quartz-Pyrrhotite-(Sphalerite-Chalcopyrite); Quartz; Fluorite

The sample is of slightly banded hornfels that is dominated by plagioclase and lesser quartz, with much less abundant sericite/muscovite, minor pyrrhotite and biotite, and trace epidote. A few veinlets are of quartz with lenses of pyrrhotite; some of these contains patches of sphalerite and of chalcopyrite. A quartz-rich veinlet has an envelope containing moderately abundant K-feldspar. A few late braided veinlets are of zeolite. A few veinlets are of fluorite.

mineral	percentage	main grain size range (mm)	
plagioclase	55-60%	0.01-0.03	
quartz	25-30	0.02-0.05	
sericite/muscovite	4- 5	0.02-0.03	(a few up to 0.1 mm)
pyrrhotite	1	0.03-0.07	
biotite	0.7	0.02-0.03	
Mineral X	0.7	cryptocrystalline	
tremolite	0.2	0.08-0.12	
sphalerite	0.2	0.02-0.05	(a few up to 0.15 mm long)
chalcopyrite	trace	0.01-0.03	
ilmenite/sphene	trace	0.03-0.05	
veinlets			
1) quartz-pyrrhotite-(sphalerite-chalcopyrite)	2- 3	0.02-0.07	
2) quartz	2	0.02-0.05	
3) zeolite	0.3	0.015-0.03	(late veinlets)
4) fluorite	0.1	0.05-0.07	

Quartz forms a few rounded grains from 0.05-0.07 mm in size that may be detrital in origin.

These are contained in a groundmass dominated by equant, anhedral plagioclase and lesser quartz.

Sericite/muscovite and much less abundant biotite form disseminated flakes that have a moderately preferred orientation parallel to foliation.

Pyrrhotite forms disseminated equant to elongate patches, the latter up to 2 mm long. Associated with the latter are patches of light brown chlorite and minor patches of chalcopyrite and sphalerite.

Mineral X forms disseminated spots averaging 0.05 mm in size of equant cryptocrystalline grains.

Sphalerite forms equant to elongated, medium reddish brown grains and lenses, in part disseminated in silicates and in part associated with small patches of pyrrhotite.

Tremolite forms scattered subhedral to euhedral prismatic grains.

A few lenses up to 0.7 mm long are of slightly coarser grained (0.05-0.07 mm), slightly interlocking quartz.

Chalcopyrite forms disseminated grains associated with sphalerite and pyrrhotite.

Ilmenite forms a few equant anhedral grains that were replaced moderately inwards from their margins by sphene.

A veinlet 0.5 mm wide is of quartz with lenses up to several mm long containing abundant pyrrhotite intergrown with lesser quartz. Two veinlets from 0.5-1.5 mm wide are of equant quartz with minor patches of pyrrhotite with lesser chalcopyrite and sphalerite, scattered clusters of pale grey chlorite and others of ragged grains of calcite, scattered anhedral to subhedral prismatic grains of epidote, and scattered patches of fluorite up to 0.3 mm long). One of these has an envelope up to a few mm wide containing moderately abundant K-feldspar (see stained offcut block).

A few late braided veinlets up to 0.05 mm wide of zeolite cut the earlier veinlets at a high angle.
A few late veinlets mainly from 0.01-0.03 mm wide and one 0.05 mm wide are of fluorite.

Sample 36027 MT71022 52.43-53.34 m   Hornfels
Lens: Quartz-(Allanite)

The sample is of slightly banded hornfels composed of plagioclase with much less abundant biotite and quartz. Mineral X is concentrated strongly in a band 3.5 mm wide that cuts across compositional banding. A coarser grained lens consists of quartz with scattered grains of allanite.

mineral	percentage	main grain size range (mm)	
plagioclase	60-65%	0.02-0.03	
quartz	17-20	0.02-0.04	
biotite	12-15	0.02-0.04	
Mineral X	3- 4	cryptocrystalline	
sphene	minor	0.015-0.025	(one grain 0.07 mm across)
pyrite	trace	0.005-0.01	
lenses			
quartz-(allanite)	minor	0.1-0.2 (qz); 0.1-0.3 (al)	

A few quartz grains from 0.05-0.06 mm across may be original detrital grains.
These are set in a slightly banded groundmass dominated by plagioclase with lesser quartz and biotite. Biotite is pleochroic from pale to light reddish brown.
Mineral X forms diffuse patches up to 0.1 mm in size of cryptocrystalline grains that contain dusty opaque. It is concentrated strongly in a band up to 3.5 mm wide that cuts compositional banding at a high angle. The contact suggests an alteration front.
Sphene forms scattered anhedral grains (0.01-0.025 mm) and one equant subhedral grain 0.07 mm across.
Pyrite forms scattered subrounded grains.

A lens 2.5 mm long by up to 0.015 mm wide is dominated by coarser grained quartz (0.1-0.2 mm) with a few grains of allanite (0.1-0.3 mm) with pleochroism from straw to light reddish brown.

Sample 36029 MT71022 48.46-49.38 Carbonaceous Pelite
Veinlets: Quartz-Pyrrhotite-(Sericite-Biotite-Chalcopyrite); Limonite

The sample contains abundant dusty carbonaceous opaque that obscures the optical properties of the silicates. Silicates are dominated by plagioclase with much less abundant sericite and minor quartz. No other transparent minerals could be recognized. Pyrrhotite forms abundant disseminated patches and lenses. A few lenses parallel to foliation are of pyrrhotite-quartz. A large veinlet is of quartz and pyrrhotite with lesser biotite-(sericite) and much less chalcopyrite. A veinlet is of limonite.

mineral	percentage	main grain size range (mm)
plagioclase	72-77%	0.005-0.01
sericite	7- 8	0.01-0.02
pyrrhotite	4- 5	0.05-0.15
quartz	3- 4	0.02-0.05
carbonaceous opaque	3- 4	dusty
sphalerite	trace	0.05
chalcopyrite	trace	0.015-0.02
veinlets		
1) quartz-pyrrhotite-biotite-(sericite)	5- 7	0.03-0.2 (qz, cp); 0.03-0.07 (se/bi); 0.05-0.3 (po)
1) limonite	0.2	cryptocrystalline

Plagioclase forms anhedral grains that contain dusty carbonaceous opaque.

Sericite forms stubby flakes with a moderately preferred orientation that defines a moderate foliation.

Pyrrhotite forms disseminated patches and lenses up to 0.5 mm long.

Quartz forms disseminated anhedral grains, in part alone, and in part associated with lenses and patches of pyrrhotite. A few of the quartz grains may be detrital in origin.

Carbonaceous opaque forms dusty disseminated grains that are concentrated slightly in wispy lenses parallel to foliation.

Sphalerite forms a few patches up to 0.07 mm long, in part associated with pyrrhotite.

Chalcopyrite forms a few patches associated with sphalerite and with pyrrhotite.

A vein up to 2 mm wide at one end of the section is of quartz and pyrrhotite with lesser patches of biotite-sericite. Biotite is pleochroic from pale to light orangish brown. Chalcopyrite forms a few patches up to 0.4 mm in size intergrown coarsely with pyrrhotite. The veinlet is mainly parallel to foliation, but where a sericite-biotite patch extends into the vein from the edge of the host rock, the foliation is warped locally to nearly perpendicular to the veinlet. The host rock plagioclase was altered strongly to sericite in this transition zone.

A few wispy veinlets and lenses parallel to foliation up to 0.05 mm wide are of pyrrhotite and quartz.

A wispy slightly braided, en echelon veinlet up to 0.02 mm wide of orange limonite cuts across foliation at a high angle.

Sample 36034 2007-BH4 4.00-4.40 m   Metamorphosed Carbonaceous Pelite

The sample is of well foliated rock that contains minor coarser, possibly detrital grains of quartz and plagioclase in a groundmass of cryptocrystalline material, probably dominated by plagioclase with moderately abundant dusty carbonaceous opaque and disseminated patches of pyrrhotite (altered moderately to secondary Fe-minerals) and minor patches of Ti-oxide. One ragged porphyroblastic patch contains abundant elongate grains of orthoamphibole(?) in subparallel orientation. Some larger patches consist of cores of pyrrhotite partly surrounded by Ti-oxide and rimmed by quartz. A few lenses, in part elongated parallel to foliation, are of quartz, pyrrhotite, and pyrite, with minor to moderately abundant chlorite and minor chalcopyrite.

mineral	**percentage**	**main grain size range (mm)**
detrital (?) grains		
quartz	1- 2%	0.03-0.05
plagioclase	0.3	0.03-0.05
groundmass		
plagioclase(?)	70-75	0.005-0.01
sericite	10-12	0.005-0.01
carbonaceous opaque	2- 3	dusty
pyrrhotite	0.5	0.02-0.07; 0.005-0.01
orthoamphibole(?)	0.5	0.07-0.15
Ti-oxide	0.3	0.005-0.015
pyrite	minor	0.03-0.07
chalcopyrite	trace	0.03-0.05
lenses		
quartz-pyrrhotite-pyrite-chlorite-(chalcopyrite)	0.3	0.03-0.07

A few grains of quartz from 0.03-0.07 mm in size may be of detrital origin.

The groundmass of the rock contains abundant dusty carbonaceous opaque that obscures the optical properties of the other minerals in all but the thinner margins of the section. The groundmass silicates probably are dominated by cryptocrystalline plagioclase with much less abundant quartz and sericite.

Orthoamphibole forms an irregular porphyroblastic patch up to 2 mm across of abundant prismatic grains, many of which are in subparallel orientation. The mineral is colourless, with moderate relief and moderate birefringence, length-slow with parallel extinction.

Pyrrhotite forms disseminated grains from 0.005-0.02 mm in size, and patches from 0.05-0.2 mm in size. Most larger patches were altered moderately to strongly to secondary Fe-minerals including pyrite and dusty, non-reflective material of unknown composition. Bordering many larger patches are clusters of Ti-oxide and rims of quartz (0.02-0.05 mm).

Ti-oxide forms disseminated patches from 0.02-0.05 mm in size. It commonly occurs as an outer zone in pyrrhotite patches over 0.1 mm in size.

Pyrite forms scattered anhedral grains, some of which probably are secondary after pyrrhotite. Some grains are associated with patches of quartz up to 0.1 mm in size.

Chalcopyrite forms a few patches associated with larger patches of pyrrhotite and with a few grains of pyrite.

A few lenses up to 1.5 x 0.2 mm are of quartz with patches of pyrrhotite, pyrite, chlorite, and lesser chalcopyrite.

Sample 36035 2007-BH4 4.97-5.07 m **Tremolite-Garnet-Diopside-(Ankerite) Skarn**
Veinlets: Calcite; Mineral Y

The sample is of skarn that contains disseminated equant garnet grains in a matrix of extremely fine grained tremolite with ragged, slightly coarser grains of diopside. Minor minerals include ankerite and quartz. A veinlet on one side of the section is of Mineral Y. Veinlets on fractures in the core sample are of calcite.

mineral	**percentage**	**main grain size range (mm)**	
tremolite	60-65%	0.01-0.03; 0.1-0.15 mm	(a few up to 0.2 mm)
garnet	7- 8	0.3-0.7	
diopside	7- 8	0.1-0.2	
ankerite	1	0.05-0.2	
veinlets			
1) calcite	1- 2	0.05-0.1	(in core sample only)
2) Mineral Y	0.3	0.2-0.3	

At one end of the section, garnet forms disseminated equant isotropic anhedral grains. At the other end of the section, most grains are subhedral to locally euhedral and slightly to moderately anisotropic. Some grains contain well developed growth zones of slightly different compositions. Garnet contains minor to moderately abundant ragged grains of diopside and minor to locally abundant clusters of tremolite and patches of ankerite

Diopside forms disseminated, anhedral, somewhat ragged equant grains that are intergrown with groundmass tremolite and with garnet.

