

## Appendix 6

### ABA TEST PROGRAM

#### 1.0 OVERBURDEN AND WASTE ROCK

##### 1.1 Objectives

To determine the NP/AP ratio or neutralizing potential (NP) divided by acid generating potential (AP), for overburden and waste rock and to confirm that the  $NP/AP > 3$ . An NP/AP of 3 or greater is generally considered to indicate non-acid generating material.

##### 1.2 General

Classify all overburdens, waste rock and low grade, partially oxidized material mined in the open pit and elsewhere on site and disposed of on surface generally as per the convention adopted for core logging, see Table 2.1. This classification is to be done by the geologist on shift.

Note all rock types or lithological units not previously identified. Note changes in mineralogy, particularly pyrite and other sulphate mineral occurrences. Note visible calcite. It is essential that this information be recorded as the ultimate pit is approached to assist in identifying any ARD potential.

##### 1.3 Frequency of Sampling

Collect a composite sample of drill cuttings from each blast.  
Collect a representative sample of overburden whenever this material is being mined.

##### 1.4 Sample Preparation

Use a riffle to reduce the sample size to 1-2 kg. Label each sample clearly and ship to an accredited laboratory in standard sample bags.

##### 1.5 Test Work and Evaluation

The laboratory shall conduct the ABA analysis using the B.C. Research Method, viz. NP to be determined by titration to pH 3.5 endpoint with sulphuric acid at room temperature and AP to be determined using the sulphide sulphur content of the sample which is obtained by subtracting the sulphate sulphur content in % by weight from the total sulphur content in % by weight. Paste pH and the inorganic carbonate content shall also be determined. Do Fizz tests and include in the final report.

Add the results reported by the laboratory to the existing mine database and do a comparison between the new and existing data. Also plot the results on a log NP/AP versus log percent sulphide sulphur graph to provide a visual comparison with the existing data. Review the variability of the results.

In order to confirm that the predominant neutralizing mineral is calcite, the laboratory shall filter the residual liquid phase from every tenth sample used to determine NP at 0.45 Om and submit the filtrate for multi-elemental ICP scan. The scan to include calcium, magnesium, aluminum and iron. Compare calcium values as determined above and inorganic carbonate values for the same sample to the values reported in the following study:

“An Assessment Of The Results Of Acid Base Accounting (ABA) And Mineralogical Test Work On Eight Samples Form The Proposed Minto Project, Yukon Territory” , prepared by Chris Mills, M.Sc., P.Eng., Consulting Environmental & Mineral Process Engineer for the Selkirk First Nation, Pelly Crossing, Yukon Territory, Vancouver, B.C., February 1997.

### **1.6 Reporting Requirements**

Report the results of the test work and analysis to the Board every six months. Report any divergence from the expected results within 30 days.

### **1.7 Additional Requirements And Follow -up**

Do ABA test work on all materials proposed for use in construction of the tailings/water dam. Materials used for construction must have an NP/AP >3, a paste pH>5 and a sulphide sulphur content < 0.3%.

Do a review once the mine is in production to confirm or modify the frequency of sampling required based upon the consistency of results obtained from the ongoing ABA test work.

Do a detailed evaluation of any rock types or lithological units not previously identified as per sub section 1.2 General. Submit samples for ABA, whole rock and mineralogical analyses as generally described in the study done for the Selkirk First Nation referred to above.

Highlight the complete range of rock types and lithological units that will be exposed in the walls of the ultimate open pit. Check that ABA test results are available for all rock types and lithological units. If ARD potential is indicated by the ongoing test work, do a study to identify various options for mine closure and closing reclamation that will minimize acid generation.

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## **2.0 Tailings Solids**

### **2.1 Objectives**

To determine the NP/AP of tailings solids and to confirm that the NP/AP > 4. An NP/AP of 3 or greater is generally considered to indicate non-acid generating tailings.

### **2.2 General**

Monitor the type of ore being milled to project the tailings ABA characteristics from the existing mine database.

### **2.3 Frequency of Sampling**

Split a 200-500 g sample from the daily 24-dried, metallurgical composite sample and retain in a plastic sample bag.

### **2.4 Sample Preparation**

Prepare a composite sample from the daily samples once per month and split to produce a 1-2 kg sample. Seal sample in an airtight container, label clearly and ship to an accredited laboratory.

### **2.5 Test Work and Evaluation**

The accredited laboratory shall conduct the ABA analysis using the B.C. Research Method as set out in sub-section 1.5 "Test Work and Evaluation."

Add the results reported by the laboratory to the existing mine database and do a comparison between the new and existing data. Also plot the results on a log NP/AP versus log percent sulphide sulphur graph to provide a visual comparison with the existing data. Review the variability of the results.

### **2.6 Reporting Requirements**

Report the results of the test work and analysis to the Board every six months. Report any divergence from the expected results within 30 days.

### **2.7 Additional Requirements And Follow -up**

If ARD potential is indicated by the ongoing ABA test work, expand the ABA test program and do a study to identify various options for mine closure and closing reclamation that will minimize acid generation.

Table 2.1 Logging Convention

The following are comments on the rock types logged in drill core.

#	Description	Abbreviation
01	<u>Foliated Hornblende Diorite</u> Granitic textured with local biotite folia; 0.5 to 1.0 cm patches of mafic minerals. Locally small quartz rich sections contain Cu sulfides. A few Kspar megacrysts present.	fHD
02	<u>Siliceous Ore</u> Quartz, magnetite and sulphides look similar to quartzite. Grades to quartz and Kspar rich quartzofeldspathic gneiss.	Sil
03	<u>K-Spar rich Quartzofeldspathic Gneiss</u> Composition: 25% to 30% equigranular Kspar, 25% to 30% equigranular quartz, 5% to 10% biotite, minor plagioclase. Kspar and quartz are aplictic textured. Some small red garnets noted. Short intersections of banded quartz-magnetite gneiss.	Qgn
04	<u>Quartz rich Quartaofeldspathic Gneiss</u> Well developed layering comprised mostly of quartz with some plagioclase, biotite and Kspar.	QQGn
05	<u>Foliated Granodiorite</u> Foliated granodiorite to quartz diorite often with orthoclase porphyroclasts. Moderately to strongly foliated biotite granodiorite composition: 40% to 45 % plagioclase, 15% to 20% quartz, 15% to 20% biotite in preferred orientations. Rounded Kspar porphyroclasts up to 2cm in size.	fG
06	<u>Biotite Quartz Feldspar Gneiss</u> More strongly foliated equivalent of foliated biotite granodiorite. Segregation of quartzofeldspathic and mafic components are common. Found close to the contracts of the main ore zone.	BQFGn
07	<u>Biotite-rich Gneiss</u> Composition: 35% to 50 % biotite, 40% to 60% plagioclase, minor quartz and Kspar. Grades to biotite rock.	Bgn
08	<u>Course grained blotchy Granodiorite</u> Grades to quartz diorite.	cG
09	<u>Equigranular Grandiorite</u> Grades to quartz diorite	eG
10	<u>Porphyroblastic Granodiorite</u> Granodiorite to quartz diorite with orthoclase porphyblasts. Composition: 50% plagioclase, 20% to 25% quartz, 10% to 15% Kspar, 10% to 15% biotite + hornblend. Contains twelve to fifteen megacrysts per foot.	pG