Tremolite occurs in two main modes. Much of it is as a felted groundmass (0.02-0.04 mm) between garnet grains. This contains disseminated grains of diopside. Tremolite also forms scattered patches up to 0.2 mm in size of subparallel to irregular aggregates of prismatic grains.

Non-reflective, probably carbonaceous opaque forms ragged interstitial patches up to 0.2 mm in size.

Ankerite forms anhedral inclusions in garnet (0.03-0.05 mm) and a few patches (up to 1 mm) that replaced groundmass tremolite. The latter contain ragged inclusions of diopside as in the tremolite groundmass nearby.

A veinlet up to 0.4 mm wide along one corner of the section is of equant anhedral grains of Mineral Y. It is colourless, with a R.I. about 1.57 and very low birefringence (0.002).

The core sample contains a few veinlets up to 0.3 mm wide of calcite along fracture surfaces.

Sample 38037 2007-BH21 8.55-8.82 m Metamorphosed Shale
Veinlet: Quartz-Calcite-Pyrite

The sample contains disseminated, subrounded to lensy patches of calcite and minor ones of quartz in a moderately foliated matrix that contains very abundant carbonaceous opaque that obscures the optical properties of the other matrix minerals (probably plagioclase with lesser calcite and sericite). A braided veinlet is of quartz with lesser calcite and much less pyrite and sericite.

mineral	**percentage**	**main grain size range (mm)**
patches, lenses		
calcite	7- 8%	0.03-0.07
quartz	0.3	0.3-0.5
groundmass		
plagioclase	65-70%	0.005-0.01
carbonaceous opaque	7- 8	amorphous
sericite	3- 4	0.01-0.015
calcite	3- 4	0.005-0.01
pyrite	2- 3	0.02-0.2 (a few up to 0.5 mm, one 1.5 mm across)
Ti-oxide	0.2	0.02-0.05
veinlet		
1) quartz-calcite-pyrite-sericite	3- 4	0.01-0.02 (qz, ct, se); 0.05-0.25 (py)

Calcite forms rounded patches (0.07-0.15 mm) and lenses up to 0.3 mm long of anhedral grains

The groundmass is obscured strongly by abundant carbonaceous opaque. It probably is dominated by plagioclase, with much less abundant sericite and calcite.

Pyrite forms disseminated anhedral to subhedral grains, some of which contain minor to moderately abundant tiny non-reflective inclusions. One large porphyroblastic pyrite grain straddles a small veinlet of quartz-calcite-sericite; where it intersects the veinlet, pyrite is relatively free of non-reflective inclusions, and where it intersects the host rock, it contains abundant non-reflective dusty inclusions. Many smaller pyrite grains that straddle the border of the veinlet show a similar distribution of dusty non-reflective inclusions.

Ti-oxide forms disseminated ragged patches.

Chalcopyrite forms very minor disseminated grains in patches o host rock included in the veinlet.

A braided veinlet from 0.3-1 mm wide is dominated by quartz with lesser calcite, much less abundant sericite, and scattered grains of pyrite. Quartz commonly has a slightly banded texture that commonly is at a moderate angle to the length of the veinlet. This is enhances by seams of sericite between bands of quartz. Calcite is concentrated moderately in lenses parallel to the borders of the veinlet or parallel to seams of calcite-quartz that cut across the veinlet at a moderate angle. Pyrite forms disseminated euhedral to subhedral grains. Sericite forms scattered lenses, mainly along the margins of the veinlet.

Sample 36038 2007-BH21 11.68-11.93 m Metamorphosed Carbonaceous Limestone
Veinlets: Quartz-Chlorite/Biotite-Pyrite

The sample is of slightly foliated carbonaceous limestone dominated by calcite with moderately abundant disseminated dusty carbonaceous opaque. A network of irregular veinlets consist of calcite, chlorite/biotite, minor pyrite and quartz, and trace chalcopyrite.

mineral	**percentage**	**main grain size range (mm)**
calcite	90-93%	0.02-0.03
carbonaceous opaque	2- 3	amorphous
pyrite	0.3	0.01-0.015; 0.03-0.05
Ti-oxide	0.1	0.005-0.015
veinlets		
1) calcite-chlorite/biotite-(pyrite-quartz)	4- 5	0.03-0.05 (ct, py). 0.005-0.02 (cl)

Calcite forms anhedral, slightly interlocking grains that contain moderately abundant dusty carbonaceous opaque. Carbonaceous opaque is concentrated slightly to moderately in wispy seams that define a weak foliation.

Pyrite forms disseminated, anhedral grains (0.01-0.015 mm) and scattered coarser single grains and clusters of grains (0.03-0.05 mm). A few patches up to 0.15 mm in size consist of skeletal aggregates of pyrite that are intergrown with calcite.

A network of intersecting veinlets from 0.05-0.3 mm wide (locally up to 0.7 mm) are of calcite with patches of brownish green chlorite, and locally moderately abundant pyrite and quartz. Chlorite/biotite occurs mainly as aggregates of equant grains (0.005 mm) and locally as patches of a few flakes (0.05-0.1 mm). Much of it has low birefringence and a light greenish brown colour, suggesting that the mineral is chlorite; some patches have moderate birefringence and slightly browner colour, indicating biotite. Chalcopyrite forms a few grains associated with calcite and biotite/chlorite.

Sample 36040 2007-BH22 8.48-8.79 m Metamorphosed Ankeritic Mudstone
Veinlets: Calcite-Pyrrhotite-(Quartz-Sericite/Muscovite)

The sample is of slightly to locally moderately contorted metamorphosed ankeritic mudstone dominated by plagioclase with abundant carbonaceous opaque and moderately abundant ankerite, and minor grains of quartz, some of which may be of detrital origin. A few strongly contorted veinlets are of calcite and pyrrhotite, with much less abundant quartz and sericite/muscovite.

mineral	**percentage**	**main grain size range (mm)**
plagioclase	60-65%	0.01-0.02
ankerite	8-10	0.01-0.02 (a few up to 0.07 mm)
carbonaceous opaque	7- 8	amorphous
sericite	1	0.015-0.02
sphene (?)	0.7	0.005-0.01
pyrrhotite	0.7	0.01-0.03 (a few up to 0.07 mm)
quartz	0.3	0.2-0.4
chalcopyrite	minor	0.01-0.03
sphalerite	trace	0.01-0.015
veinlets		
1) calcite-pyrrhotite-(quartz-sericite/muscovite)	3- 4	0.02-0.1 (ct, qz, po); 0.02-0.05 (se)

The rock is dominated by equant plagioclase grains with much less abundant ankerite.

Abundant dusty carbonaceous opaque obscures the optical properties of the other minerals in transmitted light. Some lenses contain less carbonaceous opaque than normal, and in these the other minerals can be identified. .

Sericite forms disseminated stubby flakes that are oriented moderately parallel to a weak foliation.

Quartz forms scattered equant grains, many of which may be of detrital origin.

Sphene(?) forms disseminated ragged patches, mainly from 0.07-0.15 mm in size and a few up to 0.3 mm in size of aggregates of grains.

Pyrrhotite forms disseminated grains and anhedral patches, the latter up to 0.1 mm in size.

Chalcopyrite forms a few disseminated grains.

Sphalerite forms a few grains associated with chalcopyrite.

A few strongly contorted veinlets up to 1 mm wide are dominated by calcite and pyrrhotite with less abundant patches of quartz and sericite/muscovite.

List of Photographs

Photo	Section	Description
01	36002	plagioclase-quartz-biotite hornfels cut by vein of quartz-pyrite-(chalcopyrite) that has an alteration envelope 0.3 mm wide in which biotite was altered completely to chlorite and scattered flakes of muscovite, and which contains scattered grains of calcite.
02	36002	replacement patch: pyrrhotite (altered partly to pyrite) and submosaic quartz with minor chalcopyrite (in quartz) and hematite selvages between quartz grains.
03	36003	groundmass is moderately foliated intergrowth off plagioclase and biotite with lesser quartz; replacement patch of pyrrhotite (replaced by an intimate intergrowth of pyrite and non-reflective material); skeletal veinlets and patches of pyrrhotite intergrown with the host rock.
04	36003	lower left: mottled zone of plagioclase-sericite/muscovite-(quartz) with minor disseminated lenses of pyrrhotite; upper right: plagioclase-biotite-(quartz) (main rock) with lenses of pyrrhotite; veinlet of quartz-pyrrhotite with somewhat diffuse margins.
05	36005	top left: coarser grained patch of quartz with disseminated pyrrhotite and biotite; main rock contains spheroidal to irregular patches of sericite-(plagioclase) in a matrix of plagioclase-biotite-sericite with disseminated grains of ilmenite.
06	36005	weakly mottled zone with diffuse patches of sericite-biotite-(plagioclase-ilmenite) enclosed in a matrix dominated by sericite with minor biotite, plagioclase, and ilmenite.
07	36005	variable host rock, with patches dominated by plagioclase with lesser biotite and sericite and minor ilmenite, and others dominated by sericite and plagioclase with minor biotite; one replacement patch dominated by quartz with lesser plagioclase, biotite, and pyrrhotite, and minor chalcopyrite; finely banded veinlet of opal(?).
08	36006	to the left: extremely fine grained band rich in plagioclase with lesser biotite, dusty Ti-oxide, and scattered quartz grains; to the right this grades into a zone with more abundant quartz and biotite and less plagioclase and Ti-oxide; right half: replacement zone of quartz with disseminated patches of biotite and of pyrrhotite with trace relic zircon; lower left corner: veinlet of calcite.
09	36006	to the left: one large, probably detrital quartz grain in a groundmass of quartz with lesser biotite and pyrrhotite with trace zircon; to the right: coarser

(possibly detrital) quartz grains in a finer grained groundmass dominated by plagioclase with lesser biotite and sericite and minor ilmenite/Ti-oxide.

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Photo	Section	Description
10	36007	groundmass of plagioclase with much less abundant biotite and disseminated pyrrhotite surrounds ragged mottles dominated by sericite with much less abundant plagioclase, biotite, and pyrrhotite.
11	36007	host rock: plagioclase with lesser biotite and sericite and minor disseminated pyrrhotite; veinlet of quartz-biotite-pyrrhotite with narrow envelope in which biotite is more abundant than in the host rock.
12	36008	to the left: outer envelope on vein composed of biotite, plagioclase, clinozoisite(?), with much less abundant sericite and pyrrhotite; in the centre: inner envelope dominated by contorted sericite/muscovite with trace tourmaline and minor pyrrhotite; to the right: vein of quartz with disseminated patches of scheelite and minor ones of chalcopyrite.
13	36008	sericite-biotite-plagioclase host rock cut by veinlet of sericite-ankerite-pyrrhotite-quartz (roughly outlined by the dashed yellow line); veinlet was folded, boudinaged, and offset by a shear fold parallel to foliation.
14	36012	Zone A: intergrowth of plagioclase and phlogopite, with lenses of pyrrhotite and irregular grains of scheelite.
15	36012	Zone B: coarser grained quartz with finer grained scheelite and minor apatite and phlogopite, intergrown with patches of pyrrhotite and lesser chalcopyrite.
16	36012	contact: Zone C: extremely fine grained plagioclase with patches of sericite-muscovite and minor pyrrhotite; Zone B: coarse quartz with inclusions of plagioclase and minor ones of phlogopite and pyrite; patch of scheelite adjacent to large patch of pyrrhotite with minor chalcopyrite.
17	36015	intergrowth of plagioclase, phlogopite/biotite, and pyrrhotite, with a few irregular grains of scheelite (mainly in phlogopite/biotite.
18	36015	subhedral to euhedral plagioclase grains (altered in a few patches to sericite) with interstitial patches of pyrrhotite and minor chalcopyrite.
19	36015	pyrrhotite -rich zone with band of phlogopite; cut by delicately banded veinlet of chlorite, with patches of chlorite replacing phlogopite near the veinlet; smaller wispy veinlets also are of chlorite.
20	36018	intergrowth of diopside and plagioclase with a few irregular grains of scheelite; irregular veinlet of chlorite and minor calcite near the top right corner.

List of Photographs

Photo	Section	Description
21	36018	to the left: intergrowth of quartz and granular diopside with minor patch of pyrite; in the centre: coarser grained quartz with minor diopside; to the right: pyrite (with dusty non-reflective inclusions) with chlorite/smectite along the quartz-pyrite margin and interstitial to pyrite.
22	36018	intergrowth of quartz and clinopyroxene (altered very strongly to intergrowths of limonite, ankerite, and chlorite/smectite; patches of chalcopyrite, mainly rimmed by or adjacent to patches of epidote.
23	36021	to the left: host rock: plagioclase with minor patches of pyrrhotite; middle: border zone: intergrowth of apatite (in part euhedral), pyrrhotite, and minor scheelite; to the right: coarser grained quartz with minor pyrrhotite.
24	36021	patch of chalcopyrite-pyrrhotite with minor pyrite surrounded by aggregate of epidote, scapolite(?), and lesser plagioclase and quartz; on the margin between a quartz-rich patch with lesser plagioclase and tremolite/actinolite, and the host rock dominated by very fine grained plagioclase.
25	36024	granular diopside with disseminated patches of pyrrhotite (in part replaced by plagioclase); one grain of chalcopyrite associated with pyrrhotite.
26	36024	to the left: veinlike zone of coarser grained plagioclase with disseminated patches of pyrite-pyrrhotite (su); to the right: border zone of plagioclase-(diopside) grades into diopside-plagioclase and eventually to diopside-(plagioclase) (at the edge of the photo).
27	36024	granular diopside with disseminated patches of pyrite, pyrrhotite, and minor chalcopyrite; veinlet of slightly coarser grained diopside-pyrrhotite-pyrite-chalcopyrite.
28	36025	top left: hornfels: plagioclase-quartz with much less abundant sericite and muscovite flakes whose elongation defines a weak foliation; lower right: vein
of		quartz and pyrrhotite, with a few patches of chalcopyrite in quartz and minor plagioclase (on or near the border of the vein); minor cluster of coarser grained muscovite along margin of the vein.
29	36025	hornfels: plagioclase-quartz-(sericite) with disseminated patches of cryptocrystalline Mineral X and a few patches of pyrrhotite; warped (folded?) veinlet of fluorite(?) with a central cavity containing minor calcite.
30	36026	top right: hornfels: plagioclase-quartz-sericite with disseminated patches of pyrrhotite and of Mineral X; lower left: quartz veinlet with disseminated patches of pyrrhotite-(chalcopyrite-sphalerite), chlorite, and calcite; vein

contains wispy lenses and patches of partially assimilated host rock; late braided veinlet of quartz.

List of Photographs

Photo	Section	Description
31	36026	hornfels: plagioclase-quartz with much less abundant sericite and disseminated patches of pyrrhotite; veinlet of pyrrhotite-quartz with a few patches of chalcopyrite, sphalerite, and chlorite associated with pyrrhotite.
32	36027	to the left: slightly banded intergrowth of plagioclase with lesser quartz and biotite and minor Mineral X; to the right: similar rock but it contains abundant patches of Mineral X; the contact appears to be an alteration front.
33	36027	hornfels: intergrowth of plagioclase with lesser quartz and much less biotite; weak foliation defined by parallel orientation of biotite flakes parallel to compositional banding in the rock elsewhere in the section; lens of quartz with two grains of allanite.
34	36029	moderately foliated host rock: plagioclase with lesser sericite and minor biotite with abundant dusty carbonaceous opaque; patches of pyrrhotite and disseminated grains of quartz (commonly adjacent to pyrrhotite); en echelon veinlet of limonite.
35	36029	to the left: veinlet of pyrrhotite-quartz with patches and seams of biotite and lesser sericite; to the right: host rock: plagioclase with abundant carbonaceous opaque, lesser sericite-biotite, and disseminated patches of pyrrhotite; in the centre: transition zone contains abundant sericite-(biotite) with foliation warped to a high angle to the border of the veinlet.
36	36034	minor coarser grains of quartz (some probably detrital) in a slightly banded groundmass dominated by plagioclase with much less abundant carbonaceous opaque and sericite, with disseminated patches of pyrrhotite and of quartz.
37	36034	patches of pyrrhotite (altered partly to secondary Fe-minerals) rimmed by irregular patches of Ti-oxide, with an outer zone of quartz; enclosed in host rock dominated by plagioclase with lesser sericite, carbonaceous opaque, and quartz.
38	36035	anhedral to subhedral garnet grains with abundant inclusions of diopside and ankerite in a groundmass of feathery tremolite with ragged disseminated grains of diopside; ankerite forms an elongate patch along the border of one garnet grain against groundmass tremolite.
39	36035	to the left: veinlet of Mineral Y: colourless, very low birefringence, R.I. about that of quartz; hardness medium; to the right: aggregate of feathery tremolite with ragged grains of diopside and one anhedral grain of garnet with inclusions

of diopside and minor tremolite.

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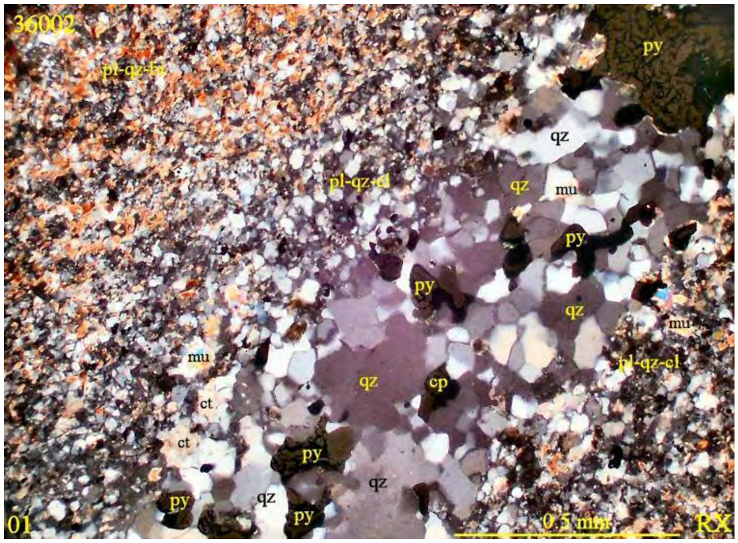
Photo	Section	Description
40	36037	rounded to lensy patches of calcite in a moderately foliated groundmass of plagioclase with very abundant carbonaceous opaque and minor calcite and sericite.
41	36037	host rock of plagioclase, carbonaceous opaque, and minor calcite and pyrite; veinlet dominated by quartz (in part in trains with minor sericite at a moderate angle to the length of the veinlet) with lesser lenses of calcite and of sericite and disseminated grains of pyrite.
42	36034	porphyroblastic patch of prismatic grains of orthoamphibole(?), many of which are in subparallel orientation; in a groundmass of plagioclase with much less abundant sericite, carbonaceous opaque, and quartz, and with disseminated patches of pyrrhotite.
43	36038	host rock: calcite with abundant carbonaceous opaque; veinlets of calcite with patches of chlorite/biotite.
44	36038	Host rock: calcite with abundant carbonaceous opaque; irregular patchy veinlets of calcite-quartz-pyrite-chlorite/biotite and minor chalcopyrite.
45	36040	contorted veinlet of calcite-pyrrhotite with a patch of quartz-(muscovite) cuts host rock: plagioclase-ankerite-carbonaceous opaque.
46	36040	vein in fold nose: top left: spheroidal patch of pyrite (secondary after pyrrhotite) showing a variety of textures and reflectances; lower left: pyrrhotite-rich zone with a few patches of sphalerite; right centre: calcite-quartz with minor muscovite; far upper right: edge of host rock: carbonaceous opaque obscures silicates.



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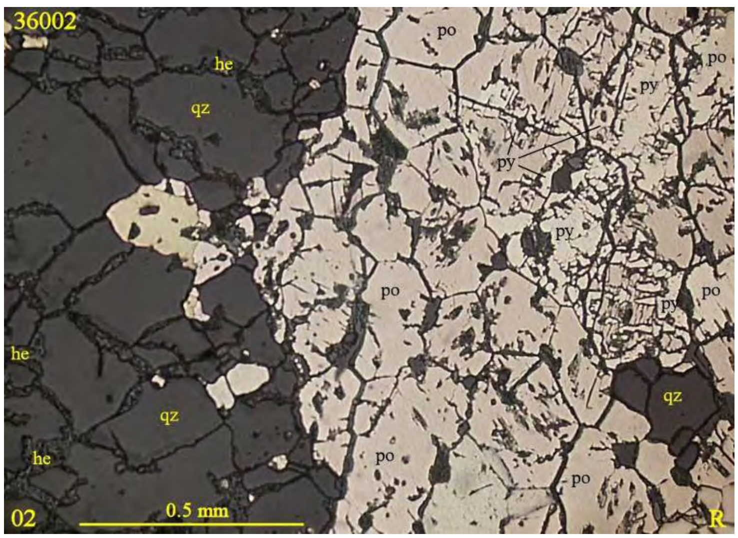

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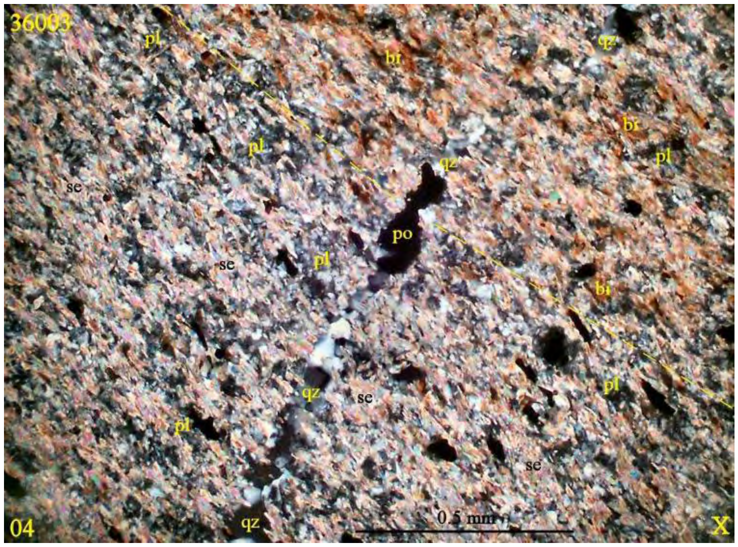
Photo 3



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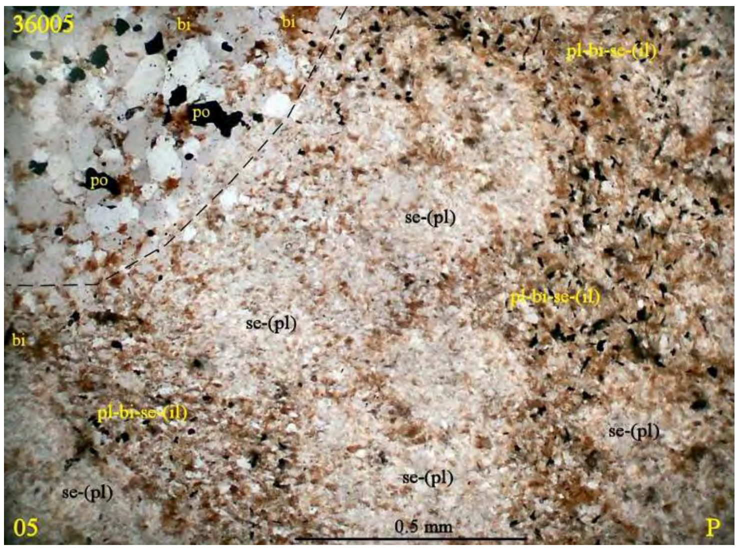

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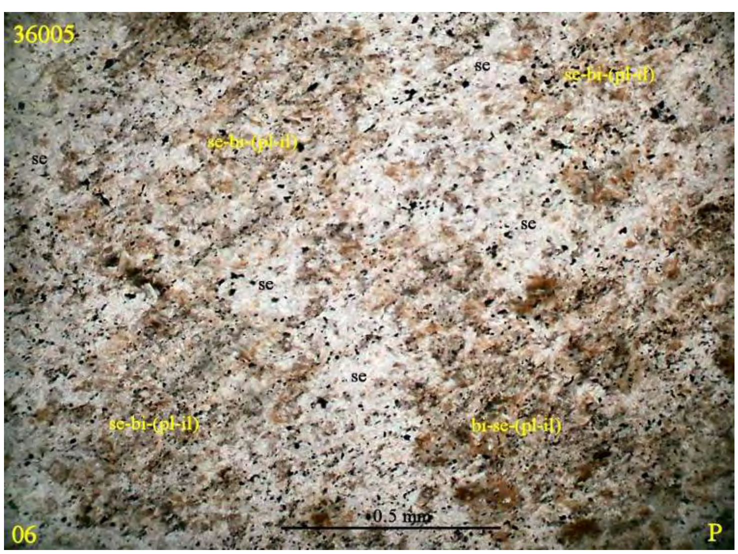

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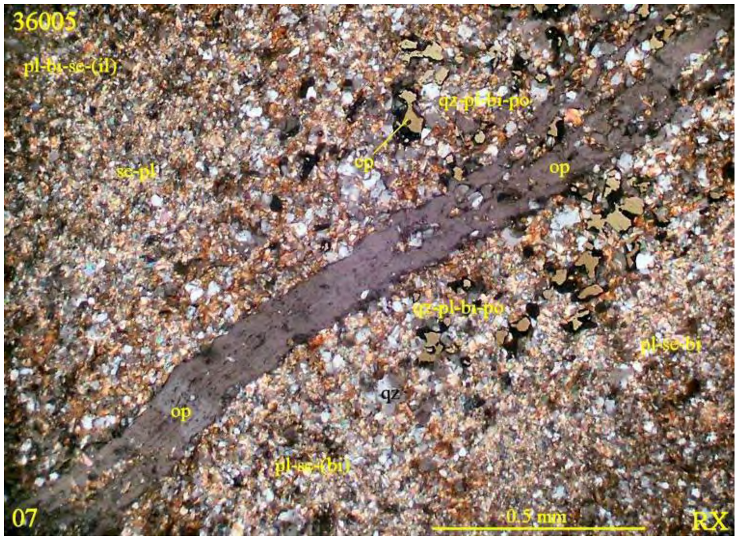

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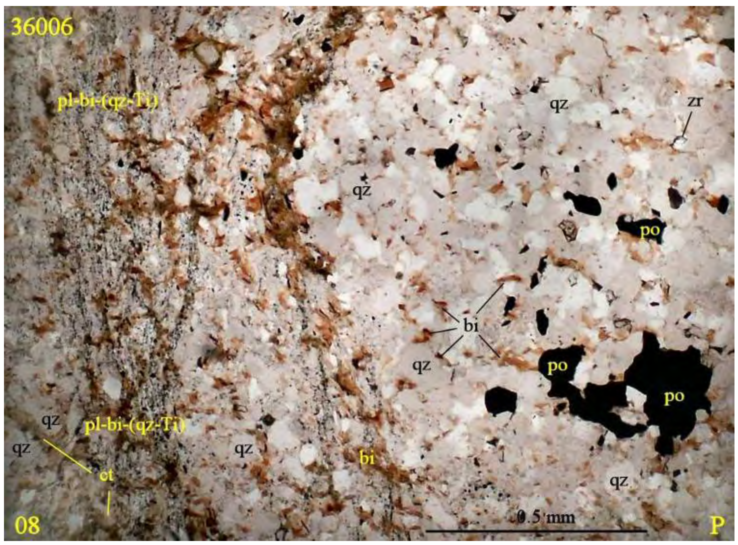

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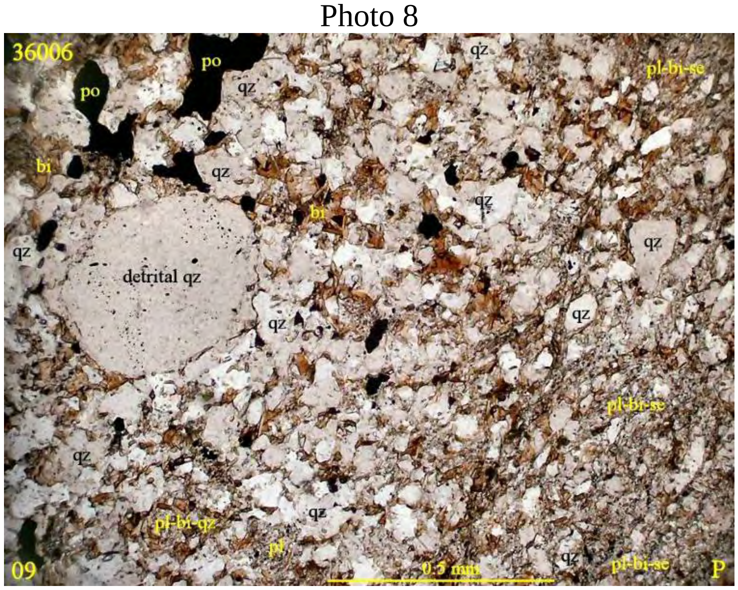

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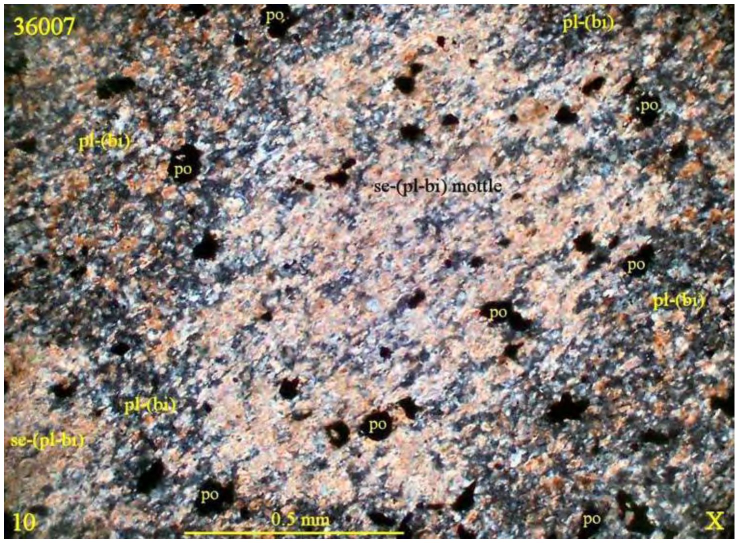

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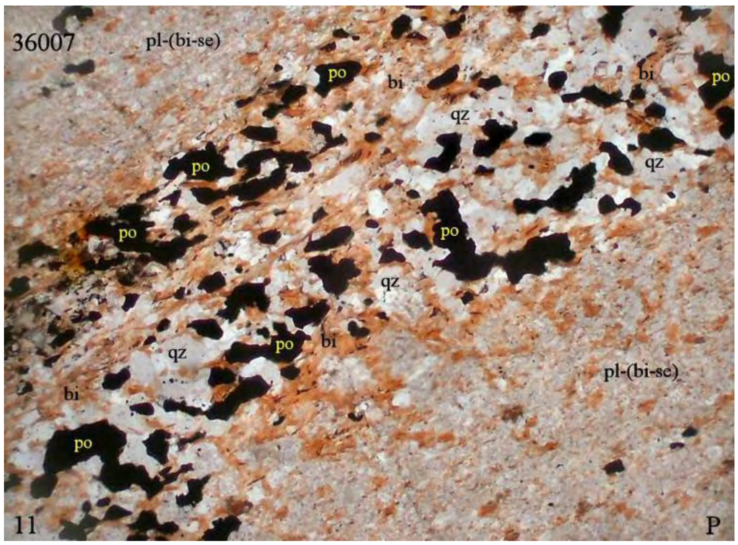

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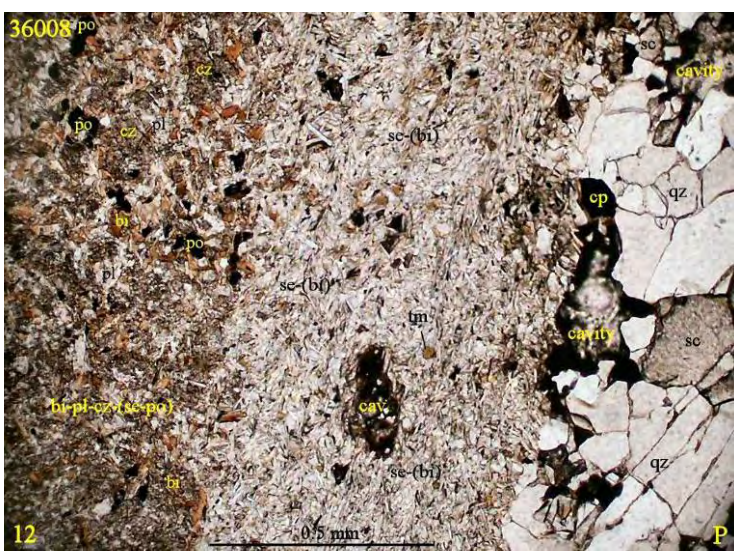

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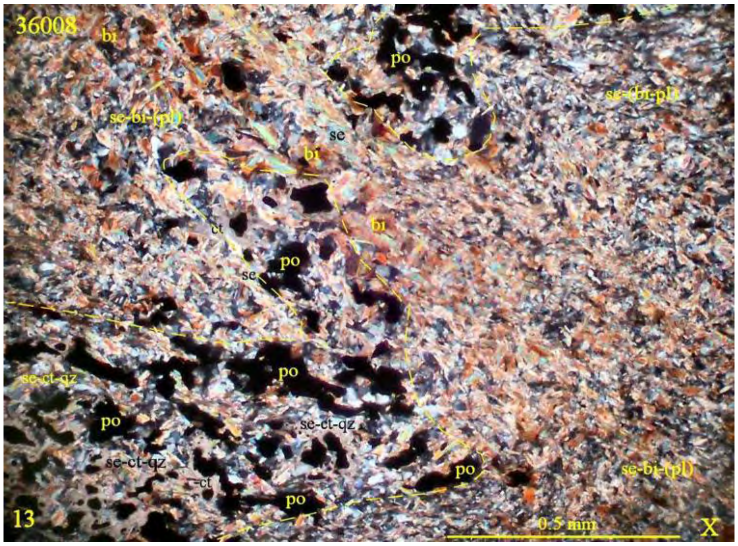

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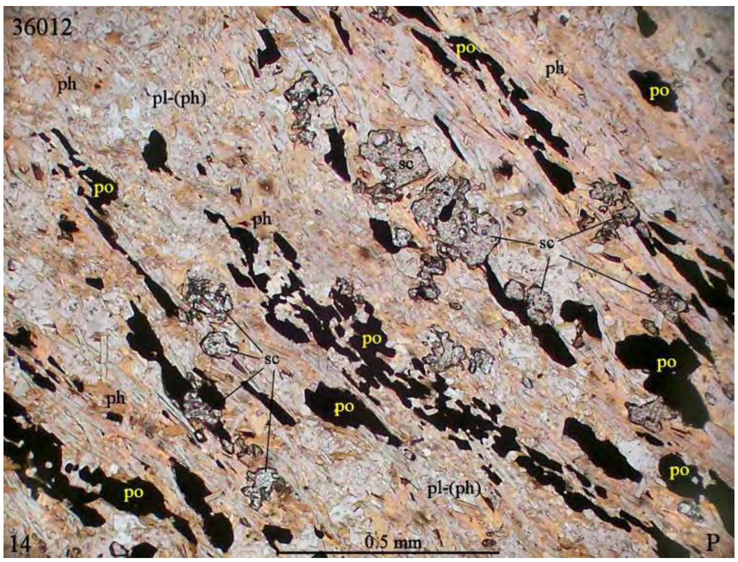

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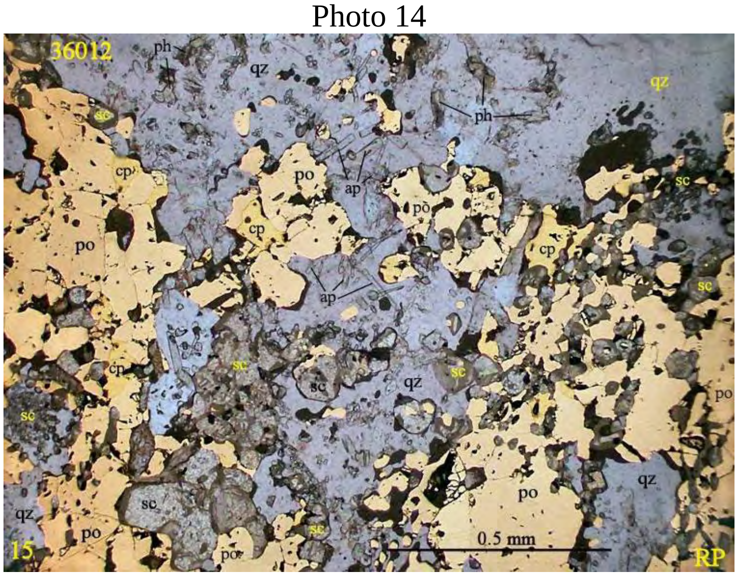

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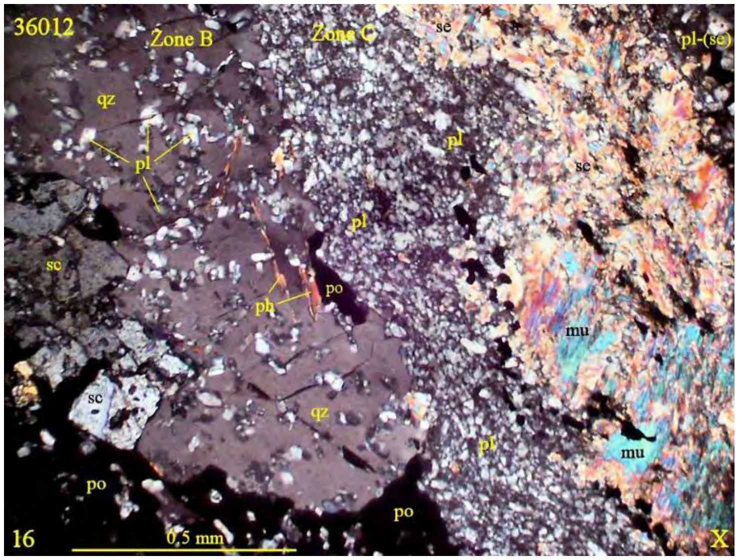

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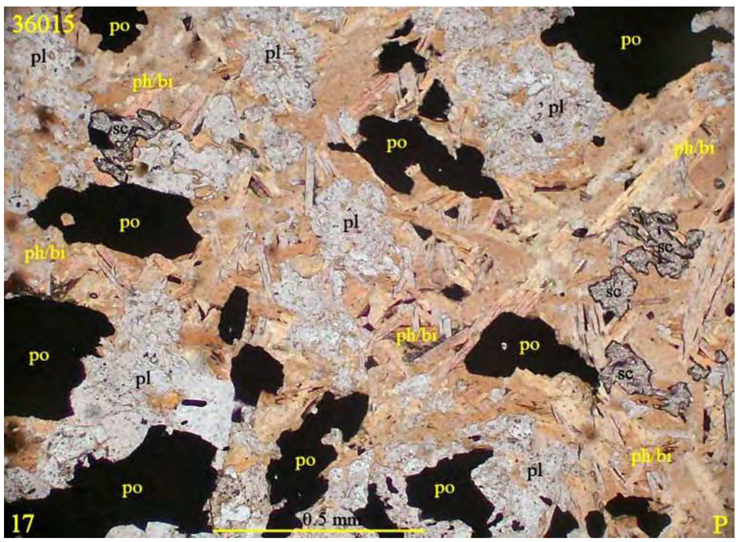

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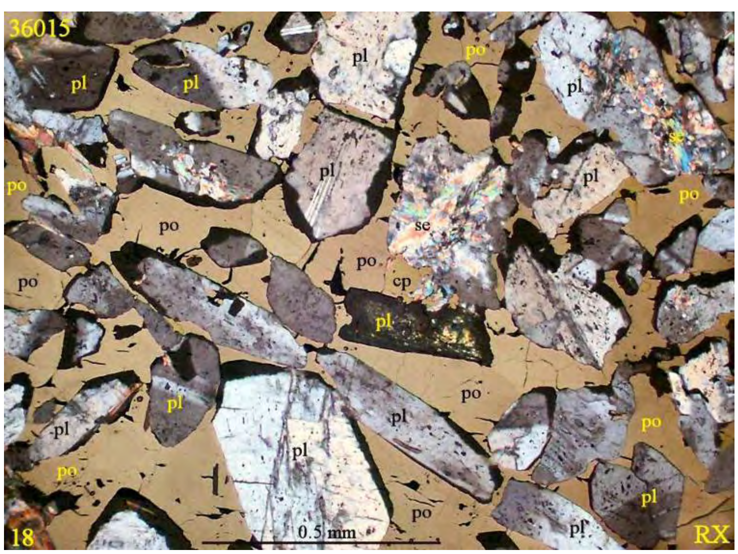

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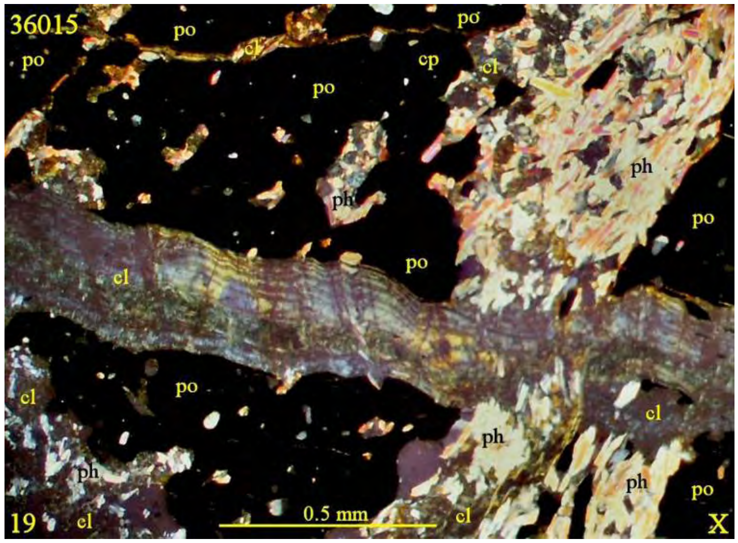

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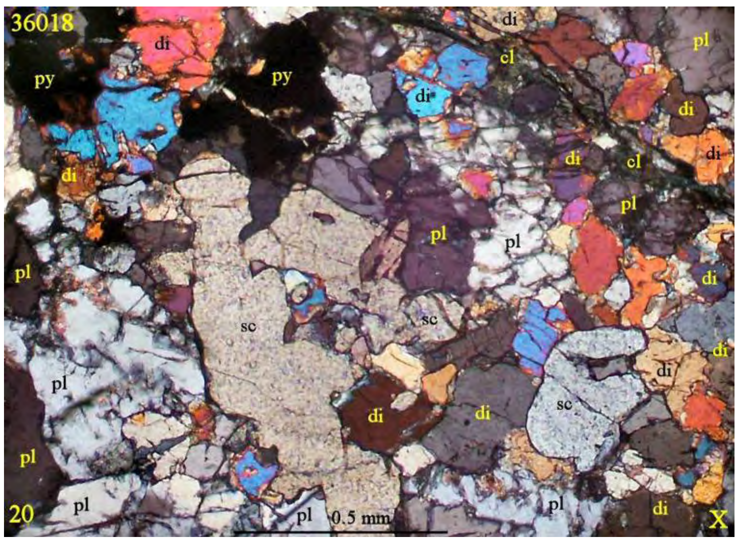

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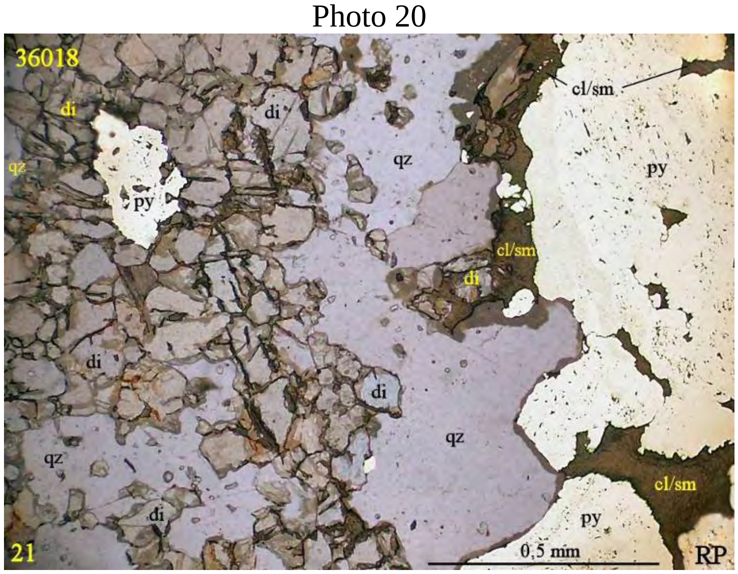

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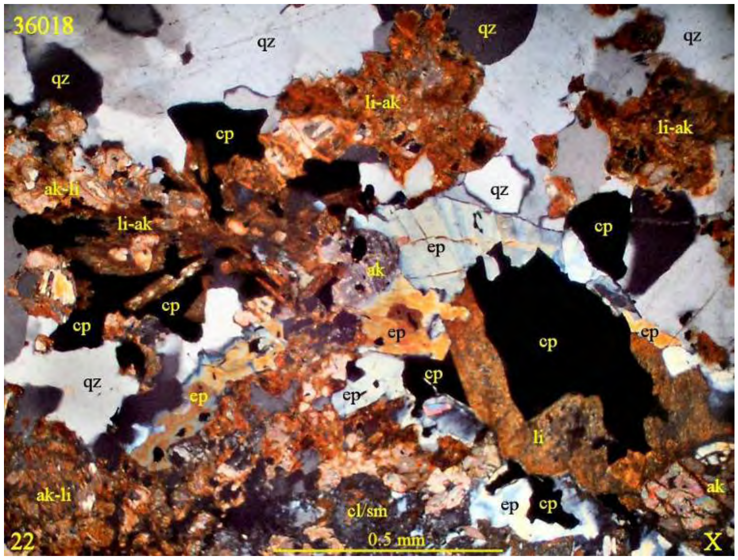

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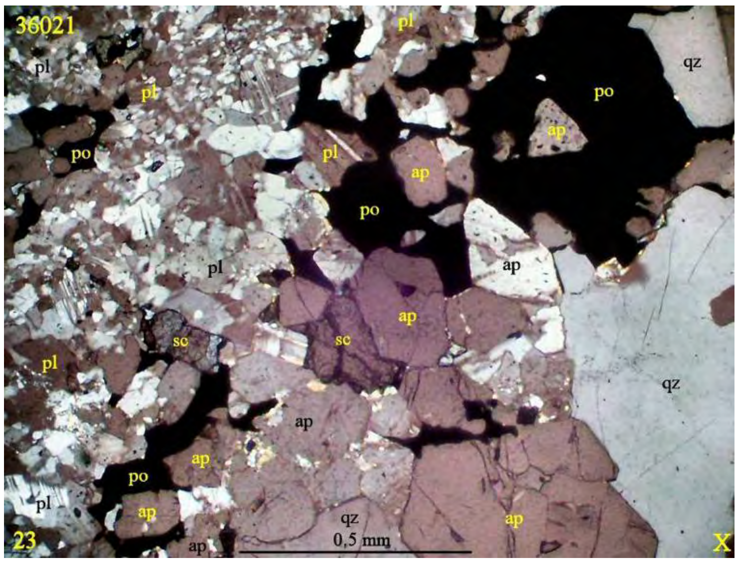

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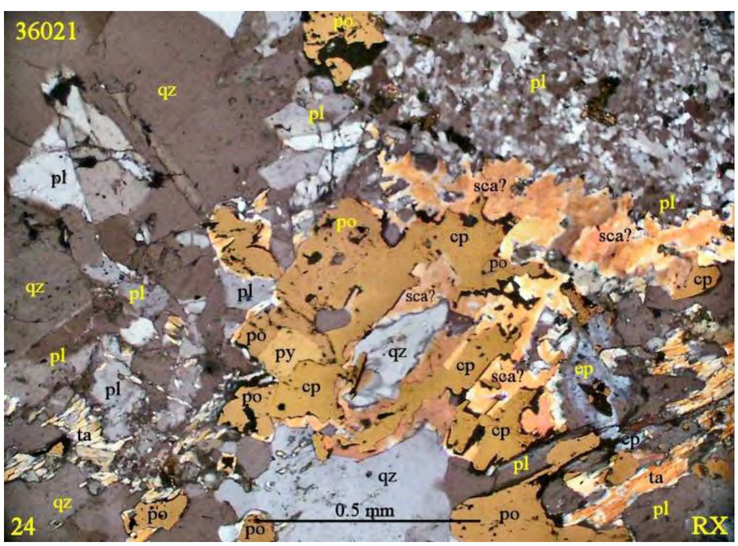

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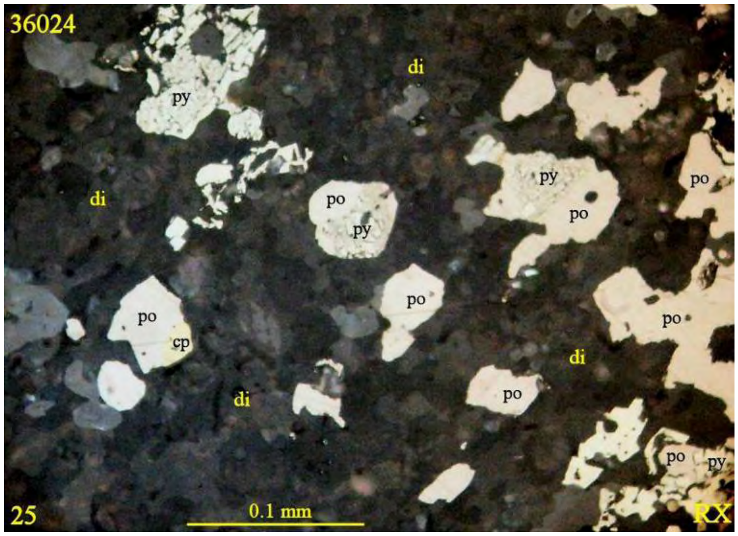

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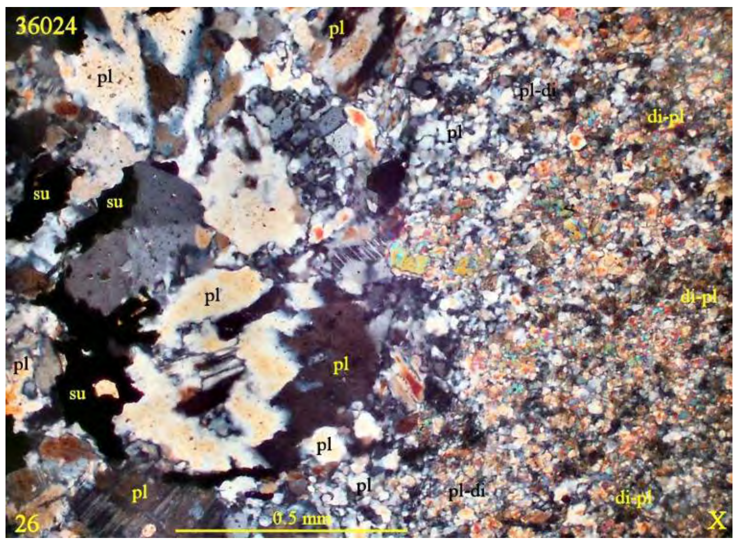

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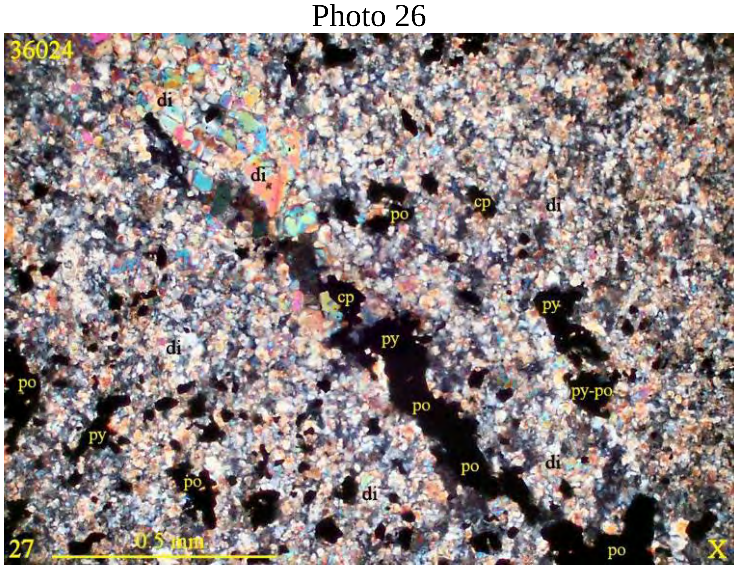

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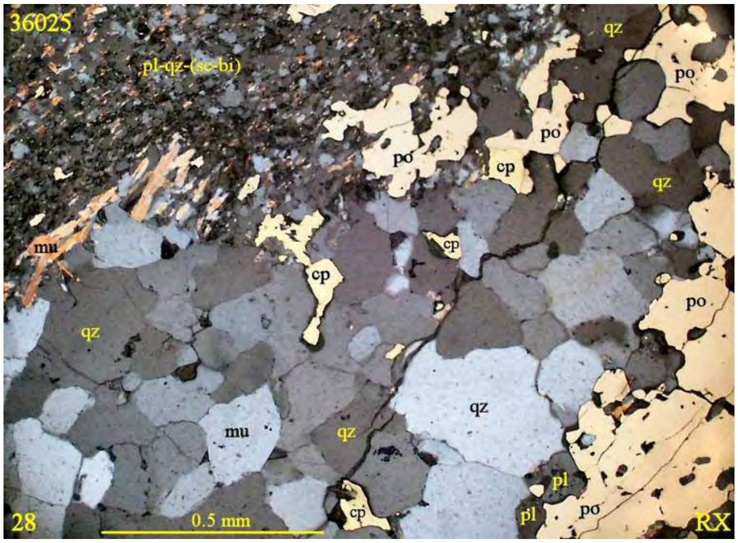

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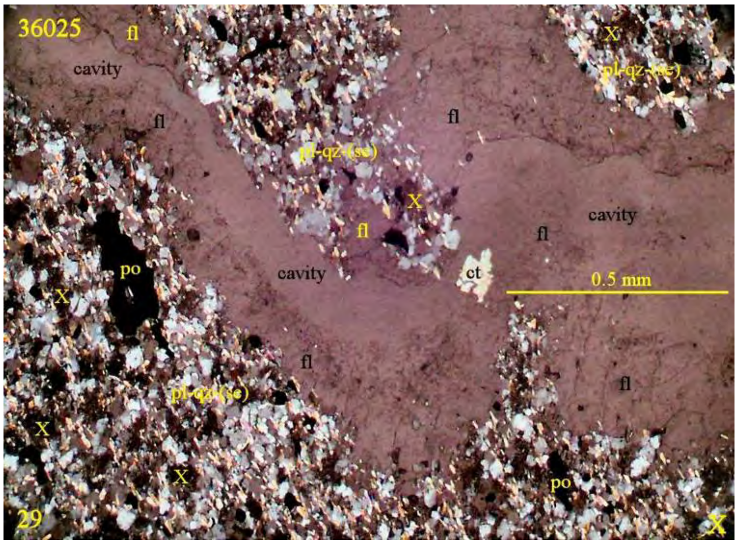

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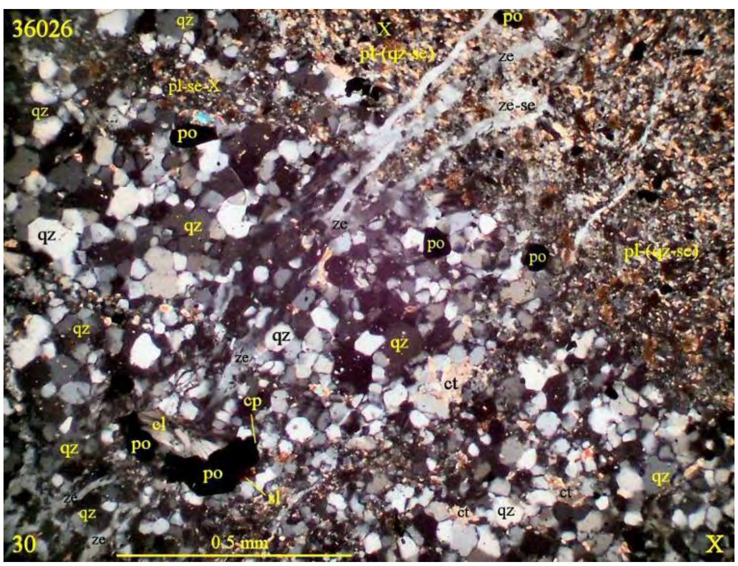

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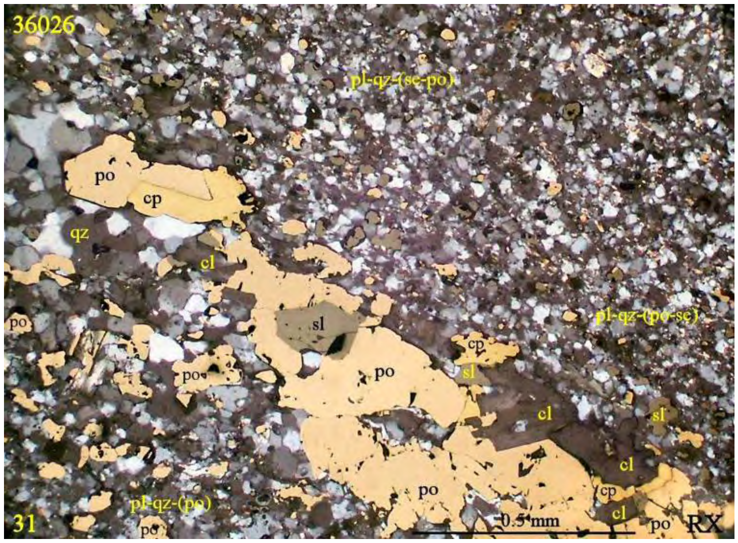

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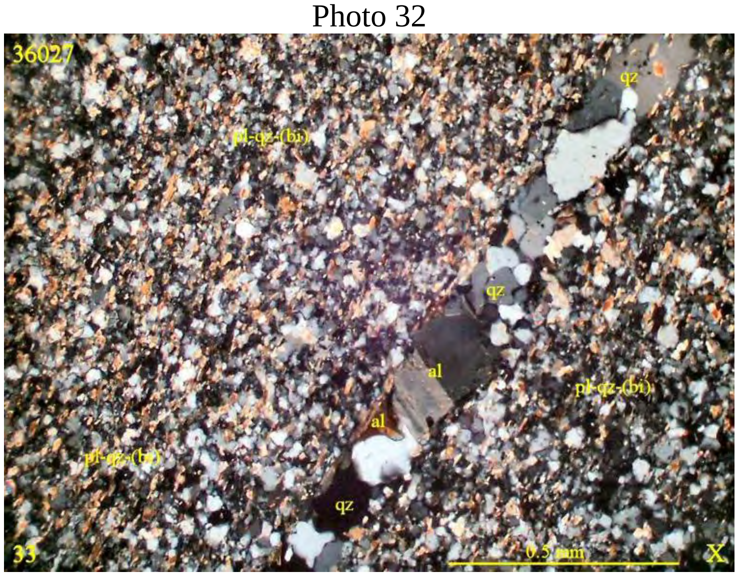

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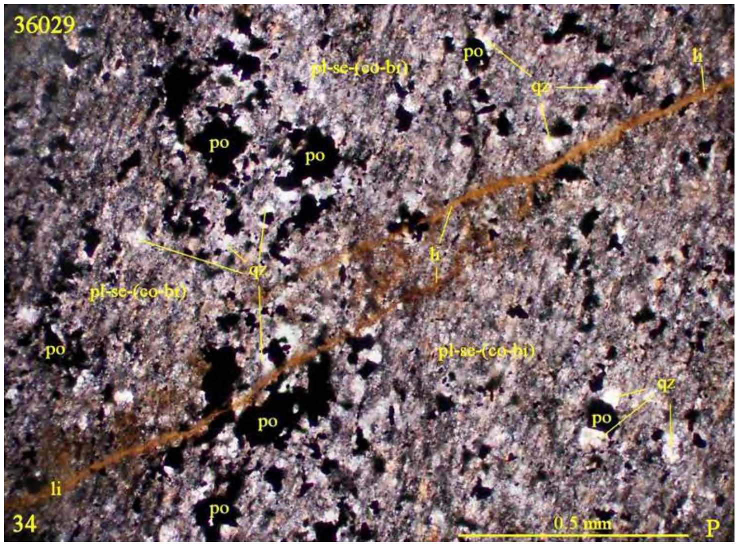

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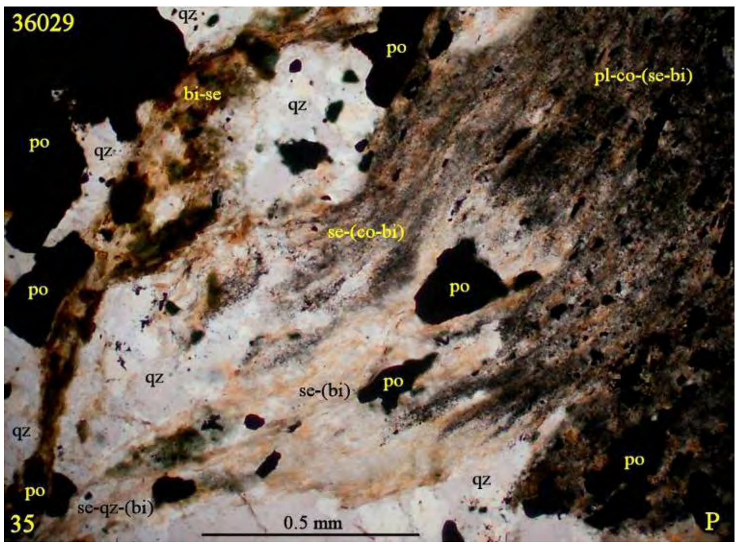

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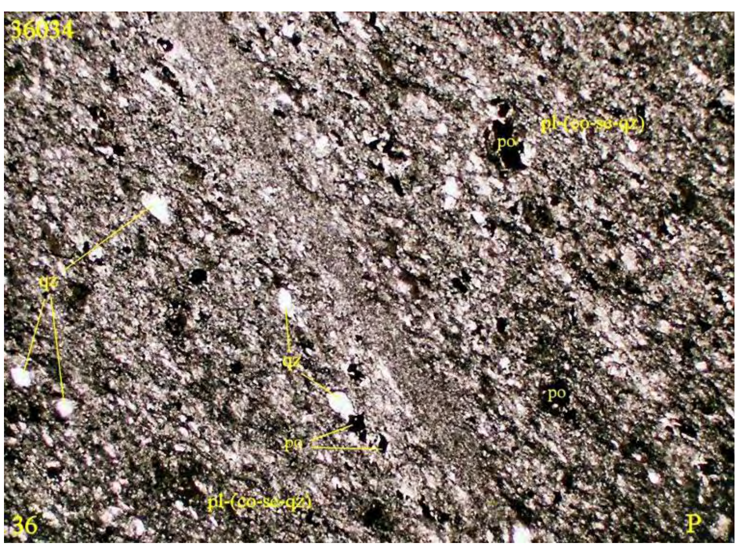

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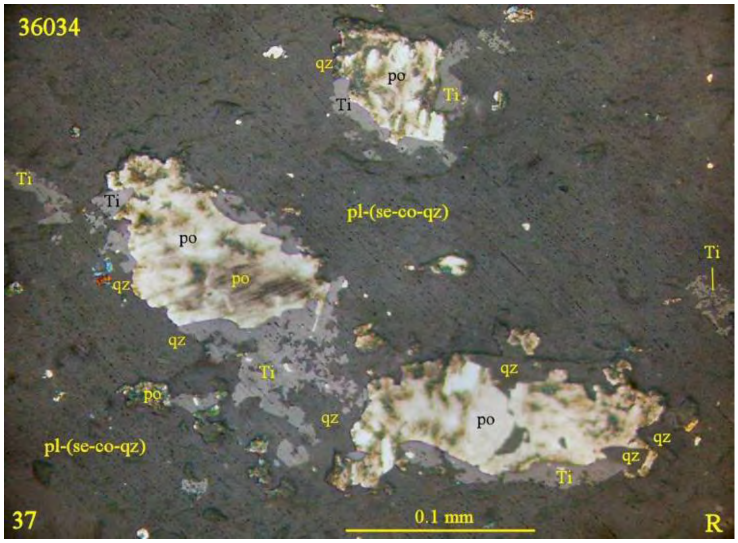

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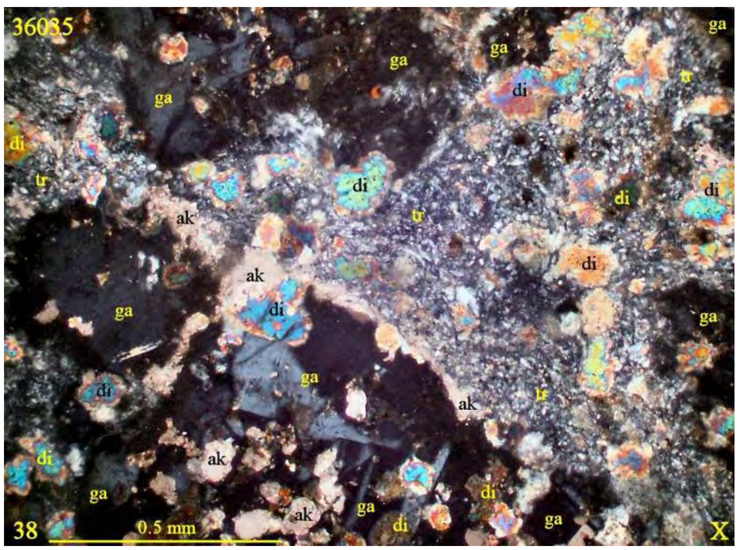

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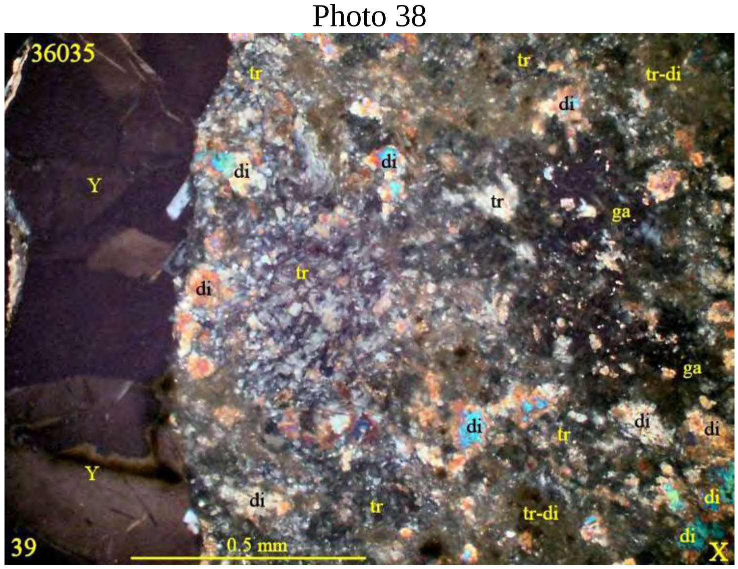

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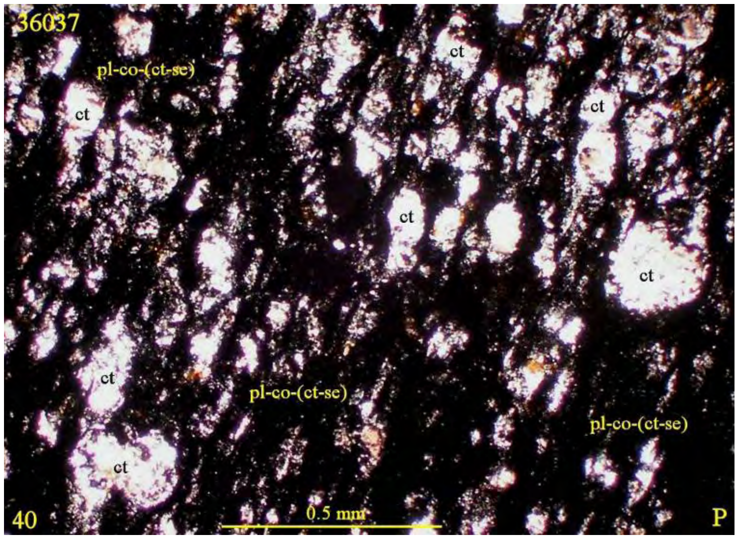

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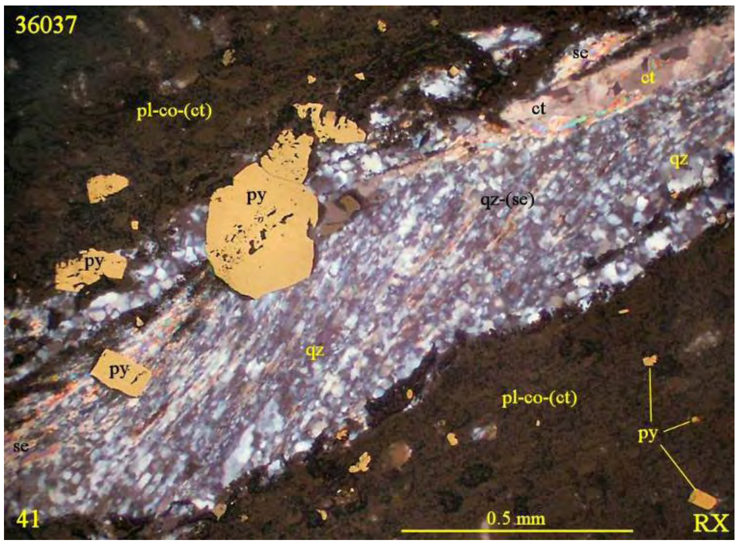

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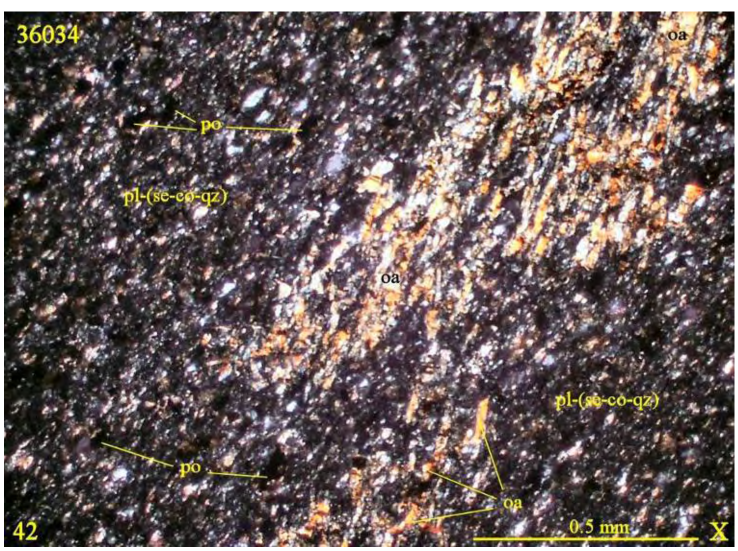

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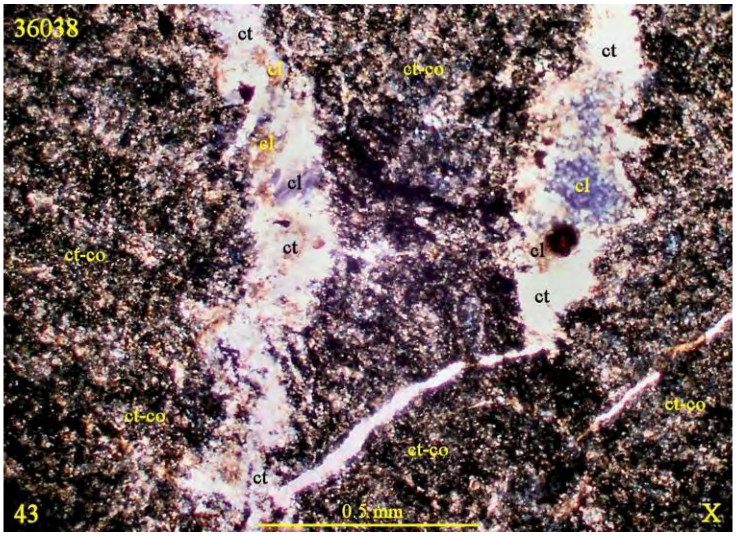

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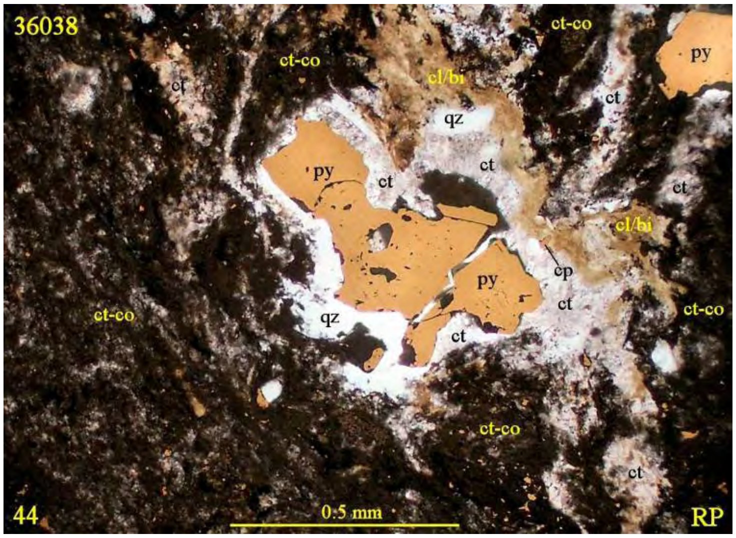

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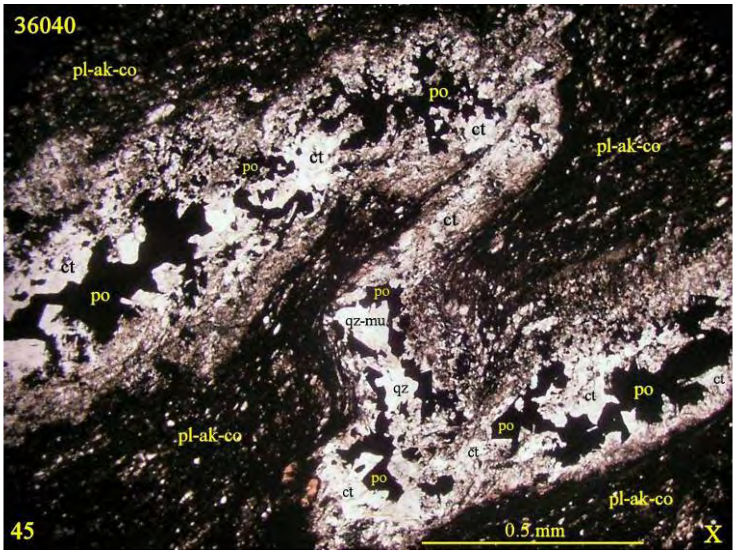

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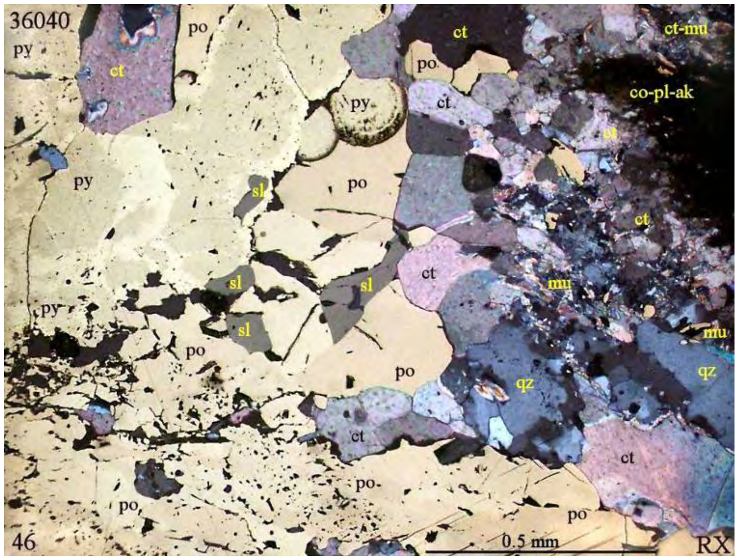
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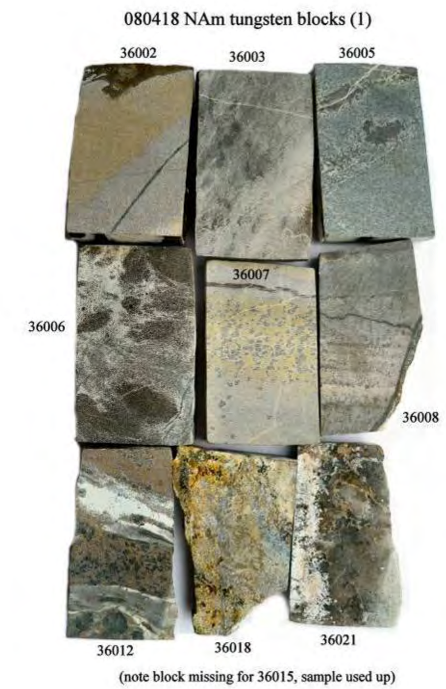

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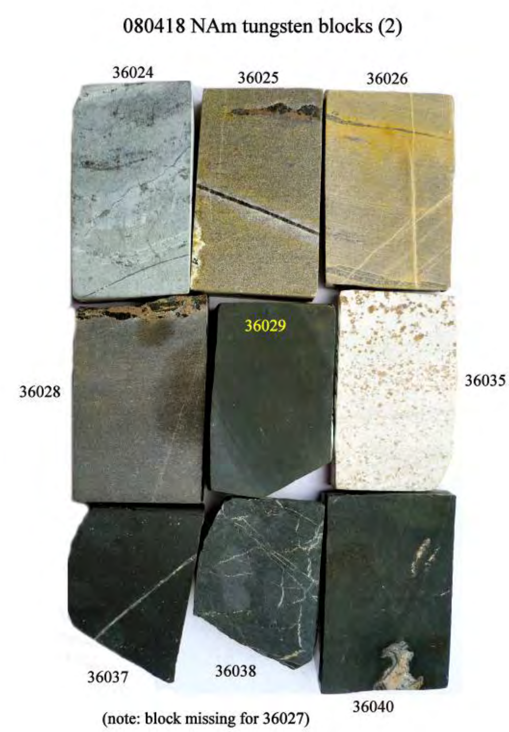

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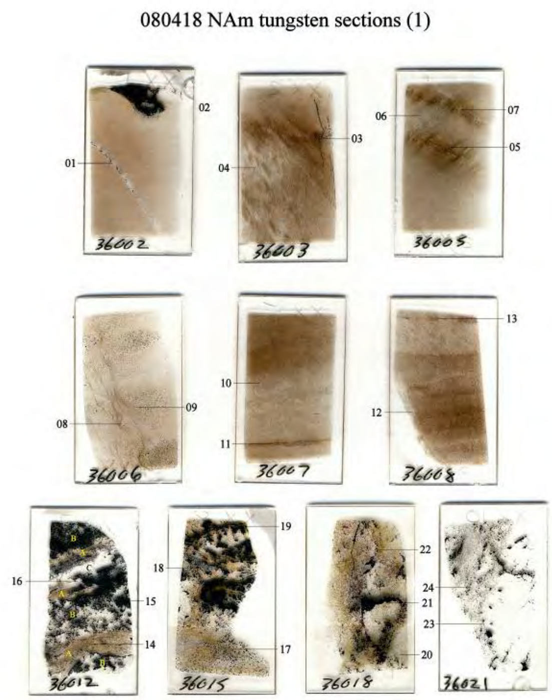

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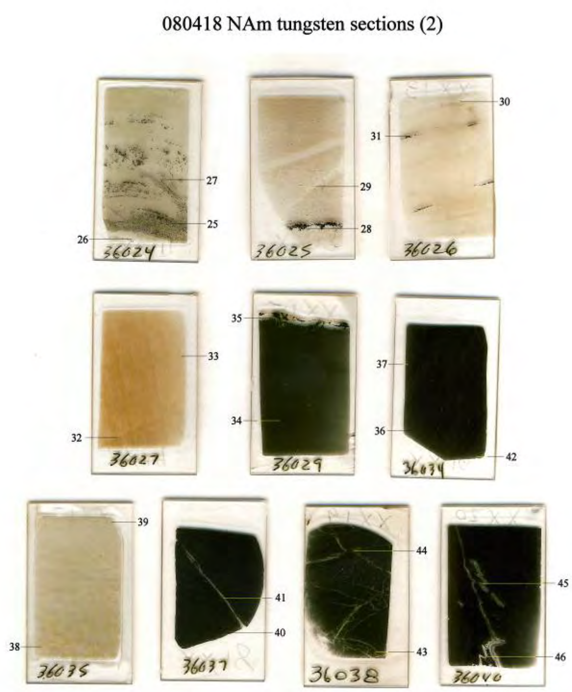

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